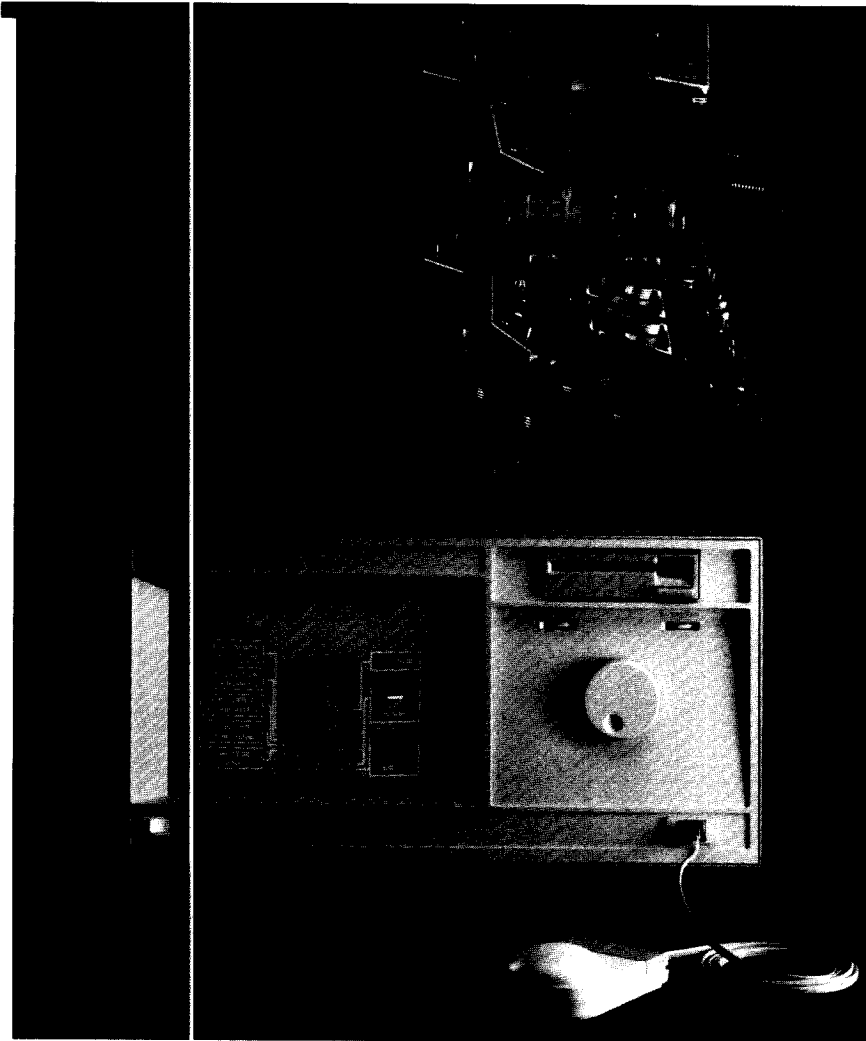


HP 16500A

LOGIC ANALYSIS SYSTEM

Reference Manual



 **HEWLETT
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X-RAY RADIATION NOTICE

ACHTUNG

Model 16500A

WARNING

Während des Betriebs erzeugt dieses Gerät Röntgenstrahlung. Das Gerät ist so abgeschirmt, daß die Dosisleistung weniger als 36 $\mu\text{A/kg}$ (0,5 mR/h) in 5cm Abstand von der Oberfläche der Kathodenstrahlröhre beträgt. Somit sind die Sicherheitsbestimmungen verschiedener Länder, u.A. der deutschen Röntgenverordnung eingehalten.

Die Stärke der Röntgenstrahlung hängt im Wesentlichen von der Bauart der Kathodenstrahlröhre ab sowie von den Spannungen, welche an dieser anliegen. Um einen sicheren Betrieb zu gewährleisten, dürfen die Einstellungen des Niederspannungs- und Hochspannungsnetzteils nur nach der Anleitung in Kapitel Einstellvorschriften des Service Handbuches vorgenommen werden.

Die Kathodenstrahlröhre darf nur durch die gleiche Type ersetzt werden. (Siehe Kapitel Ersatzteile für HP Teilenummern.)

Das Gerät ist in Deutschland zugelassen unter

der Nummer: BW/218/86/ROE

When operating, this instrument emits x-rays; however, it is well shielded and meets safety and health requirements of various countries, such as the X-ray Radiation Act of Germany.

Radiation emitted by this instrument is less than 0.5 mR/hr at a distance of five (5) centimeters from the surface of the cathode-ray tube. The x-ray radiation primarily depends on the characteristics of the cathode-ray tube and its associated low-voltage and high-voltage circuitry. To ensure safe operation of the instrument, adjust both the low-voltage and high-voltage power supplies as outlined in the Adjustments Section of the Service Manual.

Replace the cathode-ray tube with an identical CRT only. Refer to the Replacement Parts Section for proper HP part number.

Number of German License: BW/218/86/ROE

X-RAY

Printing History

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This product has been designed and tested according to International Safety Requirements. To ensure safe operation and to keep the product safe, the information, cautions, and warnings in this operating manual must be heeded.

Table of Contents

Introduction

Chapter 1: What Is the HP 16500A Logic Analysis System?

- 1-1 Introduction
 - 1-1 Key Features
 - 1-2 User Interfaces
 - 1-3 Default Configurations
 - 1-3 Storing Default Configurations
-

Chapter 2: Learning to Use the HP 16500A

- 2-1 Introduction
 - 2-1 The Display
 - 2-2 User Interfaces
 - 2-3 The Touchscreen
 - 2-3 Types of Fields
 - 2-3 Pop-Up Menus
 - 2-5 Multiple-Choice Listings
 - 2-5 Toggle Fields
 - 2-5 Immediate-Action Fields
 - 2-6 Knob/Numeric Fields
 - 2-7 Alphanumeric Keypads
 - 2-7 Entering Information with the Keypad
 - 2-8 The Optional Mouse
 - 2-8 Connecting the Mouse
 - 2-9 Disconnecting the Mouse
 - 2-9 The Knob
 - 2-9 The Cursor
 - 2-10 Exercises
-

Table of Contents (Continued)

Chapter 3: The System Configuration Menu

- 3-1 Introduction
 - 3-1 Getting into the System Configuration Menu
 - 3-2 Layout of the System Configuration Menu
 - 3-3 Slot Designators
 - 3-4 Menu Map
-

Chapter 4: HP-IB and RS-232C

- 4-1 The Controller Interface
 - 4-1 The Printer Interface
 - 4-1 Configuring the Interface for a Controller or a Printer
 - 4-3 What Is the HP-IB Interface?
 - 4-3 Selecting an Address
 - 4-4 What Is the RS-232C Interface?
 - 4-4 Baud Rate
 - 4-5 Stop Bits
 - 4-5 Parity
 - 4-5 Data Bits
 - 4-6 Protocol
-

Chapter 5: Connecting a Printer

- 5-1 Introduction
 - 5-1 HP-IB Printers
 - 5-2 HP-IB Printer Setup
 - 5-3 HP-IB Configuration
 - 5-4 RS-232C Printers
 - 5-4 RS-232C Printer Setup
 - 5-7 RS-232C Configuration
 - 5-8 Configuration Example
 - 5-9 Connecting to other Hewlett-Packard Printers
 - 5-11 Printing the Display
-

Table of Contents (Continued)

Chapter 6:

The System Front and Rear Disc Menus

- 6-1 Introduction
 - 6-1 Getting into the System Front Disc Menu
 - 6-2 The Disc Operations
 - 6-4 Menu Map
 - 6-5 Selecting a Disc Operation
 - 6-7 Disc Operation Parameters
 - 6-8 Source and Destination Discs
 - 6-9 Installing a Disc
 - 6-10 Formatting a Disc
 - 6-12 Storing on a Disc
 - 6-17 The Load Operation
 - 6-20 Renaming a File
 - 6-22 The Autoload Operation
 - 6-25 Purging a File
 - 6-26 Copying a File
 - 6-29 The Pack Disc Operation
 - 6-30 Duplicating a Disc
-

Chapter 7:

The System Utilities Menu

- 7-1 Introduction
 - 7-1 Getting into the System Utilities Menu
 - 7-2 Layout of the System Utilities Menu
 - 7-3 Menu Map
-

Chapter 8:

The Touch and Sound Fields of the System Utilities Menu

- 8-1 Introduction
 - 8-1 Getting into the System Utilities Menu
 - 8-2 Touch Calibration
 - 8-4 Touch On
 - 8-5 Sound On
-

Table of Contents (Continued)

Chapter 9:

Display Color Selection (System Utilities Menu)

- 9-1 Introduction
 - 9-1 Getting into the System Utilities Menu
 - 9-2 The Color Model
 - 9-4 Selecting the Color, Hue, Saturation, and Luminosity Fields
 - 9-6 The Color Field
 - 9-9 Returning to the Default Colors
-

Chapter 10:

Intermodule Measurements

- 10-1 Introduction
 - 10-1 Getting into the Intermodule Menu
 - 10-1 The Intermodule Menu
 - 10-4 Menu Map
 - 10-5 What Happens When You Touch Group Run?
 - 10-6 Why Use Intermodule Measurements?
 - 10-6 What Are Some Typical Intermodule Measurements?
 - 10-7 Example 1: Analyzing a Glitch
 - 10-8 Example 2: Analyzing Interrupt Handling in a CPU System
 - 10-10 Example 3: A Simple Stimulus/Response System
 - 10-11 How Are Intermodule Measurements Set Up?
 - 10-12 The Group Run Configuration Field
 - 10-13 The Group Run/Stop Field
 - 10-15 The Modules
 - 10-16 Port Out
 - 10-17 Status Indicators and Time Correlation Bars
 - 10-18 The Skew Menu
 - 10-19 Displaying Multiple Module Data on One Screen
 - 10-22 Helpful Hints
 - 10-23 Exercise
-

Table of Contents (Continued)

Appendix A:

General Characteristics

- A-1 Interface
 - A-2 Hardware Connectivity
 - A-2 Built-In Disc Drives
 - A-2 Programmability
 - A-3 Hardcopy Capability
 - A-3 Input/Output Rear-Panel BNCs
 - A-3 Interactive Measurements
 - A-4 Operating Environment
 - A-5 Ventilation Requirements
 - A-5 Power Requirements
 - A-5 Weight
 - A-6 Dimensions
-

Appendix B:

Repackaging for Shipment

- B-1 The Storage and Shipment Environment
 - B-1 Tagging the Instrument for Service
 - B-1 Repacking the Instrument
-

Appendix C:

Maintaining the HP 16500A

- C-1 Cleaning Requirements
 - C-1 Degaussing
 - C-2 Service and Calibration
 - C-2 The System Test Menu
-

Table of Contents (Continued)

Appendix D:

Self-Test Documentation

- D-1 Introduction
 - D-2 Fail Codes
 - D-2 Critical Errors
 - D-3 Non-Critical Errors
-

Appendix E:

Disc Error Messages

- E-1 Disc Error Messages
 - E-3 Disc Warning Messages
-

Appendix F:

Installing and Removing Boards

- F-1 Introduction
 - F-1 Where Do Cards Mount?
 - F-2 Installing the Cards in the HP 16500A
 - F-4 Removing Cards from the HP 16500A
-

Appendix G:

Creating a Systemized Disc

- G-1 Introduction
 - G-1 What Files are Required on the Systemized Operating Disc?
 - G-2 Creating a New Systemized Operating Disc
 - G-4 Adding a Module to the Systemized Disc
 - G-5 Updating a Systemized Disc
 - G-7 What Is a Systemized Performance Verification Disc?
 - G-8 Creating a Systemized Performance Verification Disc
-

Table of Contents (Continued)

Appendix H:

Using Flexible Discs

- H-1 Proper Handling of Flexible Discs
 - H-2 The Window and Auto-Shutter
 - H-3 Ordering Discs
 - H-4 Labeling the Disc
 - H-4 Installing the Disc
 - H-6 Write Protecting a Disc
-

Index

Introduction

Welcome to the Hewlett-Packard Logic Analysis System! The HP 16500A Logic Analysis System has been designed to be the easiest system to use, ever. Its modular mainframe allows you to configure the HP 16500A with just the modules you want and add additional modules later.

This manual explains the operation of the System and Intermodule menus of the HP 16500A Logic Analysis System. It is organized like an encyclopedia, breaking down the functions and features into their major sections, and giving more of a conceptual example of their different applications. The manual is laid out so you can find your information quickly and easily.

The first chapter summarizes the features of the instrument.

Chapter 2 is a step-by-step tutorial on operating the user interfaces of the instrument.

Chapters 3, 4, and 5 discuss the features of the System Configuration menu, including the HP-IB and RS-232C interfaces for hardcopy capabilities and controller interface.

Chapter 6 explains the disc operations available, and Chapters 7, 8, and 9 discuss the touch calibration and color selection capabilities of the System Utilities menu.

Chapter 10 introduces you to the intermodule measurement capabilities of the HP 16500A and gives several examples of possible applications.

Appendix A gives the general characteristics of the HP 16500A, and Appendices B and C cover repacking and general maintenance.

Appendix D provides self-test information, and Appendix E lists the different error messages of the System Disc menus, briefly describing what they mean.

Appendix F explains how to install and remove cards for individual modules, and Appendix G explains how to create a systemized disc.

The last appendix gives general information on using flexible discs with the HP 16500A.

If you haven't already read the manual *Setting Up The HP 16500 Logic Analysis System*, please read it before continuing.

1

What Is the HP 16500A Logic Analysis System?

Introduction

The HP 16500A is the mainframe of the Hewlett-Packard Logic Analysis System. It offers a modular structure for plug-in cards with a wide range of state, timing, oscilloscope, and pattern generator capabilities. This allows you to configure the HP 16500A with only the necessary modules for a particular application and change or update them later.

The Logic Analysis System provides both experienced and first-time users powerful measurement capabilities. The pop-up menus and color graphics lead you through setups and measurements quickly and easily, without the need to memorize a lot of steps. By simply touching the appropriate fields, you can perform functions, configure menus, and move from one menu to another.

With the intermodule capabilities, you can make interactive measurements between modules. This allows you to configure modules to interact with each other, using the triggering capabilities of one module and the acquisition capabilities of another to make measurements.

Key Features

The key features of the HP 16500A are:

- Modular mainframe with 5 card slots
- 9-inch color monitor
- Touchscreen
- Dual 3.5-inch flexible disc drives
- Intermodule triggering and time correlation of gathered data
- HP-IB and RS-232C interfaces for:
 - Hardcopy output to a printer
 - Controller interface

User Interfaces

The HP 16500A has three user interface devices: the knob on the front panel, the touchscreen, and the optional mouse.

The knob on the front panel is used to move the cursor on certain menus, increment or decrement numeric fields, and to roll the display.

The touchscreen fields can be selected by touch or with the optional mouse. To activate a touchscreen field by touch, touch or press the field (the dark blue box) on the display with your finger until the field changes color. Then remove your finger from the screen to activate your selection.

To activate a field with the optional mouse, position the cursor (+) of the mouse over the desired field and press the button on the upper-left corner of the mouse.

The user interfaces are discussed in more detail in Chapter 2.

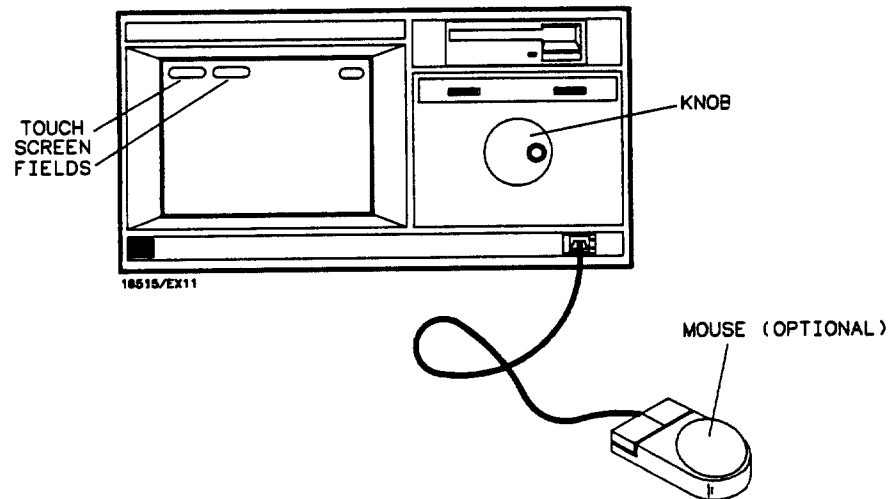


Figure 1-1. HP 16500A User Interfaces

Default Configurations

When the instrument is powered up, pre-determined values are automatically assigned to the different fields of the menus to configure the instrument for basic measurements. This allows you to make a basic measurement by just turning on the instrument, connecting the probes, and touching the Run field. Often only minor changes are needed for more complex measurements.

Storing Default Configurations

The default configurations may be stored on a disc for later use or reset by cycling the power. Storing the default configurations on a disc is a convenient way to return to the default values without cycling the power. The default values for each field are listed in the reference manuals for each module and in the following chapters for the mainframe. These can be stored for each module separately or together in one file. Refer to Chapter 6 for more information on storing configurations.

2

Learning to Use the HP 16500A

Introduction

Chapter 2 introduces you to the HP 16500A user interfaces and shows you how easy they are to use. Then it guides you through a brief exercise using the interfaces to perform some basic operations.

The Display

The menu is the actual display that you see on screen. It lists information about the system and gives you access to touchscreen fields for configuring the system. These fields give you access to additional fields, allow you to move from menu to menu, input information, and perform functions. Figure 2-1 points out some of the touchscreen fields and information listed on the **System Configuration** menu.

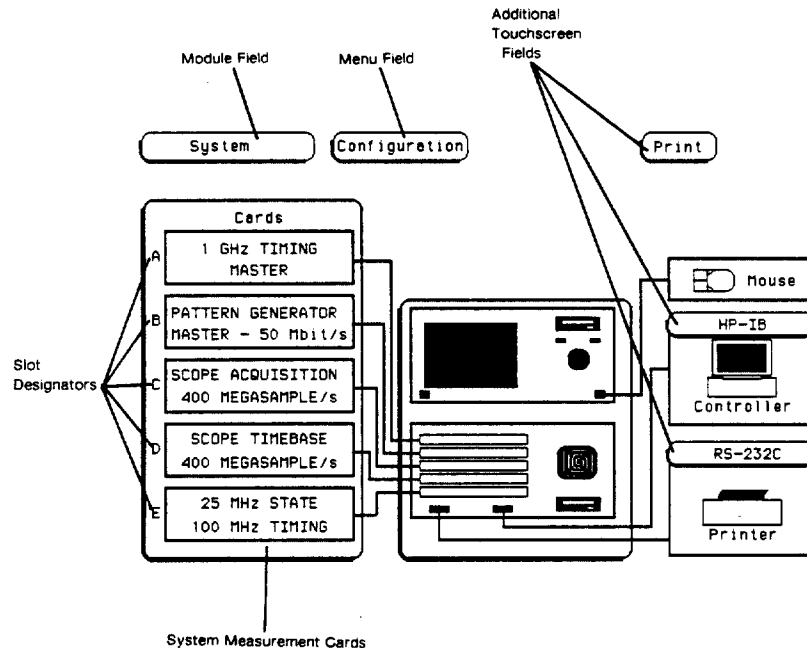


Figure 2-1. The System Configuration Menu

The **Module** field in the upper-left corner of the display represents the hardware and system software that forms a complete tool or software option within the HP 16500A. The **Menu** field to the right of the **Module** field represents one of the many screens available for configuring individual modules.

The **System Measurement Cards** listed in figure 2-1 represent the actual hardware for the individual modules within this HP 16500A. The **Slot Designators** listed to the left of cards show the physical location for each card within the HP 16500A. In figure 2-1, the HP 16531A Oscilloscope Acquisition card is shown in slot C and the HP 16530A Oscilloscope Timebase card is shown in slot D. The combination of these two cards and the appropriate software represents the 400 Megasample/Second Oscilloscope module in this HP 16500A.

User Interfaces

The HP 16500A has three user interface devices: the touchscreen, the knob on the front panel, and the optional mouse.

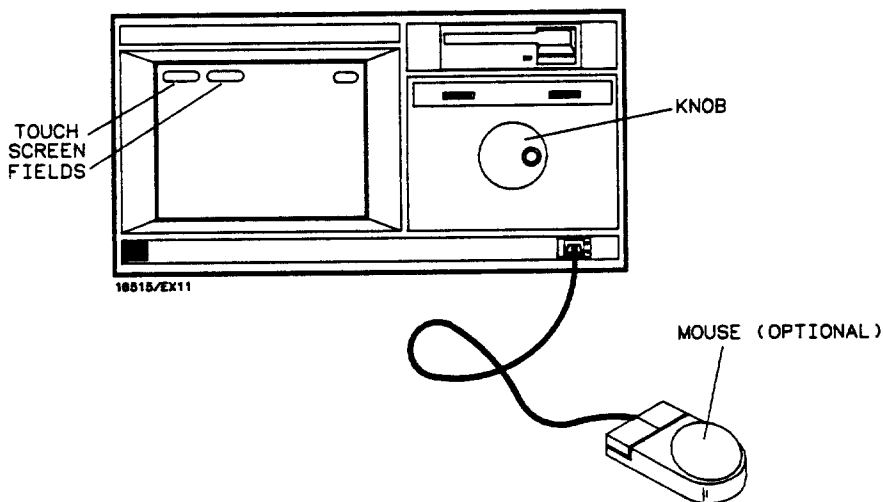


Figure 2-2. User Interfaces

The Touchscreen

The touchscreen provides the main front-panel control or access of the menus. It consists of touch-sensitive fields that you can use to enter alphanumeric data into fields, access other menus, and configure the HP 16500A for measurements. Generally, any touch-sensitive field or box that is used to access or enter information in the HP 16500A system is referred to as a field. The only exception is the alphanumeric input fields in the pop-up keypads. These are referred to as keys.

These fields can be used via either touch or mouse select. To activate a field by touch, touch or press the field (the blue box) on the display with your finger until the field changes color. Then remove your finger from the screen to activate your selection. If you have trouble selecting the field you want, place your finger on the screen and move it around and over that field until it changes color. Then pull your finger away from the screen.

Note

No selection can be activated as long as your finger is touching the screen. The only exception is keypads. Keypad selections are activated as you touch them.

Types of Fields

The touchscreen consists of a variety of different types of fields. These fields may access pop-up menus, multiple-choice listings, keypads, etc. Through these fields you execute functions, move between menus, and configure the system for specific operations.

Pop-Up Menus

Pop-up menus appear when you touch certain fields. They display the functions available for configuring or performing major operations, including configuring the RS-232C interface, calibrating the touchscreen, and more. When you are finished with the pop-up menu, simply touch **Done** to return to the original display.

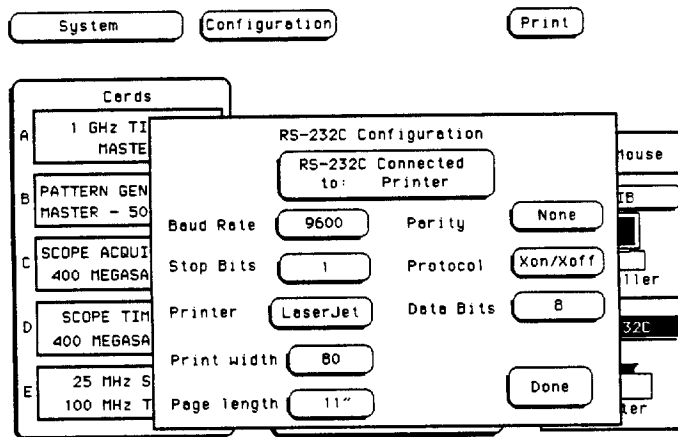


Figure 2-3. The RS-232C Pop-Up Menu

Pattern Fields. Pattern fields are fields that access pop-up menus that only display selections available for a single function. A good example of this is the **Edge** field of the **Trace** menu of the logic analyzer. The selections available apply only to the **Edge** field. As you make your selections, the selections appear in a box at the top of the pop-up menu. When you are finished configuring the pattern field, touching **Done** returns you to the original display and updates the pattern field with the new configuration.

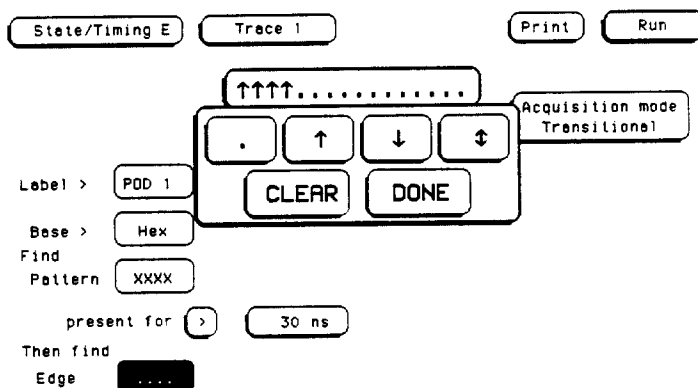


Figure 2-4. The Edge Field Pop-Up Menu

Multiple-Choice Listings

Multiple-choice listings display the selections available for particular operations, menus available for particular modules, modules available within particular mainframes, and more. By simply selecting the appropriate field you can configure operations, change menus, move between modules, etc. To return to the original selection, simply touch the field within the listing with the light-blue background.

Toggle Fields

Toggle fields have only two possible entries. They switch between functions (such as from a Controller to a Printer configuration) or simply turn a feature on and off. To return to the original selection, simply touch the field again.

Immediate-Action Fields

Immediate-action fields perform a function as soon as they are selected. For example, selecting the **Done** field immediately returns you to the original display. Selecting the **Default Colors** field immediately returns you to the default display colors. There are no additional selections or actions required.

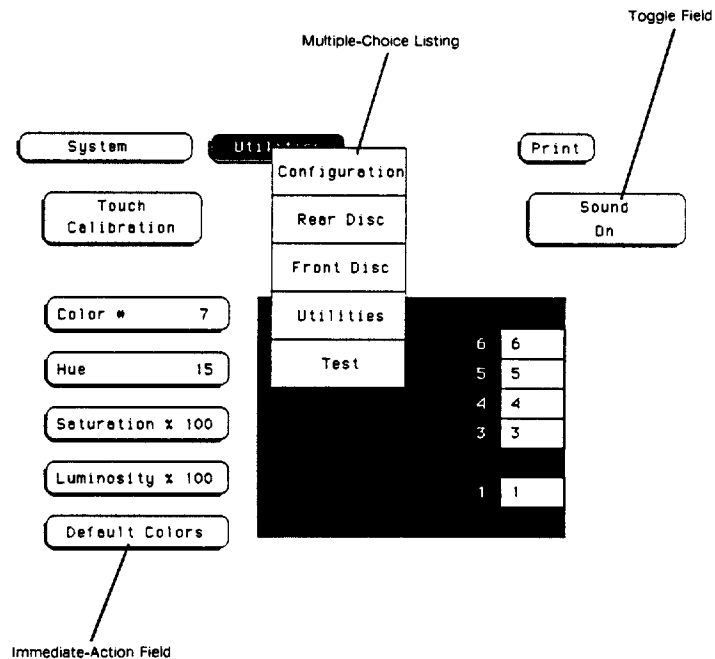


Figure 2-5. Multiple-Choice Menus and Toggle Fields

Knob/Numeric Fields

If a numeric field isn't light blue, touching the field once turns it light blue. Once a field is light blue, rotating the knob changes the value in it. If you touch a numeric field that is already light blue, a keypad appears on screen to enter a new value.

Once the value for a numeric field has been changed, you can return to the original value by entering it with the keypad or by rotating the knob.

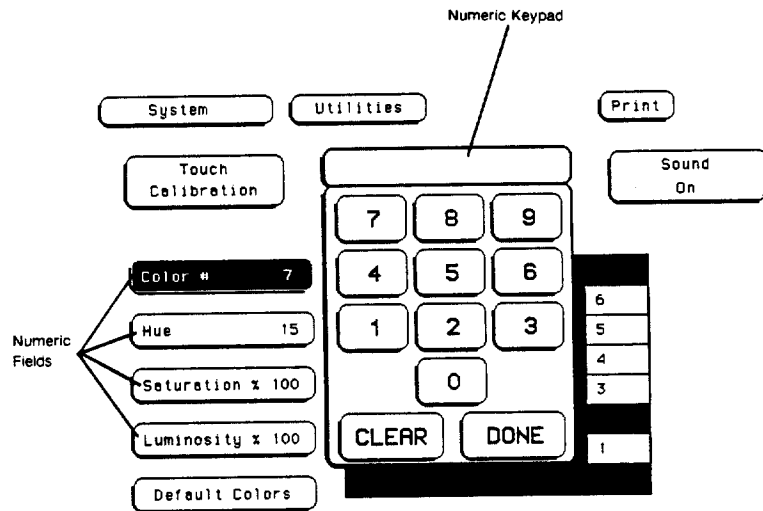


Figure 2-6. Numeric Fields

Alphanumeric Keypads

When you select a field that requires an alphanumeric input, an alphanumeric keypad appears on screen. Simply enter the appropriate information with the keypad and touch **Done** when you are finished.

To return to the original information after an alphanumeric field has been changed, simply re-enter the original information with the keypad.

Entering Information with the Keypad

To enter information with the keypad, simply touch the appropriate key for each input and that input will appear in the box at the top of the keypad. When you are finished, touch **DONE** and the keypad disappears, placing your entry in the appropriate field.

If you need to change a letter or correct a mistake for a pattern or alphanumeric entry before leaving the keypad, simply move the cursor with the knob to the character you want to change and enter the correct character.

Generally, to return to the original value before completing an entry, touch **CLEAR**, then **DONE**.

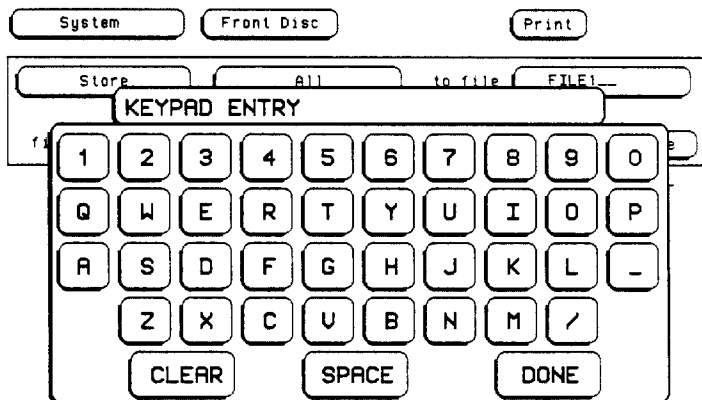


Figure 2-7. Alphanumeric Keypad

The Optional Mouse

Fields can be selected either by touch or with the optional mouse. The optional mouse is a mechanical device that you can move about on a desktop to control a pointer (+) on the menu. When the pointer is on the desired field, activate the field by pressing the button on the upper-left corner of the mouse.

You can also use the mouse to duplicate the function of the knob on the front panel. Simply hold down the button on the upper-right corner of the mouse and move the mouse about on a desktop. Moving the mouse up or to the right is the same as turning the knob clockwise. Moving the mouse down or to the left is the same as turning the knob counterclockwise.

Connecting the Mouse

To connect the mouse:

1. Hold the connector (on the cord of the mouse) with the two spring clips on the bottom.
2. On the lower-right corner of the HP 16500A front panel is a port marked with two dots. Gently push the connector into this port until the connector clicks into place.

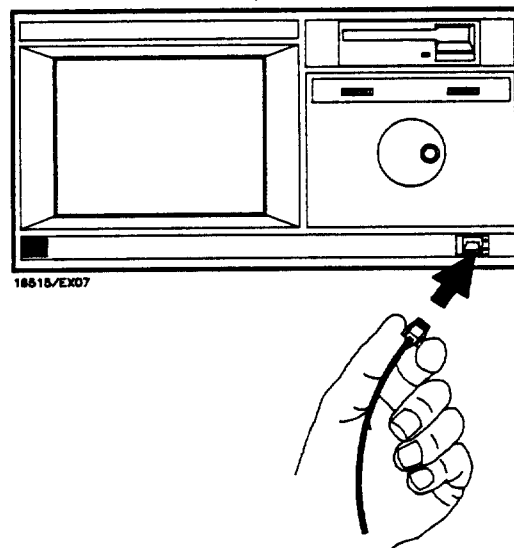


Figure 2-8. Connecting the Optional Mouse

Disconnecting the Mouse

To disconnect the mouse:

1. Press the two spring clips on the connector together and gently pull the connector out of the port.

The Knob

The **knob** on the front panel can move the "cursor" on certain menus, increment and decrement numeric fields, and roll the display. "Rolling the display" refers to the instrument's ability to rotate or scroll through information on the screen.

The Cursor

The **cursor** is an indicator on the display that allows you to highlight characters within fields and other areas within certain menus. Rotating the knob moves the cursor within a particular field or function or moves information through the cursor line by line. The area where the cursor resides is displayed in inverse video of the normal background.

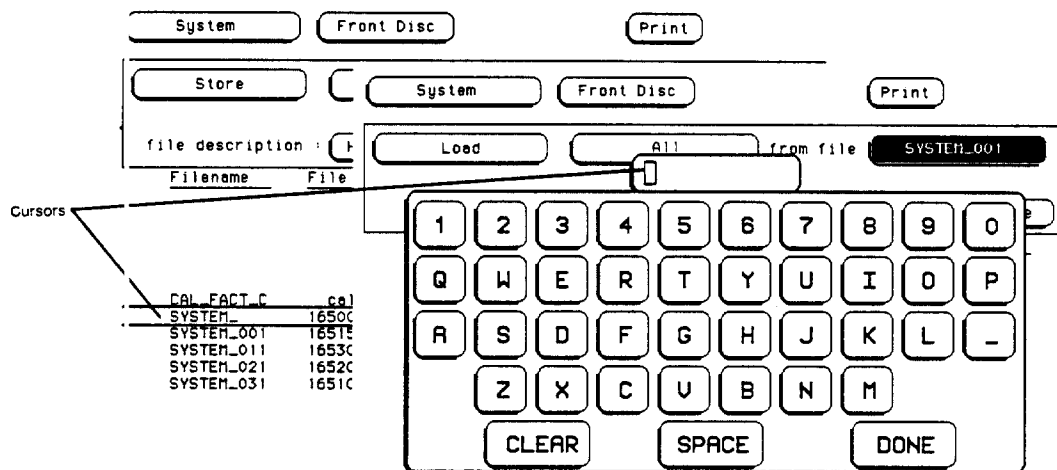


Figure 2-9. Cursor Examples

Exercises

The following brief exercises will help you become more familiar with using the HP 16500A interfaces. The steps are both numbered and lettered. The numbered steps state the objective and the lettered steps explain how to accomplish each step objective. You may be able to go through the exercises by just following the numbered steps. When you need more information on how to accomplish the step objective, refer to the lettered steps.

1. Make sure you are in the **System Configuration** menu. If not, select this menu.
 - a. If you are not already in the **System** module, as indicated by the field in the upper-left corner of the menu, touch this field. When the (multiple-choice) pop-up appears, touch **System** and the pop-up disappears, bringing up one of the **System** menus.
 - b. If you are not already in the **Configuration** menu, as indicated by the field to the right of **System**, touch this field. When the pop-up appears, touch **Configuration** and the pop-up disappears, bringing up the **System Configuration** menu.

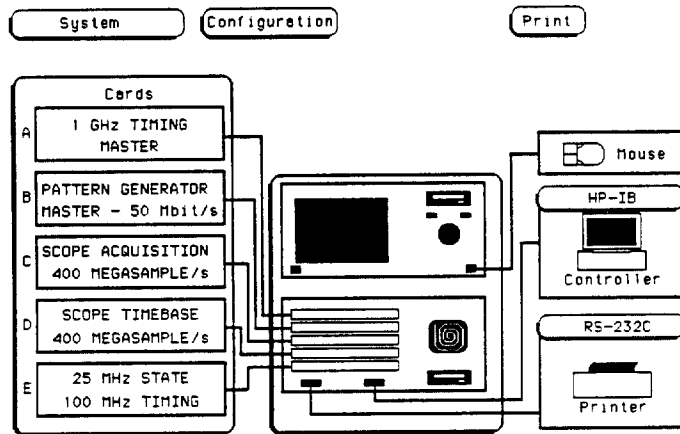


Figure 2-10. The System Configuration Menu

2. Select the **System Front Disc** menu.
 - a. Touch the menu field to the right of **System** in the upper-left corner of the display.
 - b. When the (multiple-choice) pop-up appears, touch **Front Disc** and the pop-up disappears, bringing up the **System Front Disc** menu.

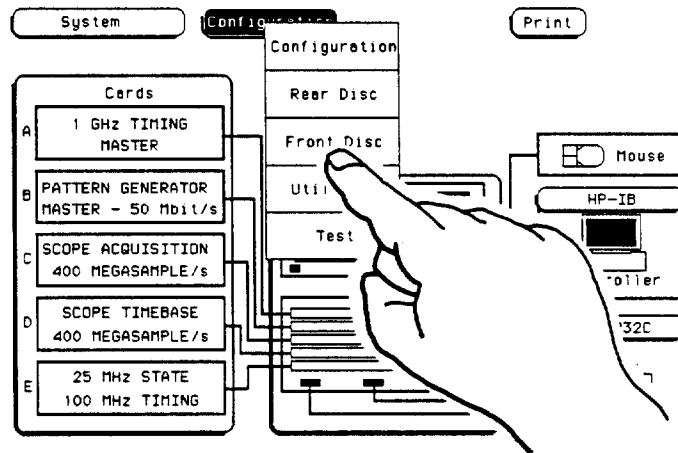


Figure 2-11. Selecting the System Front Disc Menu

3. Select the **Store** operation.

a. Touch the file operation field directly below the module field.

b. When the pop-up appears, touch **Store**. This brings up the **Store** operation.

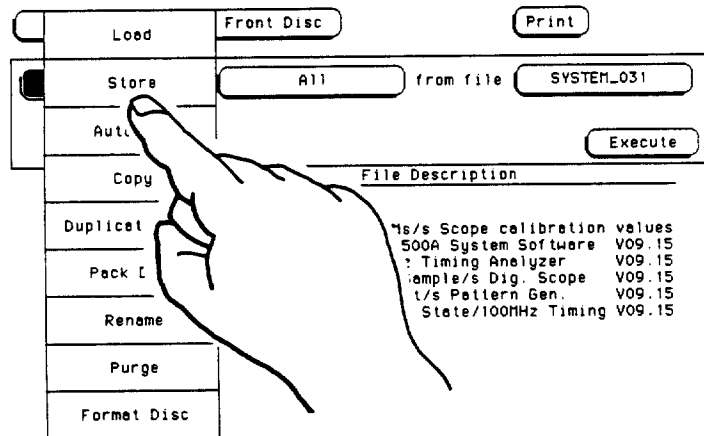


Figure 2-12. Selecting the Store Operation

4. Enter the filename "EXAMPLE1" in the field to the right of "to file."
 - a. Touch the filename field to the right of "to file."
 - b. When the pop-up alphanumeric keypad appears, enter "EXAMPLE1" with the keypad by touching the appropriate key for each character. As you enter each character, the character appears in the box at the top of the keypad and the cursor moves one space to the right.

Note

To change a letter or correct a mistake, use the knob to move the cursor to the letter you want to change and enter the correct letter.

- c. Touch **DONE** when you are finished and the pop-up disappears, putting EXAMPLE1 in the appropriate field.

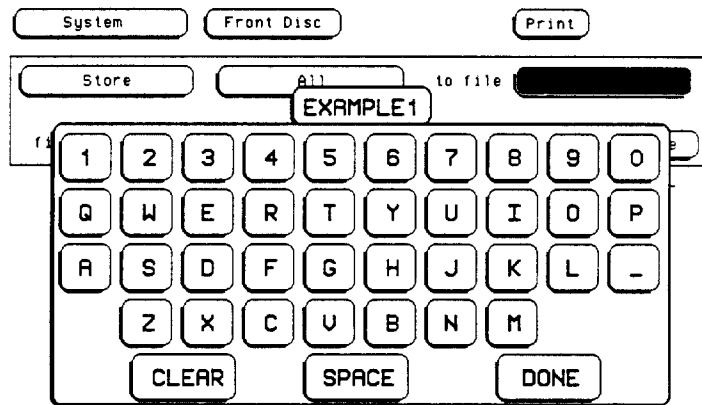


Figure 2-13. Entering a Filename

5. Enter "CONFIGURATIONS AND DATA" for the file description.
 - a. Touch the field to the right of "file description."
 - b. When the pop-up alphanumeric keypad appears, enter CONFIGURATIONS AND DATA in the box with the keypad by touching the key for each letter.
 - c. Touch **DONE** when you are finished and the pop-up disappears, putting CONFIGURATIONS AND DATA in the appropriate field.

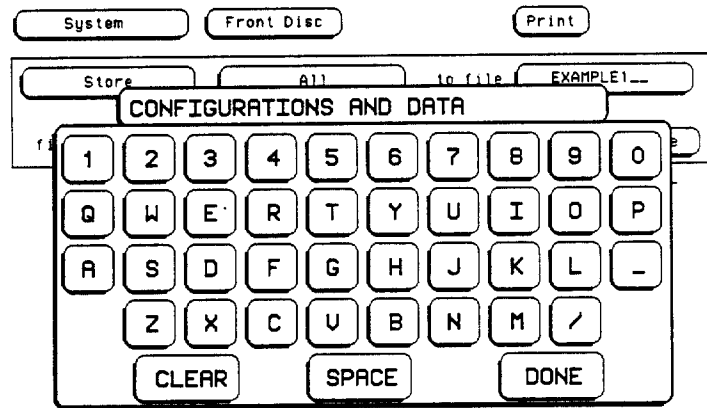


Figure 2-14. Entering a File Description

6. Now select the **System Utilities** menu.
 - a. Touch the menu field to the right of **System** in the upper-left corner of the display.
 - b. When the pop-up appears, touch **Utilities** and the pop-up disappears, bringing up the **System Utilities** menu.

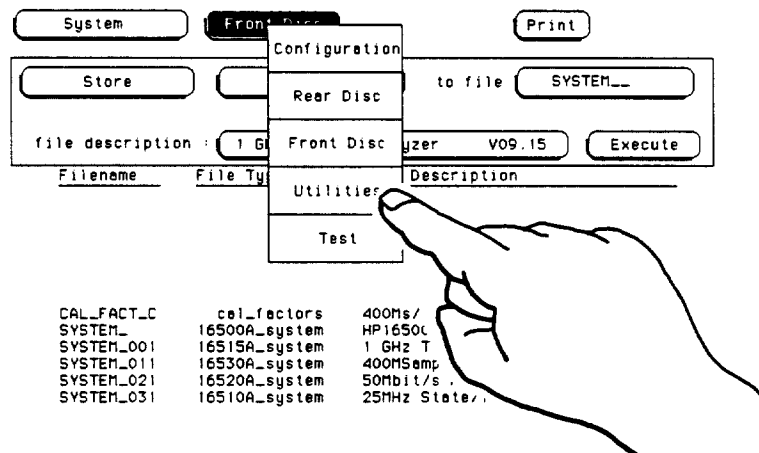


Figure 2-15. Selecting the System Utilities Menu

7. Change the **Hue** for Color #5 to 45 with the keypad.
 - a. If the **Color** field isn't light blue, touch this field.
 - b. Rotate the knob counterclockwise until **5** appears in the **Color** field.
 - c. Touch the **Hue** field below the **Color** field.
 - d. After it turns light blue, touch the **Hue** field again and a pop-up keypad appears.
 - e. Enter **45** with the keypad and touch **DONE**. The keypad will disappear, putting **45** in the **Hue** field.

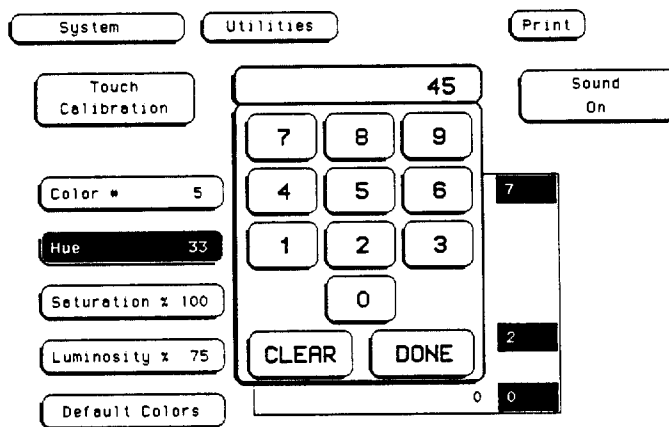


Figure 2-16. Entering a New Value for Hue

8. Return to the default settings for the color fields.
- a. Touch the **Default Colors** field in the lower-left corner of the menu. Since this is an immediate action field, selecting the **Default Colors** field immediately returns you to the default display colors.

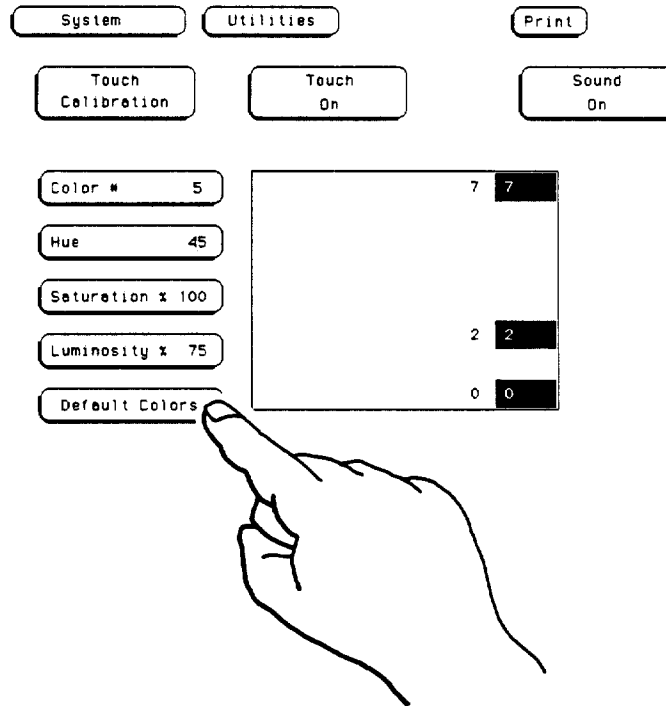


Figure 2-17. Returning to the Default Colors

9. Turn off the sound effects of the instrument.

a. Touch the **Sound On** field and it toggles to **Sound Off**.

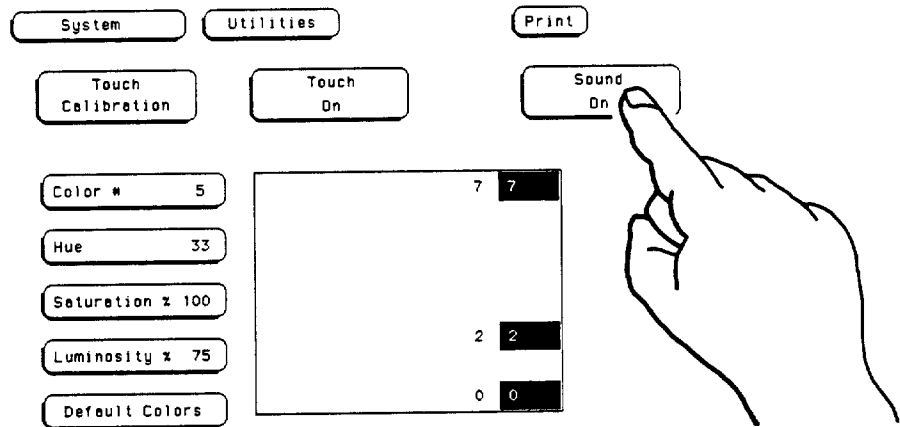


Figure 2-18. Turning the Sound Effects Off

10. Then turn the sound effects back on.

a. Touch the **Sound Off** field and it toggles to **Sound On**.

11. Return to the **System Configuration** menu.
 - a. Touch the menu field to the right of **System** in the upper-left corner of the display.
 - b. When the pop-up appears, touch the **Configuration** field. The pop-up disappears, bringing up the **System Configuration** menu.

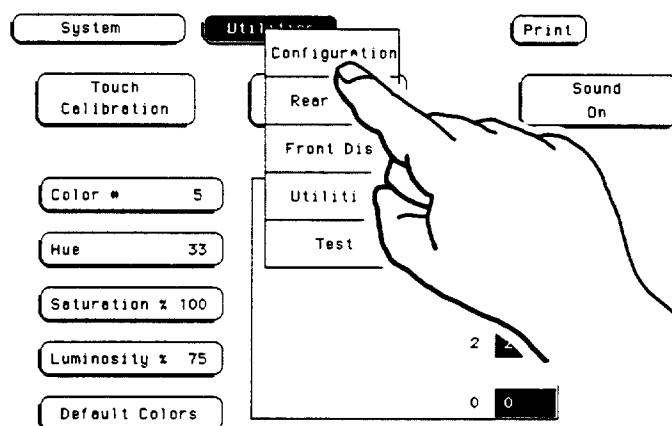


Figure 2-19. Selecting the System Configuration Menu

Refer to specific chapters in this manual for more information on the functions and menus of the HP 16500A.

3

The System Configuration Menu

Introduction

The **System Configuration** menu is the first menu you see after the initial power-up of the instrument. This menu lists the modules and software options that your system is configured with, shows whether or not a mouse is connected, and gives you access to the configuration of the HP-IB and RS-232C interfaces.

Getting into the System Configuration Menu

In the upper-left corner of the menu are two fields that indicate which menu and module the instrument is in (see figure 3-1). The one to the extreme left (**System**) shows you what module you're in and the one to the right of the module field (**Configuration**) shows you what menu within the module you're in.

- If the module field in the upper-left corner of the screen does not display **System**, touch this field and when the pop-up appears, touch **System**. This will get you into one of the **System** menus.
- If the module field in the upper-left corner of the screen displays **System**, but the field to the right of **System** doesn't display **Configuration**, touch this field. When the pop-up appears, touch **Configuration** to bring up the **System Configuration** menu.

Layout of the System Configuration Menu

Figure 3-1 shows the layout of the **System Configuration** menu and lists the major features and functions.

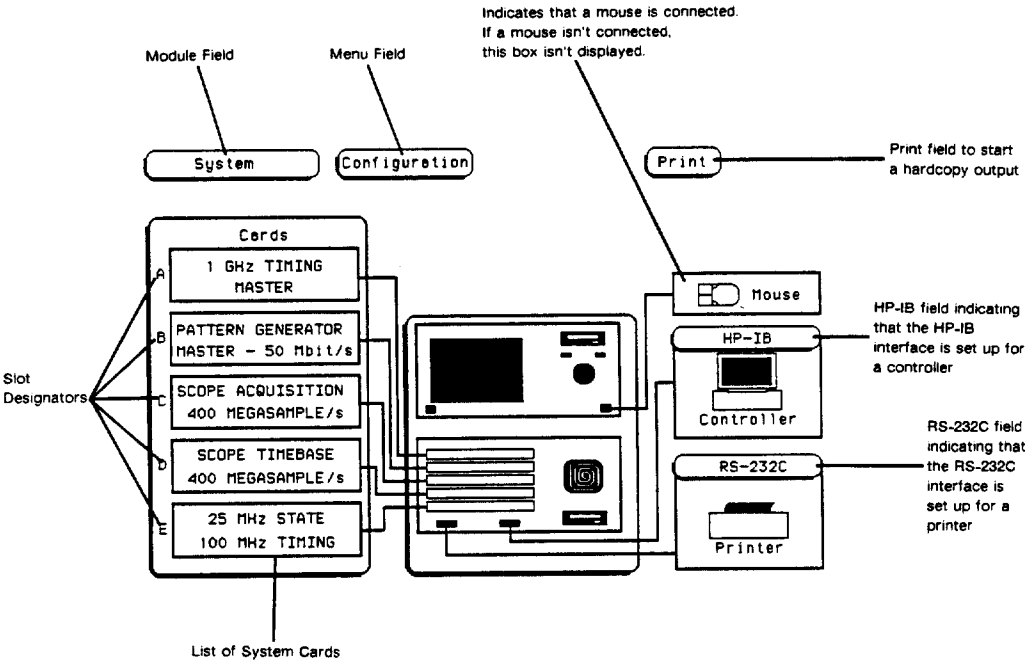


Figure 3-1. The System Configuration Menu

Slot Designators

The slot designators A through E, are displayed to the left of the list of cards for the system and indicate the locations or slots for each card. When you touch the module field, a pop-up appears. The letters A, B, C, D, or E after the name of each module indicate the location of each "master" card for that module. **Oscilloscope D** indicates that the master card for the **Oscilloscope** module is in slot **D** of the instrument.

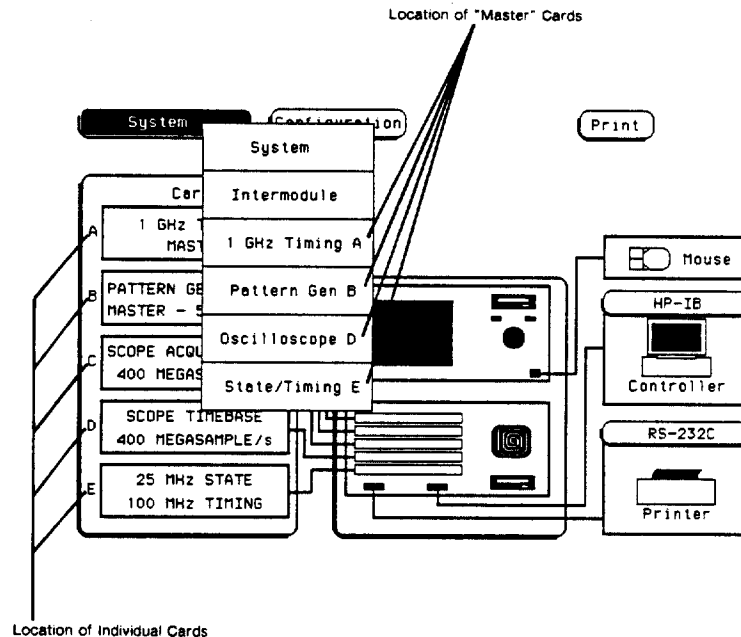


Figure 3-2. Slot Designators

Menu Map

Figure 3-3 displays a menu map for the **System Configuration** menu. When the field has a numeric input, the range is displayed in parentheses.

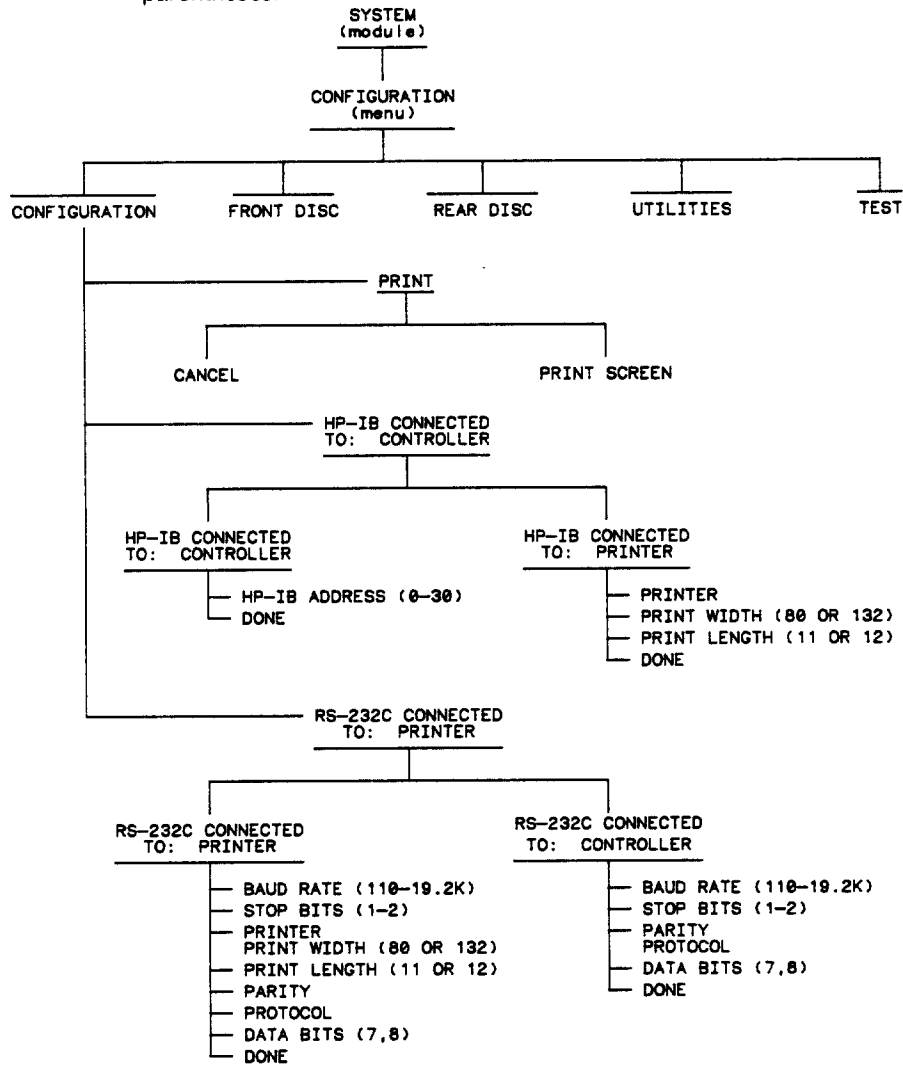


Figure 3-3. Menu Map for the System Configuration Menu

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4

HP-IB and RS-232C

The Controller Interface

The HP 16500A is equipped with a standard RS-232C interface and an HP-IB interface that allows you to connect to a controller. This gives you remote access for running measurements, for up-loading and down-loading configurations and data, for outputting to a printer, and more. The controller interface is explained in more detail in the *HP 16500A System Programming Manual*.

The Printer Interface

The HP 16500A can output its screen display to various HP-IB and RS-232C graphics printers. Configured menus as well as waveforms and other data can be printed for complete measurement documentation. The printer interface is explained in more detail in Chapter 5.

Configuring the Interface for a Controller or a Printer

To configure the HP-IB or RS-232C interfaces for a controller or a printer, first select the **System Configuration** menu. Then touch the appropriate field for the interface you want to configure (RS-232C or HP-IB). When the pop-up appears, touch the field at the top of the pop-up to switch between a printer and a controller configuration. Whenever you change the configuration for one interface, the other interface automatically changes to the opposite configuration.

For example, to configure the HP-IB interface for a printer:

1. Select the **System Configuration** menu and touch the **HP-IB** field.
2. When the pop-up appears, touch the field displaying **HP-IB Connected to: Controller** and it changes to **HP-IB Connected to: Printer**. At the same time the RS-232C interface automatically changes from a printer to a controller configuration.

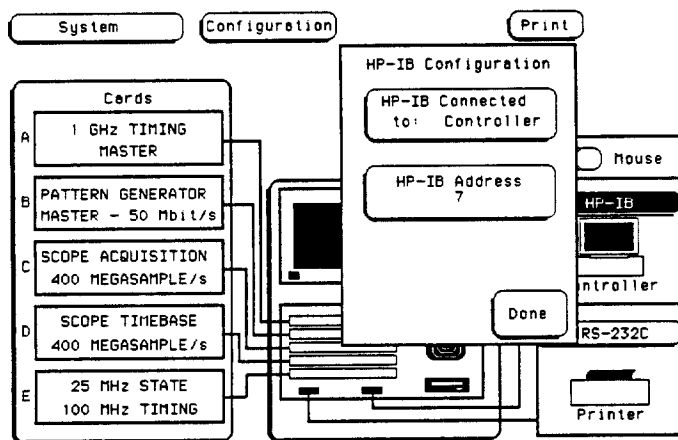


Figure 4-1. HP-IB Controller Configuration

The HP-IB printer must be set to **Listen Always** for the HP-IB interface. In this mode, no HP-IB addressing is necessary, so the HP-IB address field is not displayed. Three additional fields then appear to allow you to select the printer type, character width, and page length.

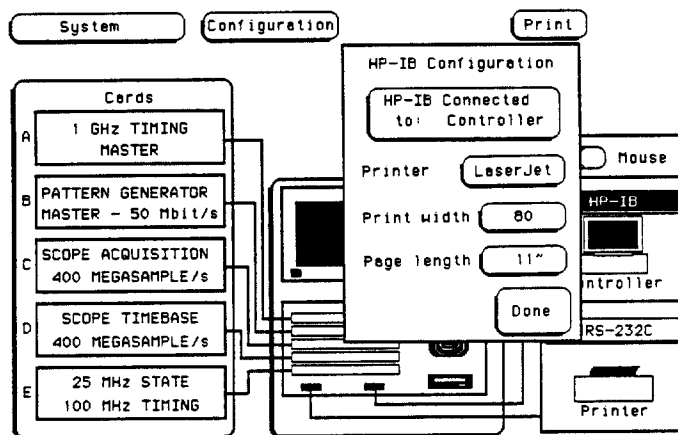


Figure 4-2. HP-IB Printer Configuration

To return to the HP-IB controller interface:

1. Touch the field displaying **HP-IB Connected to: Printer** and it changes back to **HP-IB Connected to: Controller**. Automatically, the RS-232C interface switches back to a printer configuration.
2. Touch **Done** and the HP-IB pop-up disappears.

What Is the HP-IB Interface?

The Hewlett-Packard Interface Bus (HP-IB) is Hewlett-Packard's implementation of IEEE Standard 488-1978, "Standard Digital Interface for Programmable Instrumentation." The HP-IB is a carefully defined interface that simplifies the integration of various instruments and computers into systems. It uses an addressing technique to ensure that each device on the bus (interconnected by HP-IB cables) receives only the data intended for it. To accomplish this, each device is set to a different address and this address is used to communicate with other devices on the bus.

Selecting an Address

The HP-IB address can be set to 31 different HP-IB addresses, from 0 to 30. Simply choose an address that is compatible with your device and/or software. The default is 7.

To select an address:

1. Select the **System Configuration** menu and touch the **HP-IB** field on the right side of the menu.
2. When the pop-up appears, either rotate the knob or use the pop-up keypad to enter the address. To use the keypad, touch the **HP-IB Address** field and a pop-up keypad will appear. Then enter the address and touch **DONE**.
3. When you are finished configuring the HP-IB pop-up, touch **Done**.

What Is the RS-232C Interface?

The RS-232C interface on this instrument is Hewlett-Packard's implementation of EIA Recommended Standard RS-232C, "Interface Between Data Terminal Equipment and Data Communications Equipment Employing Serial Binary Data Interchange." With this interface, data is sent one bit at a time and characters are not synchronized with preceeding or subsequent data characters. Each character is sent as a complete entity without relationship to other events.

Baud Rate

The baud rate is the rate at which bits are transferred between the interface and the peripheral. The baud rate must be set to transmit and receive at the same rate as the peripheral, or data cannot be successfully transferred. To set the baud rate:

1. Select the **System Utilities** menu and touch the **RS-232C** field.
2. When the pop-up menu appears, touch the field directly to the right of "Baud Rate."
3. When the second pop-up appears, touch the baud rate you want from the list displayed in the pop-up (110 to 19.2k) and the pop-up will disappear.

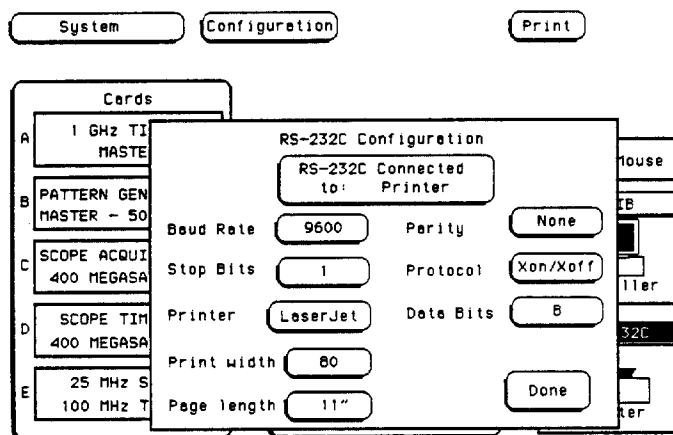


Figure 4-3. RS-232C Pop-up

Stop Bits

To change the Stop Bits:

1. Touch the field directly to the right of "Stop Bits" on the RS-232C pop-up menu.
2. When the new pop-up appears, select either **1**, **1.5**, or **2** Stop Bits to identify the end of the character. The pop-up will disappear, placing your selection in the appropriate field.

Parity

The parity bit detects errors as incoming characters are received. If the parity bit does not match the expected value, the character is assumed to be incorrectly received. The action taken when an error is detected depends on how the interface and the device program are configured.

Parity is determined by the requirements of the system. The parity bit may be included or omitted from each character by enabling or disabling the parity function. To set the parity bit:

1. Touch the field directly to the right of "Parity" on the RS-232C pop-up menu.
2. When the pop-up appears, select either **None**, **Odd**, or **Even** to match the parity of the external device. After you make your selection, the pop-up disappears.

Data Bits

Data bits are the number of bits sent and received per character that represent the binary code of that character. They consist of either 7 or 8 bits, depending on the application. With 8-bits, no parity bit is included with the data bits. To set the data bits:

1. Touch the field directly to the right of "Data Bits" on the RS-232C pop-up.
2. When the pop-up appears, select either **7** or **8** and the pop-up will disappear.

Protocol

Protocol governs the flow of data between the instrument and the external device. To change the protocol:

1. Touch the field directly to the right of "Protocol" on the RS-232C pop-up.
2. When the pop-up appears, select:
 - **None**
 - With less than a 5-wire interface, selecting **None** does not allow the sending or receiving device to control how fast the data is being sent. No control over the data flow increases the possibility of missing data or transferring incomplete data.
 - With a full 5-wire interface, selecting **None** allows a hardware handshake to occur. With a hardware handshake, hardware signals control data flow. The HP 13242G cable allows the HP 16500A to support hardware handshake.
 - **Xon/Xoff**
 - Xon/Xoff stands for Transmit On/Transmit Off. With this mode, the receiver controls the data flow and can request that the printer stop data flow at any time.

After you make your selection, the pop-up disappears.

3. Touch **Done** when you are finished setting up the RS-232C configuration pop-up.

5

Connecting a Printer

Introduction

The HP 16500A can output its screen display to various HP-IB and RS-232C graphics printers. Configured menus as well as waveforms and other data can be printed for complete measurement documentation.

HP-IB Printers

The HP 16500A interfaces directly with HP PCL printers supporting the printer command language or with Epson printers supporting the Epson standard command set. These printers must also support HP-IB and "Listen Always." Printers currently available from Hewlett-Packard with these features include:

- the HP 2225A ThinkJet
- the HP 2227B QuietJet
- the HP 3630A option 002 PaintJet

Note

The printer must be in "Listen Always" when HP-IB is the printer interface.

The HP 16500A HP-IB port does not respond to service requests (SRQ) when controlling a printer. The SRQ enable setting for the HP-IB printer has no effect on the HP 16500A printer operation.

HP-IB Printer Setup

To set up the printer for the HP 16500A:

1. Turn off the HP 16500A and connect an HP-IB cable from the printer to the HP-IB connector on the rear panel of the HP 16500A.

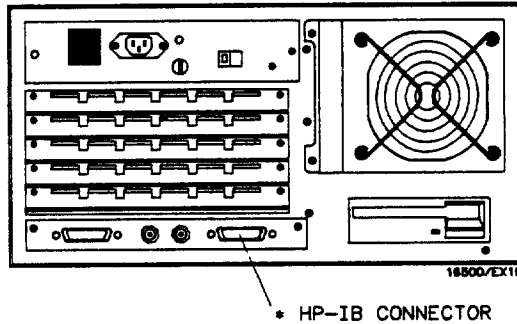


Figure 5-1. HP 16500A Rear Panel

2. Make sure the printer is in LISTEN ALWAYS (or LISTEN ONLY).

For example, figure 5-2 shows the HP-IB configuration switches for an HP-IB ThinkJet printer. For the "Listen Always" mode move the second switch from the left to the "1" position. Since the HP 16500A doesn't respond to SRQ EN (Service Request Enable), the position of the first switch doesn't matter.

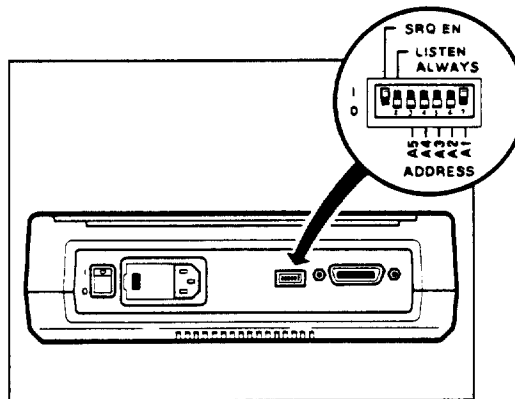


Figure 5-2. Configuration Switches for the HP ThinkJet Printer

HP-IB Configuration

Turn on the HP 16500A and when the **System Configuration** menu is displayed:

1. Touch the **HP-IB** field.
2. When the pop-up appears, touch **HP-IB Connected to: Controller** to switch from a controller to a printer configuration. This automatically switches the RS-232C interface from a printer to a controller configuration.
3. Touch the field to the right of "Printer" and when the pop-up appears, select the printer that you're using (ThinkJet, QuietJet, etc.). If you're using an Epson graphics printer or an Epson compatible printer, select **Alternate**.

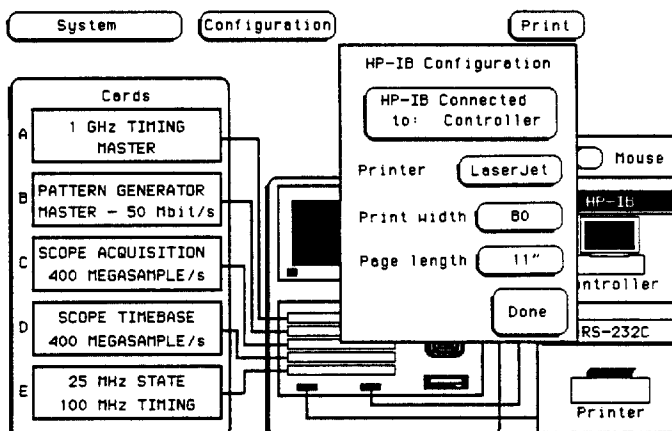


Figure 5-3. HP-IB Printer Interface Pop-up

4. Touch the "Print Width" field and print width toggles between **80** and **132**. Select the width for your application or leave it at the default of **80**. Print width tells the printer that you are sending up to 80 or 132 characters per line (when you **Print All**) and is totally independent of the printer itself.
 - If you select 132 characters per line when using other than the **QuietJet** selection, the listings are printed in a compressed mode. Compressed mode uses smaller characters to allow the printer to print more characters within a given area.
 - If you select 132 characters per line for the **QuietJet** selection it can print a full 132 characters per line without going to compressed mode, but the printer must have wider paper.
 - If you select 80 characters per line for any printer, a maximum of 80 characters are printed per line.
5. Touch the "Print length" field and print length toggles between **11** and **12**. Select the length for your application or leave it at the default of **11**. Print length tells the printer the page length for the type of paper you are using.
6. Touch **Done** when you finish setting up the HP-IB pop-up.

RS-232C Printers

The HP 16500A interfaces directly with RS-232C printers including the HP ThinkJet, HP QuietJet, HP LaserJet, and HP PaintJet printers.

RS-232C Printer Setup

To set up the printer for the HP 16500A:

1. Turn off the HP 16500A and connect an RS-232C cable (HP 13242G) from the printer to the RS-232C connector on the rear panel of the HP 16500A.

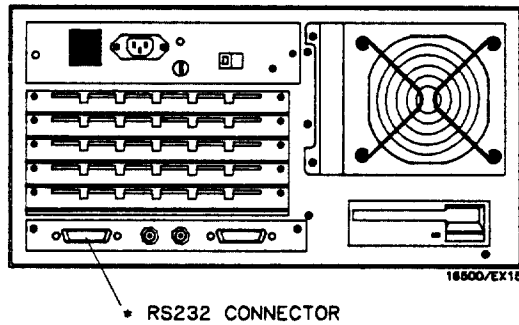


Figure 5-4. HP 16500A Rear Panel

2. Before turning on the printer, locate the mode configuration switches on the printer. Then configure the printer as follows:
 - For example, the HP QuietJet series printers have two banks of mode function switches inside the front cover. Push all the switches down to the "0" position as shown in figure 5-5.

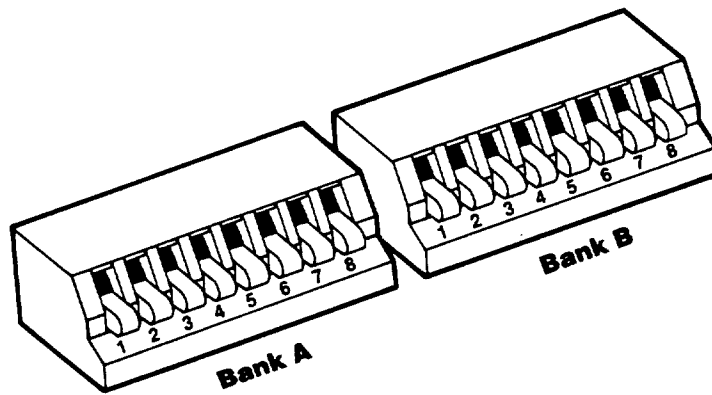
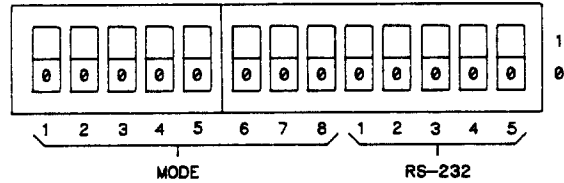


Figure 5-5. Switch Configuration for HP QuietJet Printers

- For the HP 2225D (RS-232 HP ThinkJet) printer, the mode switches are on the rear panel of the printer. Push all the switches down to the "0" position as in figure 5-6.



16500/EX17

Figure 5-6. Switch Configuration for HP ThinkJet Printers

- For the HP LaserJet printer, the switch settings can remain in the factory default settings.

RS-232C Configuration

Turn on the HP 16500A and when the **System Configuration** menu is displayed:

1. Touch the **RS-232C** field.
2. When the pop-up appears, the top field should display **RS-232C Connected to: Printer**. If not, touch this field to switch to a printer configuration. This automatically switches the HP-IB interface from a printer to a controller configuration.
3. Set the baud rate, stop bits, parity, protocol, and data bits to match the setup for the RS-232C printer by selecting the appropriate fields.

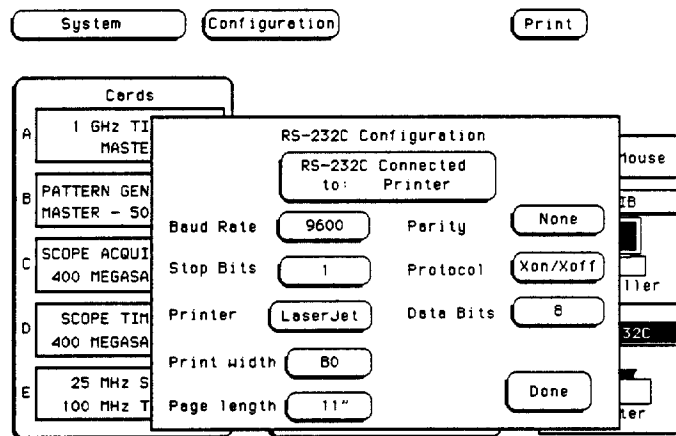


Figure 5-7. RS-232C Printer Interface Pop-up

4. Set the Printer field to match the type of printer you are using (ThinkJet, QuietJet, etc.).
5. Touch the field to the right of "Print Width" and print width toggles between **80** and **132**. Select the width for your application or leave it at the default of **80**. Print width tells the printer that you are sending either 80 or 132 characters per line (when you **Print All**) and is totally independent of the printer itself.
6. Touch the "Print length" field and print length toggles between **11** and **12**. Select the length for your application or leave it at the default of **11**. Print length tells the printer the page length for the type of paper you are using.
7. Touch **Done** when you finish setting up the RS-232C pop-up.

Configuration Example

Figure 5-8 shows how the RS-232C configuration pop-up is configured for the HP LaserJet printer. The only difference between this configuration and the configuration for the HP QuietJet and HP ThinkJet printers is the printer selection. All the other fields remain in their default settings.

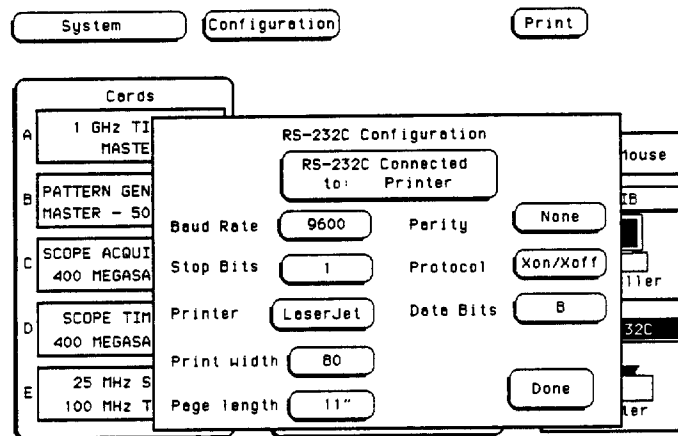


Figure 5-8. RS-232C Configuration for HP LaserJet Printers

Connecting to other Hewlett-Packard Printers

The HP 16500A can also be used with other Hewlett-Packard graphics printers. Simply connect the printer to the HP 16500A using the appropriate cable (HP-IB or RS-232C) and configure the HP 16500A as shown in Table 5-1.

Table 5-1. HP Printer Selection

For this HP Printer	Select this Printer from the pop-up
HP 2631G	QuietJet
HP 2671G	ThinkJet
HP 2673A	ThinkJet
HP 9876A	ThinkJet
HP 2932/34 (option 046)	QuietJet

Note

HP-IB printers must support "Listen Always" to work with the HP 16500A.

The HP 82906A graphics printer is not supported because it does not support "Listen Always" on HP-IB.

The HP 2932A or HP 2934A option 046 printer is configured from the front panel of the printer, instead of with switches on the rear panel. The correct configuration for the HP 16500A is shown in figure 5-9.

Note

Refer to the "HP 16500A Programming Manual" for information on setting up an external controller to activate the printer.

```
***** SETTINGS *****

***** LIST *****          ***** MODIFY *****
PRINTER      INTERFACE      PRINTER      INTERFACE

***** LIST INTERFACE *****
                        HP-IB

SECONDARY COMMANDS  LISTEN ALWAYS  SERVICE REQUEST  ADDRESS  SET DEFAULTS
      off              on              off              1

***** END OF SETTINGS *****
```

Figure 5-9. Configuration for the HP 2932/34 Option 046

Printing the Display

After connecting the printer to the instrument and setting the printer and instrument configurations, apply power to the printer.

Each menu has a **PRINT** field in the upper-right corner. Touch the **PRINT** field and a pop-up appears, displaying your choices.

- **Cancel** is used to stop the HP 16500A from sending data.
- **Print Screen** prints everything shown on the screen.
- **Print All** (available only in certain menus) prints all of the information listed for that display, including any listings that do not appear on screen. These listings can be 80 or 132 characters wide, depending on the Print Width setting.

To initiate a print, touch **Print Screen** or **Print All**, at which point the **Cancel** field will replace the print field.

To abort a print, touch **Cancel**.

Note

The HP 16500A does not check the operation of the printer, so no error message is displayed.

6

The System Front and Rear Disc Menus

Introduction

Chapter 6 describes the disc operations of the HP 16500A. The System Front and Rear Disc menus operate exactly the same.

Getting into the System Front Disc Menu

To bring up the **System Front Disc** menu:

1. Touch the menu field to the right of **System** in the upper-left corner of the display.
2. When the pop-up appears, touch **Front Disc** to bring up the **System Front Disc** menu.

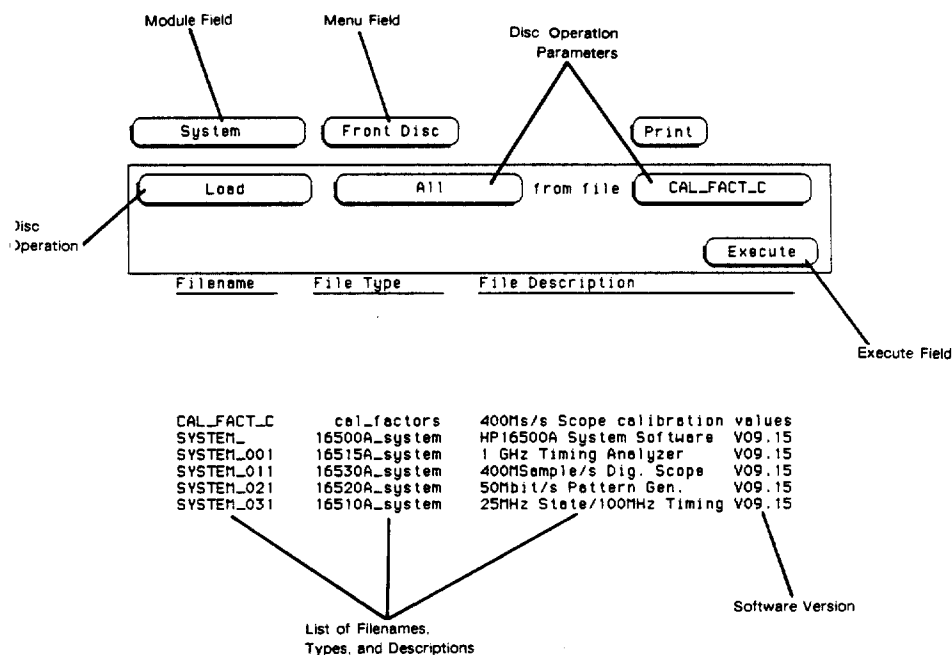


Figure 6-1. The System Front Disc Menu

Note

The software version numbers (VXX.YY) shown in this manual may be different for your instrument. Also, the last two digits of the software version number (YY) for specific modules may be different from other modules without affecting software operation or compatibility. The first two digits (XX) must be the same for all modules and system files within a specific mainframe.

The Disc Operations

Nine disc operations are available:

Load - Instrument setup and data can be loaded from the disc for the mainframe and modules.

- Inverse assemblers for analyzer modules can be loaded.

Store - Instrument setup and data can be stored on disc.

Note

System files for mainframe and modules cannot be stored.

Autoload - Designates a set of configuration files to be loaded automatically the next time the HP 16500A is turned on.

Copy - Any file can be copied from one disc to another or to the same disc.

Duplicate Disc - All files from one disc are copied to another disc. The directory and all files on the destination disc will be destroyed with this operation. The copied files are packed on the new disc as they are copied and the new disc is formatted if it is required.

The System Front and Rear Disc Menus

Pack Disc	- This function packs files on a disc. Packing removes all empty or unused sectors between files on a disc so that more space is available for files at the end of the disc.
Rename	- Any filename on a disc can be changed to another name.
Purge	- Any file on a disc can be purged (deleted) from the disc.
Format Disc	- Any double-sided 3.5 inch flexible disc can be formatted or initialized. The directory and all files on the disc will be destroyed with this operation.

Although default values are provided for these disc operations, a disc operation may require additional information from the user. This information is entered by touching or selecting the appropriate fields displayed for each disc operation. Disc operations are initiated by touching the **Execute** field. If there is a problem or additional information is needed to execute an operation, a pop-up appears near the center of the screen displaying the status of the operation (displays an error message, prompts the user to swap discs, etc.).

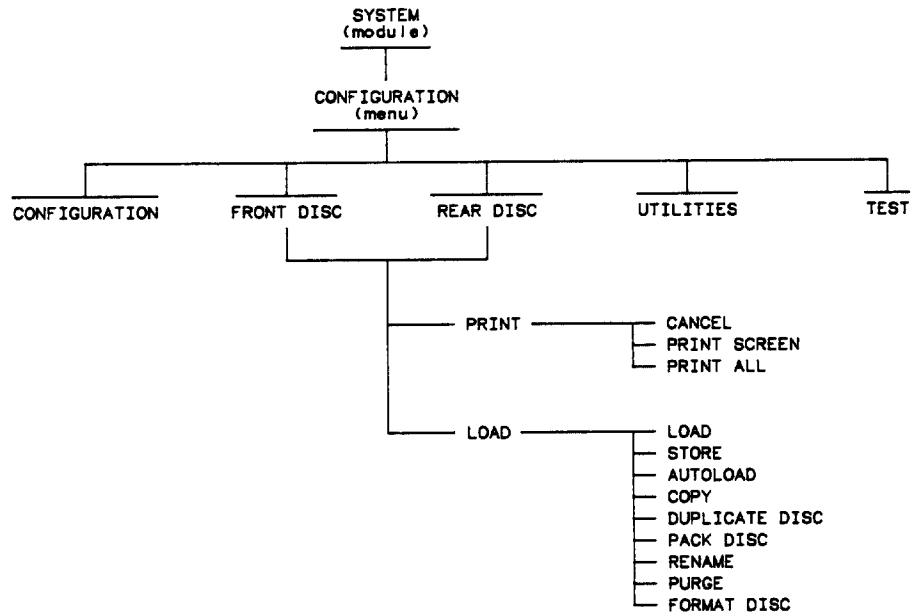
If executing a disc operation could destroy or damage a file, a pop-up appears when you touch **Execute**. If you don't want to complete the operation, touch **Cancel** to cancel the operation. Otherwise, touch **Continue** and the operation will be continued.

When a disc operation is being executed, the background of the **Execute** field changes color. When the **Execute** field returns to the original color, the disc operation is complete.

Whenever a disc drive is being accessed, an asterisk (*) appears in the upper-right corner of the display.

Menu Map

Figure 6-2 displays a menu map for the System Front and Rear Disc menus.



18300/BL.00

Figure 6-2. Menu Map for the System Front and Rear Disc Menus

Selecting a Disc Operation

To select a disc operation:

1. Touch the disc operation field directly below **System** on the display (Load).

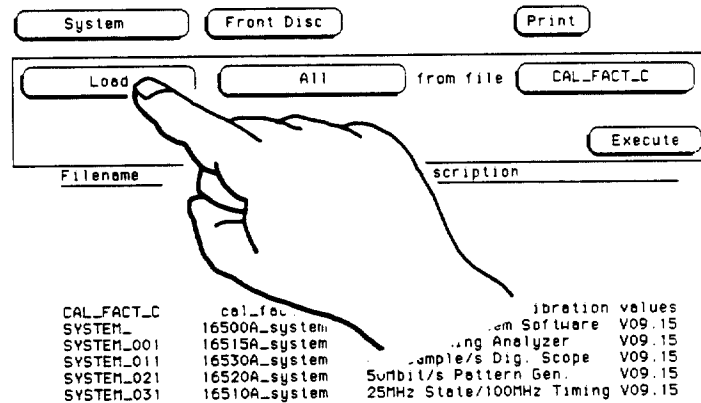


Figure 6-3. Selecting the Disc Operations Field

- When the pop-up appears, touch the field for the operation you want. After you select a field, the pop-up disappears, bringing up the appropriate operation. For example, touch **Store**.

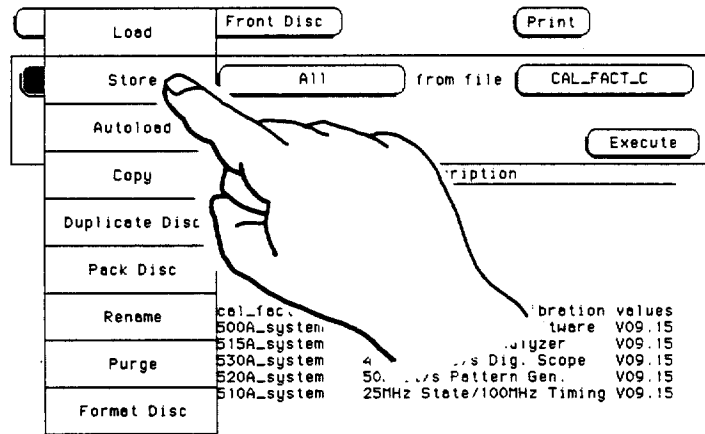


Figure 6-4. Selecting the Store Operation

Disc Operation Parameters

The disc operation parameters specify which modules are being operated on and give the names, types, and descriptions of files involved in the disc operation.

After setting up the disc operation, touch **Execute**. When the background of the **Execute** field returns to the original color, the disc operation is complete.

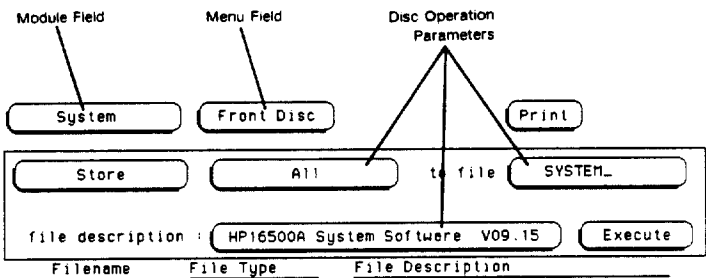


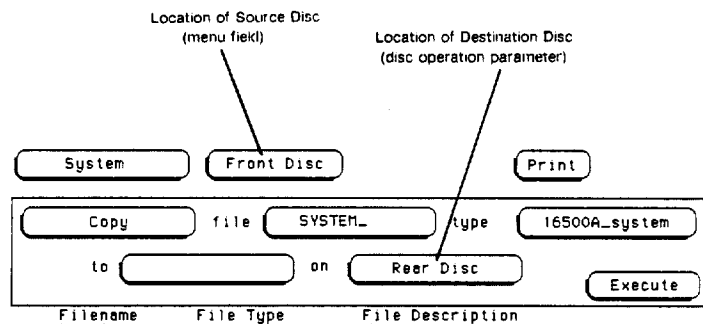
Figure 6-5. Disc Operation Parameters

Source and Destination Discs

The menu field (Front Disc or Rear Disc) indicates the location of the disc on which you're performing the operation. This disc is referred to as the **Source** disc.

For the **Copy** operation and the **Duplicate Disc** operation, a disc operation parameter is used to select the location of the disc to which the information will be transferred (Front Disc or Rear Disc). This disc is referred to as the **Destination** disc.

When you copy a disc (or duplicate a disc), you copy from the **Source** disc (indicated by the menu field) to the **Destination** disc (indicated by the disc operation parameter). You can use the same disc drive for both the **Source** and **Destination** discs by just switching discs when necessary. For the copy operation, the **Source** and **Destination** discs can be the same.



Filename	File Type	File Description
CAL_FACT_C	cal_factors	400Ms/s Scope calibration values
SYSTEM_	16500A_system	HP16500A System Software V09.15
SYSTEM_001	16515A_system	1 GHz Timing Analyzer V09.15
SYSTEM_011	16530A_system	400MSample/s Dig. Scope V09.15
SYSTEM_021	16520A_system	50Mbit/s Pattern Gen. V09.15
SYSTEM_031	16510A_system	25MHz State/100MHz Timing V09.15

Figure 6-6. Disc Locations

The System Front and Rear Disc Menus

Installing a Disc

Included with the HP 16500A is one blank 3.5 inch flexible disc for your own use. You can install it into either the front or rear disc drive, but normally the operating system disc resides in the rear disc drive. To install a disc:

1. Hold the disc so that the Hewlett-Packard label is on top and the metal auto-shutter is away from you.
2. Push the disc gently, but firmly, into the front disc drive until it clicks into place.

Note

The HP 16500A disc drives use the gray Hewlett-Packard double-sided discs, which can be ordered in a package of ten with the Hewlett-Packard part number 92192A. DO NOT use single-sided discs with the HP 16500A.

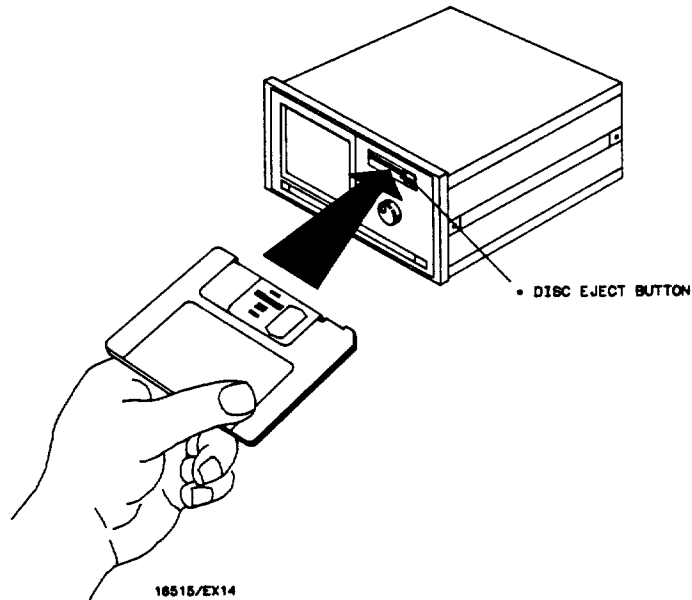


Figure 6-7. Installing a Disc

Formatting a Disc

Before any information can be stored on a new disc, you must first format it. Formatting marks off the sectors of the disc and creates the LIF (Logical Interchange Format) directory on the disc.

Note

The HP 16500A supports up to 144 entries. If the disc was formatted elsewhere with more than 144, the disc will be permanently changed if you use it in the HP 16500A.

The HP 16500A does not support track sparing. If a bad track is found, the disc is considered bad. If a disc has been formatted elsewhere with track sparing, it is NOT compatible with the HP 16500A and will cause unpredictable results.

To format a disc:

1. Select the **Format Disc** operation. After the **Format Disc** operation appears, the instrument reads the disc and lists the files on it.
 - If this is a new disc, the menu will display "Unsupported Format" on the lower portion of the menu.
 - If it is already formatted, but there are no files on it, the menu will display "No Files."
 - If the disc already has files, a list of those files will appear on the lower portion of the menu along with a file type and description.

Note

The HP 16500A supports (for both read and write) 256-byte and 512-byte LIF formatted discs, but the HP 16500A will only format to 1024-byte.

The HP 16500A does NOT support any single-sided formats.

2. To format the disc, touch **Execute**. When the pop-up appears, touch **Continue** and the instrument will go through a sequence to format the disc. Otherwise, touch **Cancel** to cancel the **Format Disc** operation.

CAUTION

Once EXECUTED, the Format Disc operation permanently erases all the existing information from the disc. After that, there is no way to retrieve the original information.

Filename	File Type	File Description
----------	-----------	------------------

UNSUPPORTED FORMAT

Figure 6-8. The Format Disc Operation

Storing on a Disc

The **Store** operation allows you to store the configurations and data from all of the modules or a particular module to a file with a given description.

Note

Storing the default configurations is a convenient way to return to the default values without cycling the power.

To store files:

1. Select the **Store** operation.

The screenshot shows a graphical user interface for the 'Store' operation. At the top, there are three buttons: 'System', 'Front Disc', and 'Print'. Below these is a larger rectangular box containing the main controls. Inside this box, there is a 'Store' button, followed by an 'All' button and the text 'to file'. To the right of 'to file' is a text input field. Below these elements is the label 'file description :' followed by another text input field. To the right of this field is an 'Execute' button. At the bottom of the interface, there are three column headers: 'Filename', 'File Type', and 'File Description', each followed by a horizontal line indicating a list area.

NO FILES

Figure 6-9. The Store Operation

2. Touch the field to the right of "to file" and a pop-up appears displaying an alphanumeric keypad.
3. Enter a filename that starts with a letter and contains up to eight characters. It can be any combination of letters and numbers, but there can be no blank spaces between any of the characters.

For example, touch the appropriate keys to enter the filename "FILE1."

Note

If you make an error, move the cursor (with the knob) to the incorrect character and insert the correct character with the keypad.

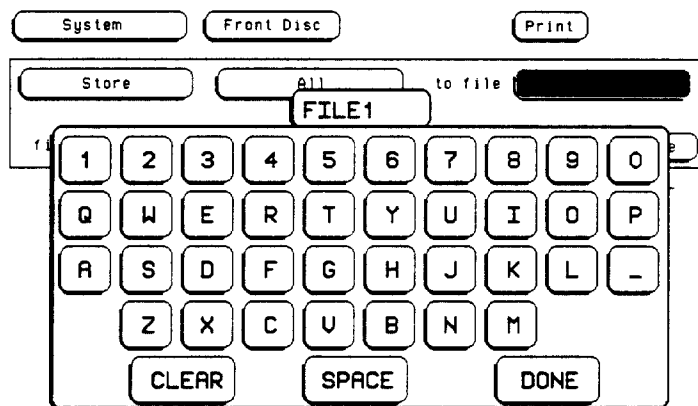


Figure 6-10. Entering a Filename

4. Touch **DONE** when you are finished and the pop-up disappears, putting FILE1__ to the right of "to file."

Note

The two spaces(__) after the filename designates that this file is for the system. One space and a letter (_X) after the filename designates that the file is for a specific module.

5. Touch the field to the right of "file description."
6. When the pop-up appears, touch the appropriate keys to enter "PRACTICE FILE" as your file description. The file description can be up to 32 characters in length.

Note

The field for "file description" makes it easier to identify the type of data in each file. This is for your convenience, but you can leave this field blank.

There is no way to change a file description after a file has been stored.

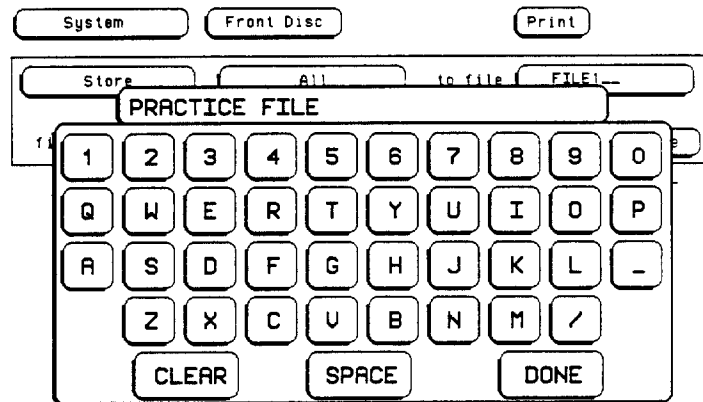


Figure 6-11. Entering a File Description

7. Touch **DONE** when you are finished and the pop-up will disappear, putting PRACTICE FILE to the right of "file description."
8. Touch **Execute to Store All** to FILE1.
9. When the **Cancel/Continue** pop-up appears, touch **Continue** to continue.

CAUTION

If you store a new configuration and data to an existing file, the new configuration and data are written over the original information, DESTROYING the original information in that file.

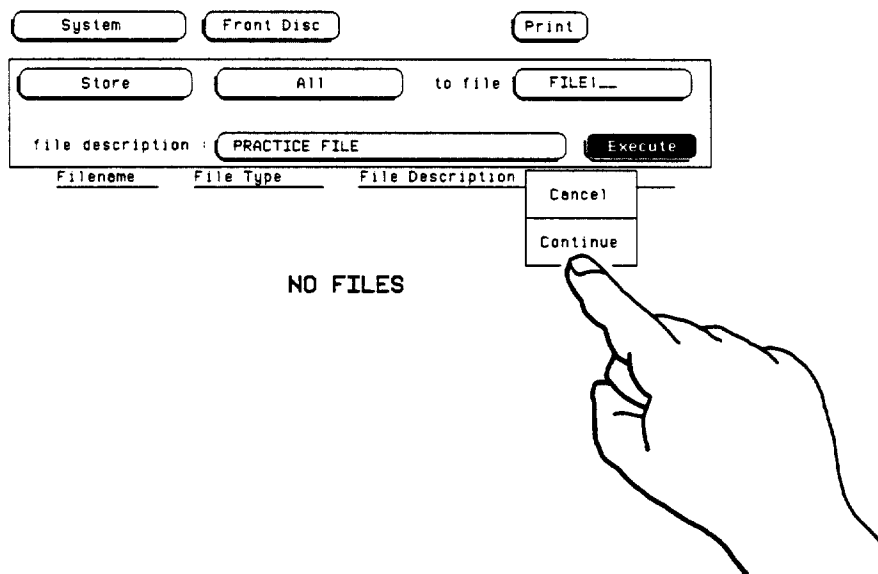


Figure 6-12. Storing a File

System
Front Disc
Print

Store
All
to file
FILE1__

file description :
PRACTICE FILE
Execute

Filename	File Type	File Description
FILE1_A	16515A_config	PRACTICE FILE
FILE1_B	16520A_config	PRACTICE FILE
FILE1_D	16530A_config	PRACTICE FILE
FILE1_E	16510A_config	PRACTICE FILE
FILE1__	16500A_config	PRACTICE FILE

Figure 6-13. Listing of the Files Stored

When you **Execute** the **Store All** operation, the HP 16500A stores the configuration of the instrument for each module in the instrument and for the system. The field to the right of "to file" now displays FILE1__ because this was the last file stored.

In this example, five files are listed on the lower portion of the display.

- FILE1_A (type) 16515A_config is for the module in slot A (the HP 16515A 1 GHz Timing module);
- FILE1_B (type) 16520A_config is for the module in slot B (the HP 16520A Pattern Generator);
- FILE1_D (type) 16530A_config is for the module in slot D (the HP 16530A Oscilloscope);
- FILE_E (type) 16510A_config is for the module in slot E (the HP 16510A State/Timing Analyzer);
- FILE1__ (type) 16500A_config is for the system.

Note

The HP 16500A system software includes the Intermodule software.

The Load Operation

The **Load** operation allows you to load all of the modules or a particular module with previously stored configuration and data from a file on the disc. To load files:

- 1. Select the **Load** operation.

SystemFront DiscPrint

LoadAll

from fileFILE1__

Execute

Filename	File Type	File Description
FILE1_A	16515A_config	PRACTICE FILE
FILE1_B	16520A_config	PRACTICE FILE
FILE1_D	16530A_config	PRACTICE FILE
FILE1_E	16510A_config	PRACTICE FILE
FILE1__	16500A_config	PRACTICE FILE

Figure 6-14. The Load Operation

- 2. The **All** field to the right of **Load** tells the analyzer that you want to **Load All** of the modules from the file "FILE1__." For this example, load only the module in slot D (the Oscilloscope) from this file.

Touch **All** and when the pop-up appears, touch the field for **Oscilloscope D**. When the pop-up disappears, **Oscilloscope D** is displayed in the field to the right of **Load**.

- The **Load** operation is type dependent. This means that you cannot load a file for one module type into a module of a different type.

For example, the screen now indicates that you want to Load the module Oscilloscope D from FILE1___. Touch **Execute** and an error message appears to indicate that FILE1___ is the incorrect type of file.

Note

The Load All operation is slot dependent. Even if the file is the right type, the slot indicator (last letter of the filename) must match the slot indicator of the module (last letter of the module name).

Filename	File Type	File Description
FILE1_A	16515A_config	PRACTICE FILE
FILE1_B	16520A_config	PRACTICE FILE
FILE1_D	16530A_config	PRACTICE FILE
FILE1_E	16510A_config	PRACTICE FILE
FILE1___	16500A_config	PRACTICE FILE

Figure 6-15. Disc Error Message

Note

The compatible file types for each module are listed in the card installation section of the reference manual for that module.

4. To correctly load the module **Oscilloscope D**, rotate the knob on the front panel until FILE1_D appears in the field to the right of "from file." FILE1_D is for file type "16530A_config" which is a compatible file type for this module. Touch **Execute** and the file is loaded into the oscilloscope module.

Note

*Another way to enter the name of the file in the field to the right of "from file" is to touch this field. When the pop-up keypad appears, enter the correct filename. Touch **Done** when you are finished.*

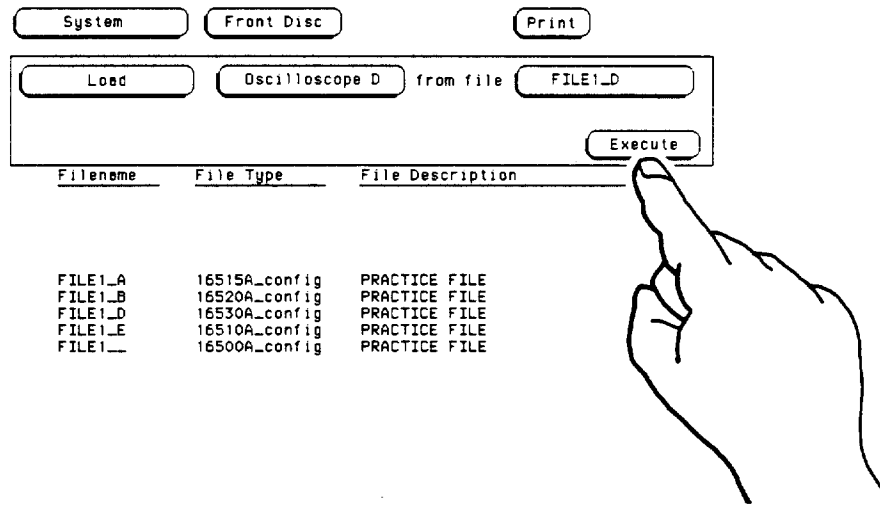


Figure 6-16. Loading the HP 16530A Oscilloscope

Renaming a File

The **Rename** operation allows you to change the name of a file of a particular type or all types to a different name. The only restriction is that you cannot rename a file to an already existing filename. To rename a file:

1. Select the **Rename** operation.
2. Use either the knob or the pop-up keypad to enter a filename in the field to the right of "file." For this example, select **FILE_D**.
3. Touch the field to the right of "type" and a pop-up will appear with the following choices:
 - **All Types** allows you to rename all the different types of files listed for a filename and to ignore any slot qualifications that appear in the filename;
 - "a particular file type" (16530A_config) allows only the current file to be renamed.

Filename	File Type	File Description
FILE1_A	16515A_config	PRACTICE FILE
FILE1_B	16520A_config	PRACTICE FILE
FILE1_D	16530A_config	PRACTICE FILE
FILE1_E	16510A_config	PRACTICE FILE
FILE1_	16500A_config	PRACTICE FILE

Figure 6-17. Renaming a File

4. Touch the file type you want and the pop-up disappears, displaying your choice in the appropriate field. For this example, select **All Types**.
5. Touch the field to the right of "to" and a pop-up keypad appears.
6. Enter the new name for the file with the keypad and touch **DONE** when you are finished. For this example, enter LEARN1.

Note

*The slot designators for the files are only preserved when copying **All Types**. Otherwise, the destination file appears exactly as entered in the destination field.*

7. Touch **Execute** and the files are renamed LEARN1. The last file to be renamed now appears in the field to the right of "file."

System
Front Disc
Print

Rename
file

LEARN1_A

type

All Types

to

LEARN1

Execute

Filename	File Type	File Description
LEARN1_A	16515A_config	PRACTICE FILE
LEARN1_B	16520A_config	PRACTICE FILE
LEARN1_D	16530A_config	PRACTICE FILE
LEARN1_E	16510A_config	PRACTICE FILE
LEARN1_	16500A_config	PRACTICE FILE

Figure 6-18. Renaming Files Completed

The Autoload Operation

Autoload allows you to designate a set of configuration files to be loaded automatically the next time the HP 16500A is turned on. This allows you to change the default configuration of certain menus to a configuration that better fits your needs. When the **Autoload** operation is **Enabled**, your designated configuration file is loaded as if you had performed a **Load All**. To enable the **Autoload** operation:

1. Select the **Autoload** operation.
2. Touch the **Disable** field and when the pop-up appears, select **Enable**.

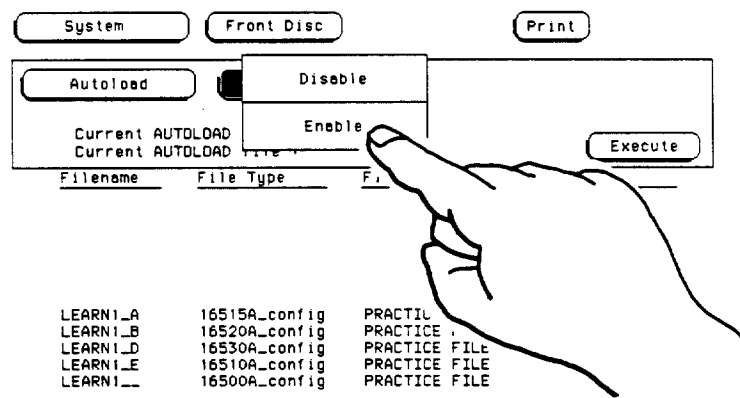


Figure 6-19. Selecting Enable

3. With the knob or the pop-up keypad enter the name of your customized configuration files in the field to the right of "File." For this example, enter LEARN_A.

Note

Autoload loads all of the files for a given filename. If you want to load only the file for a given module, rename that file to separate it from the other files and enable it as the current **Autoload** file.

4. Touch **Execute** and the Autoload function is Enabled as shown after "Current AUTOLOAD status:" on the display. The question mark (?) after the filename (LEARN_?) indicates that all files for this given filename will be loaded when Autoload is enabled.

Note

As long as Autoload is enabled before the instrument is shut off, Autoload will remain enabled when you power-up the instrument and the configuration files will be loaded.

The "AUTOLOAD" file contains the filenames to be autoloaded and indicates whether or not the Autoload operation is enabled.

System	Front Disc	Print
Autoload	Enable	File : LEARN1_A
Current AUTOLOAD status : ENABLED		Execute
Current AUTOLOAD file : LEARN1_?		
Filename	File Type	File Description
AUTOLOAD	autoload_file	status: ENABLED file: LEARN1_?
LEARN1_A	16515A_config	PRACTICE FILE
LEARN1_B	16520A_config	PRACTICE FILE
LEARN1_D	16530A_config	PRACTICE FILE
LEARN1_E	16510A_config	PRACTICE FILE
LEARN1_	16500A_config	PRACTICE FILE

Figure 6-20. The Autoload Operation Enabled

Note

The "Current AUTOLOAD file:" specifies a group of files.

To disable the Autoload operation:

1. Touch **Enable** and when the pop-up appears, touch **Disable**.
2. When the pop-up disappears, touch **Execute** and the Autoload operation is disabled.

System

Front Disc

Print

Autoload

Disable

Current AUTOLOAD status : DISABLED
Current AUTOLOAD file :

Execute

Filename	File Type	File Description
AUTOLOAD	autoload_file	status: DISABLED
LEARN1_A	16515A_config	PRACTICE FILE
LEARN1_B	16520A_config	PRACTICE FILE
LEARN1_D	16530A_config	PRACTICE FILE
LEARN1_E	16510A_config	PRACTICE FILE
LEARN1_	16500A_config	PRACTICE FILE

Figure 6-21. The Autoload Operation Disabled

Purging a File

Use the **Purge** operation to purge (delete) a file of a particular type or of all types.

In this example, you will purge the file LEARN1_A from the disc.

1. Select the **Purge** operation.
2. With either the knob or the pop-up keypad enter LEARN1_A in the field to the right of "file."
3. Touch the field to the right of "type" and when the pop-up appears, select 16515A_config for the file type.
 - **All Types** allows you to purge all the different types of files listed for a filename and ignore any slot qualifications that appear in the filename;
 - "a particular file type" (16515A_config) allows only the current file to be purged.
4. Touch **Execute** and when the pop-up appears, touch **Continue** and notice that only the file LEARN1_A is purged from the disc.

CAUTION

Once EXECUTED, the Purge operation permanently erases all the existing information from the file. After that, there is no way to retrieve the original information.

Note

Refer to "The Pack Disc Operation" section of this chapter for information on how and when the purged areas of a disc are used.

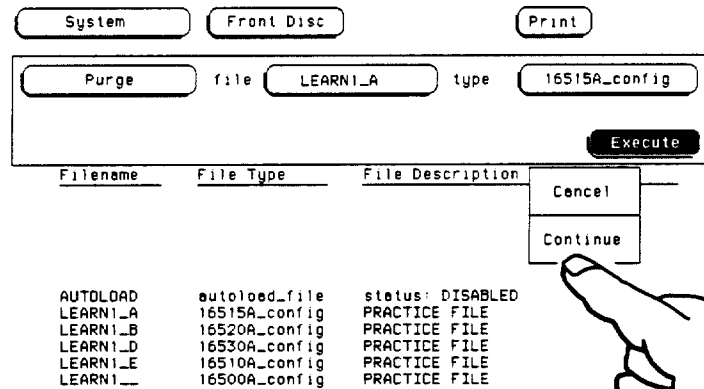


Figure 6-22. Purging a File

Copying a File

The **Copy** operation allows you to copy a file or group of files specified on the source disc to the destination disc. To copy files:

1. Select the **Copy** operation.
2. With either the knob or the pop-up keypad enter the filename in the field to the right of "file." For example, enter LEARN1_B.
3. Touch the field to the right of "type" and a pop-up will appear with the following choices:
 - **All Types** allows you to copy all the different types of files listed for a filename and ignore any slot qualifications that appear in the filename;
 - "a particular file type" (16520A_config) allows only the current file to be copied.
4. Touch the file type you want and the pop-up disappears, displaying your choice in the appropriate field. For this example, touch 16520A_config.

The System Front and Rear Disc Menus

5. Touch the field to the right of "to" and when the pop-up keypad appears, enter the name of the file you want to "copy to." For this example, enter "NEWFILE." After entering the filename, touch **DONE**.

Note

You cannot copy over an existing file.

6. Touch the destination field (Front Disc) to the right of "on" and select either **Front Disc** or **Rear Disc** for the location of the destination disc. For this example, select **Front Disc**.
7. Touch **Execute** to copy the file.

Note

*The slot designators for the files are only preserved when copying **All Types**. Otherwise, the destination file appears exactly as entered in the destination field.*

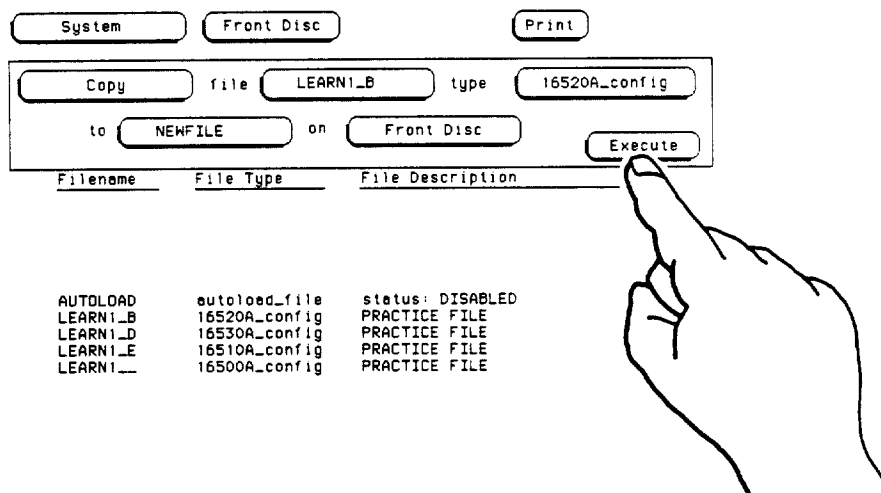


Figure 6-23. Copying a File

8. When pop-ups appear, simply follow their instructions as they apply to your situation and touch **Continue** to continue.

- When "Insert DESTINATION disc" appears, insert the destination disc into the disc drive you selected in step 6. For this example, the the original disc (source disc) is the destination disc. So when "Insert DESTINATION disc" appears," touch **Continue**. No additional prompts will appear since you did not change discs.
- If you are using separate discs for the destination and source discs with only a single disc drive, the message "Insert SOURCE disc" will appear. When this appears, remove the destination disc and re-install the source disc. Then touch **Continue**.

Note

*You can copy across various supported formats and it is highly recommended that you complete a **Copy** operation. Touching **Cancel** during a **Copy** operation may result in a corrupted destination disc.*

The Pack Disc Operation

By deleting files from the disc and adding other files, you may end up with blank areas on the disc (between files) that are too small for the new files you are creating. The **Pack Disc** operation packs the current files together, removing unused areas from between the files so that more space is available for files at the end of the disc. To pack the disc:

1. Select the **Pack Disc** operation.
2. Touch **Execute** and when the background of the **Execute** field returns to the original color, the **Pack Disc** operation is complete.

Filename	File Type	File Description
AUTOLOAD	autoload_file	status: DISABLED
LEARN1_B	16520A_config	PRACTICE FILE
LEARN1_D	16530A_config	PRACTICE FILE
LEARN1_E	16510A_config	PRACTICE FILE
LEARN1_	16500A_config	PRACTICE FILE
NEWFILE	16520A_config	PRACTICE FILE

Figure 6-24. The Pack Disc Operation

Duplicating a Disc

The **Duplicate Disc** operation allows you to duplicate all the files on one disc to another disc.

This operation allows you to make a back-up copy of your important discs so you won't lose important data in the event that a disc wears out, is damaged, or a file is accidentally deleted.

To duplicate the disc:

1. Select the **Duplicate Disc** operation.
2. Touch the field to the right of **Duplicate Disc**.
3. When the pop-up appears, touch **Front Disc** or **Rear Disc** to indicate where the destination disc resides. For this example, touch **Rear Disc**.

Note

*If the source format and destination format are not the same, or the destination disc format is unrecognized, **Duplicate Disc** will automatically format the destination disc. If the source disc is in the 1024-bytes/sector LIF format, the destination and source disc will be in the same format.*

CAUTION

*The original directory and files on the destination disc are destroyed by the **Duplicate Disc** operation.*

4. Touch **Execute**, then **Continue**.

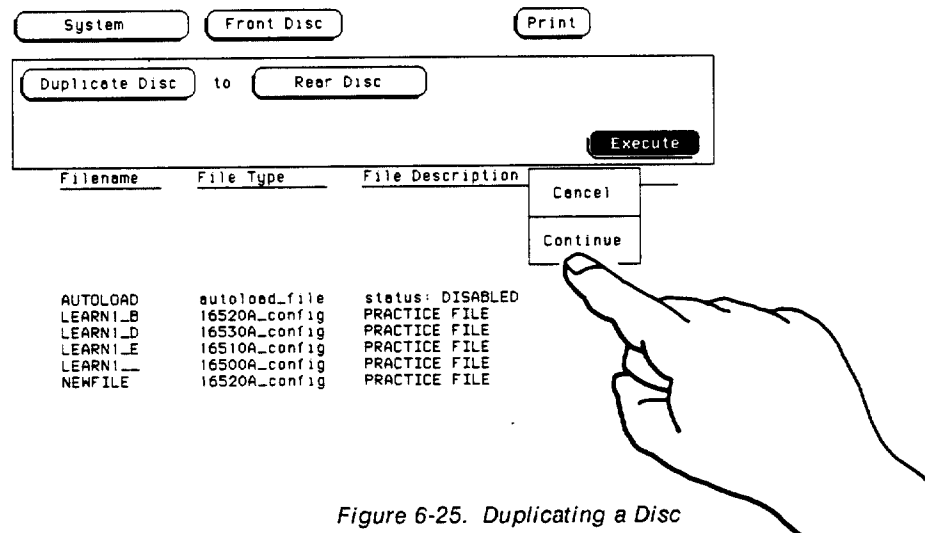


Figure 6-25. Duplicating a Disc

5. When pop-ups appear, simply follow their instructions as they apply to your situation and touch **Continue** to continue.
 - When "Insert DESTINATION disc" appears, insert the destination disc into the disc drive you selected in step 3. Make sure this disc DOES NOT contain any files that need to be saved. Then touch **Continue**.
 - If you are using the same disc drive for your source disc and destination disc, the message "Insert SOURCE disc" will appear. Remove the destination disc and re-install the source disc. Then touch **Continue**.

Note

*When you are using the same disc drive for the **Source** and the **Destination** discs, the advisories "Insert SOURCE disc" and "Insert DESTINATION disc" may appear repeatedly. Simply follow their instructions and touch **Continue** to continue. The number of times you need to change the discs is directly proportional to the length and number of files on the disc you are duplicating.*

7

The System Utilities Menu

Introduction

The **System Utilities** menu is used for turning the sound and touchscreen on and off, recalibrating the touchscreen, and changing the instrument colors. Chapter 7 gives you a brief overview of this menu, then Chapters 8 and 9 discuss the specific functions of the **System Utilities** menu.

Getting into the System Utilities Menu

In the upper-left corner of the screen are two fields that indicate which menu the instrument is in (see figure 7-1). The one to the extreme left shows the module you are in and the one to the right of the module field shows the menu you are in.

- If the module field in the upper-left corner doesn't display **System**, touch this field and when the pop-up appears, touch **System**. This will bring up one of the **System** menus.
- If the field in the upper-left corner displays **System**, but the field to the right of it doesn't display **Utilities**, touch this field. When the pop-up appears, touch **Utilities** to bring up the **System Utilities** menu.

Layout of the System Utilities Menu

Figure 7-1 shows the layout of the **System Utilities** menu and lists the major functions and features.

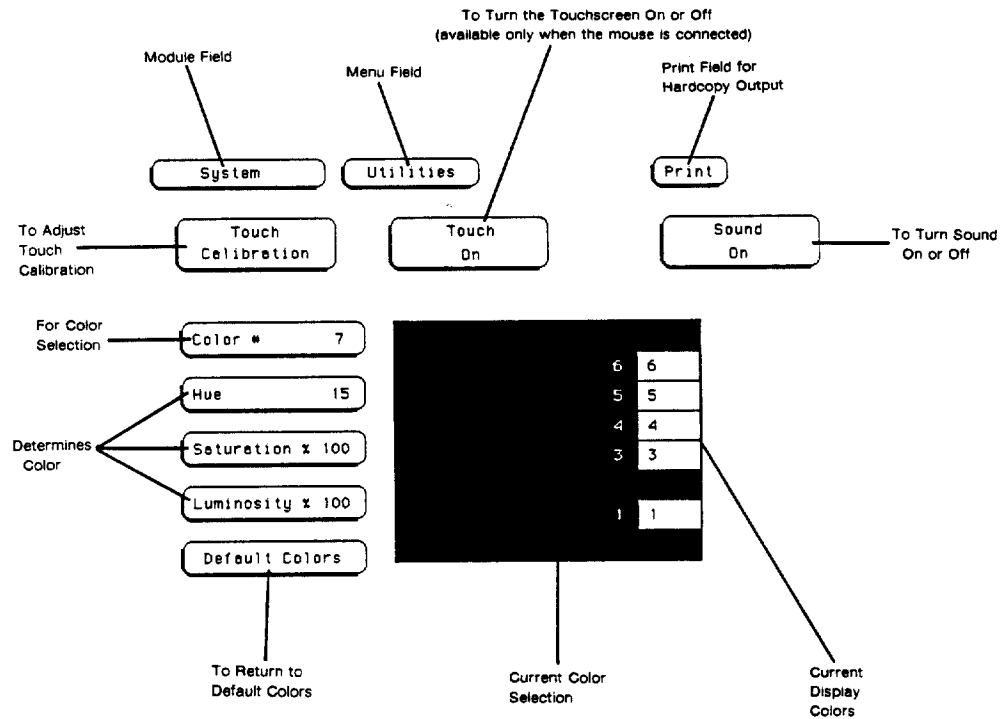
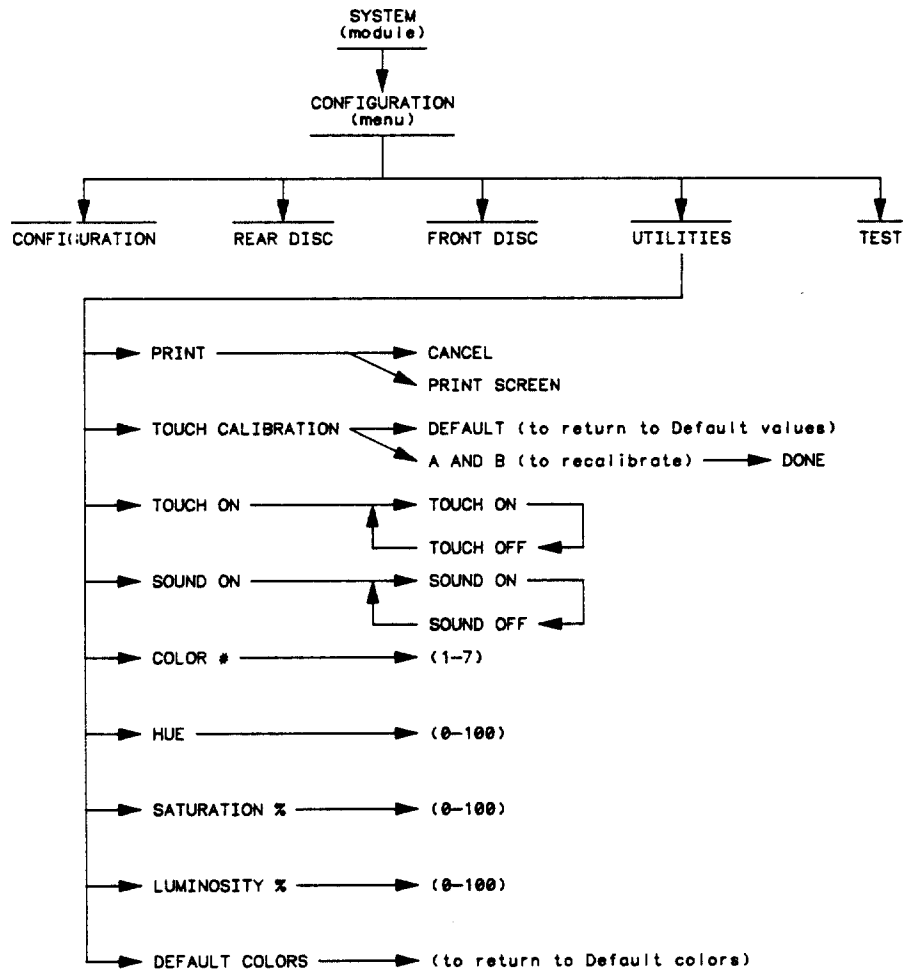


Figure 7-1. The System Utilities Menu

Menu Map

Figure 7-2 displays a menu map for the **System Utilities** menu.



16500/BL07

Figure 7-2. Menu Map for the System Utilities Menu

8

The Touch and Sound Fields of the System Utilities Menu

Introduction

This chapter covers the Touch and Sound fields of the **System Utilities** menu. These fields allow you to recalibrate the touchscreen for better line-of-sight use, turn the touchscreen on and off (when you're using a mouse), and turn on and off the sound effects of the instrument.

Getting into the System Utilities Menu

To bring up the **System Utilities** menu:

1. Touch the field to the right of **System** in the upper-left corner of the display.
2. When the pop-up appears, touch **Utilities** to bring up the **System Utilities** menu.

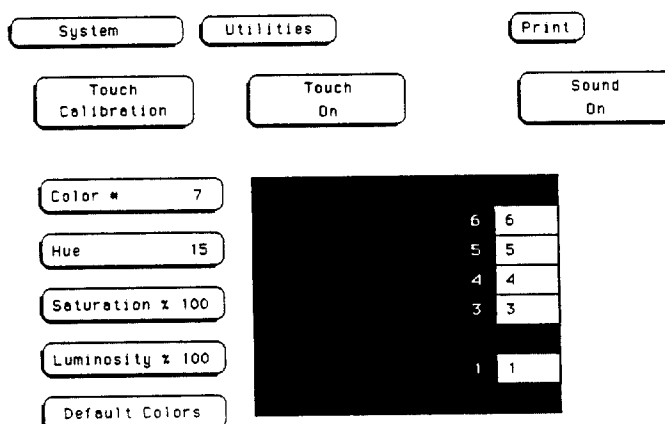


Figure 8-1. The System Utilities Menu

Touch Calibration

It is unnecessary to periodically calibrate the touchscreen. Touch calibration just allows you to reset the touchscreen to your needs and compensate for parallax from different viewing angles.

The **Touch Calibration** field in the upper-left corner of the display brings up the pop-up for adjusting the touchscreen calibration to your own line of sight and to the angle at which you touch the screen. The default calibration is acceptable for most uses, but to change the calibration do the following:

1. Touch the **Touch Calibration** field.

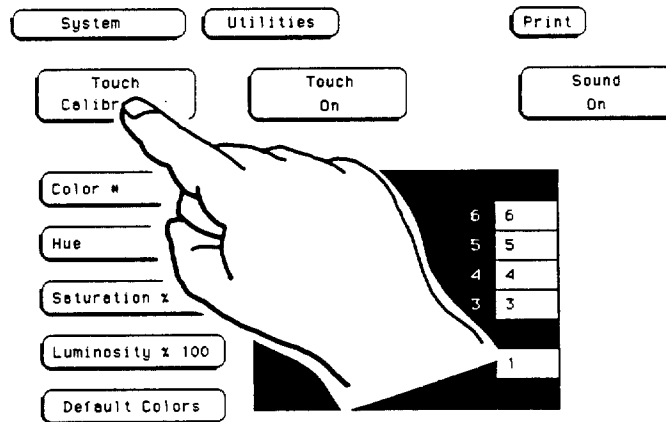


Figure 8-2. Selecting Touch Calibration

2. Touch the **A** field as accurately as possible.
3. Touch the **B** field as accurately as possible.

Note

*Recalibration is done immediately after you touch **A** or **B**. The point at which you remove your finger from **A** or **B** determines where you place your finger to activate subsequent fields.*

4. Touch **Done** when you are finished.

To return to the default touch calibration, touch **Touch Calibration** and when the pop-up appears, touch the **Default** field. This returns the instrument to its default touchscreen calibration. Touch **Done** when you are finished.

Note

At power-up touch returns to the default calibration unless a HP 16500A configuration file is loaded.

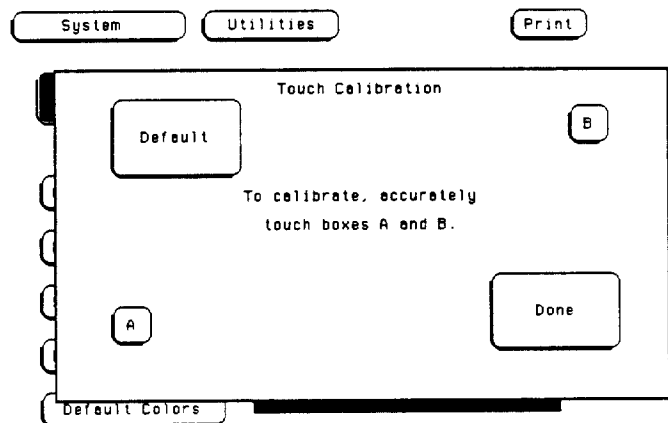


Figure 8-3. Touch Calibration Pop-Up

Touch On

In the center of the menu is the **Touch On** field, which only appears when the optional mouse is connected. Touching this field switches the touchscreen on and off. If you disconnect the mouse after turning the touchscreen off, the touchscreen automatically turns on again. If you want to turn the touchscreen off again after reconnecting the mouse, you must touch **Touch Off** which will change the field to **Touch On**. Then touch **Touch On** and when the field changes to **Touch Off**, the touchscreen will be shut off again.

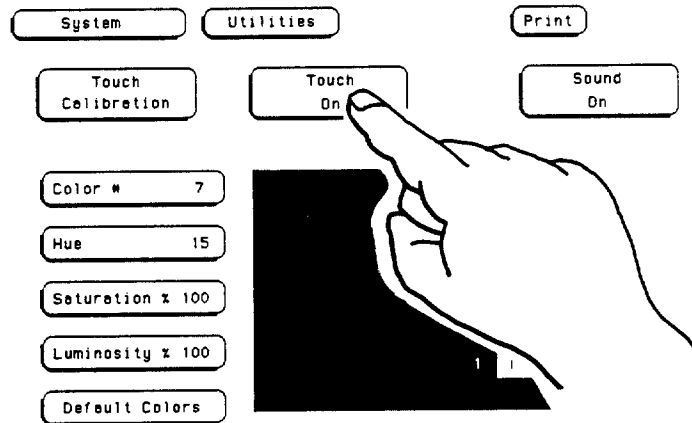


Figure 8-4. The Touch On Field

Sound On

In the upper-right corner, below the **Print** field, is the **Sound On** field. This field is used to turn on and off the sound effects of the instrument. These include the clicks you hear when you touch the fields on the menus and the beeps you hear on error messages.

To turn off the sound effects, touch **Sound On** and it changes to **Sound Off**, shutting off the sound effects. To turn them on again, touch **Sound Off** and it changes back to **Sound On**, turning the sound effects on again.

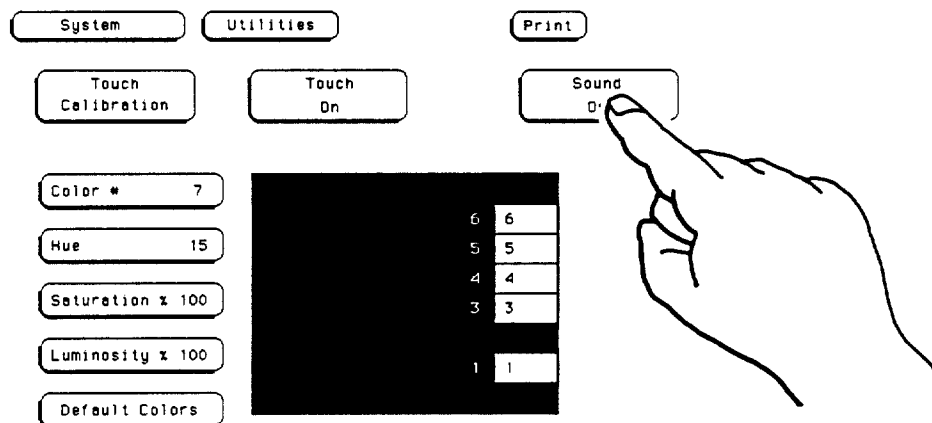


Figure 8-5. The Sound On Field

9

Display Color Selection (System Utilities Menu)

Introduction

In the HP 16500A, color saves time and prevents errors by clarifying the display, making it easier to distinguish one major area from another.

The color selection feature of the HP 16500A allows you to customize display colors, which improves contrast and lessens eye fatigue caused by your operating environment. If you are color-blind to certain colors, are operating in a difficult light environment, or don't like the default colors, you can quickly and easily change them.

Getting into the System Utilities Menu

To bring up the **System Utilities** menu:

1. Touch the menu field to the right of **System** in the upper-left corner of the display.
2. When the pop-up appears, touch **Utilities** to bring up the **System Utilities** menu.

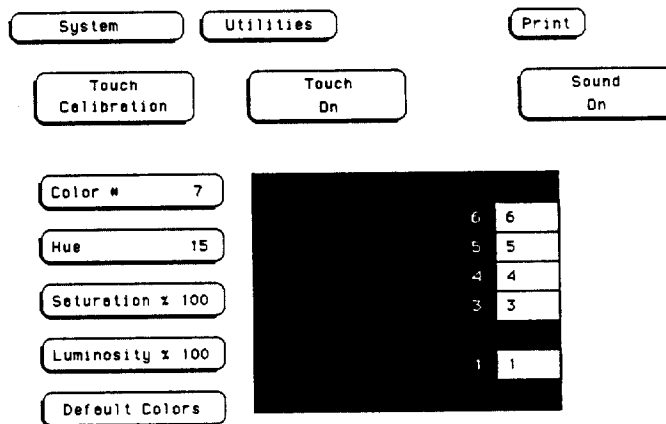


Figure 9-1. The System Utilities Menu

The Color Model

The HP 16500A uses the HSL color model (Hue, Saturation, and Luminosity). This model is very effective for interactive color selection. Similar in concept to the method used by artists for mixing paints, pure hues are selected, and then white and black are mixed to dilute the color and/or darken it.

- **Hue** is the pure color. 0 is red, 33 green, and 67 blue. The selection ranges from 0 to 100.
- **Saturation** is the ratio of the pure color mixed with white (0 to 100%)
- **Luminosity** is the brightness per unit area (0 to 100%).

Figure 9-2 shows a cylindrical representation of the HSL model (Hue, Saturation, and Luminosity). **Hue** is the angular coordinate, **Saturation** is the radial coordinate, and **Luminosity** is the altitude above the polar coordinate plane.

The cylinder rests on a black plane (Luminosity = 0%) and extends upward. As you increase in altitude, you increase luminosity, which represents an increase in brightness. Whenever luminosity is zero, the values of saturation and hue do not matter. Zero luminosity is black, and 100% luminosity gives you the pure color.

White is the center of the top of the cylinder (Luminosity = 100%, Saturation = 0%). The center line of the cylinder (Saturation = 0%) is a line which connects the center of the black plane (Luminosity = 0%, Saturation = 0%) with white (Luminosity = 100%, Saturation = 0%) through a series of gray steps (Luminosity from 0% to 100%, Saturation = 0%). Whenever saturation is 0%, the value of hue does not matter. Zero saturation is white, and 100% saturation gives you the pure color. The outer edge of the cylinder (Saturation = 100%) represents the fully saturated color.

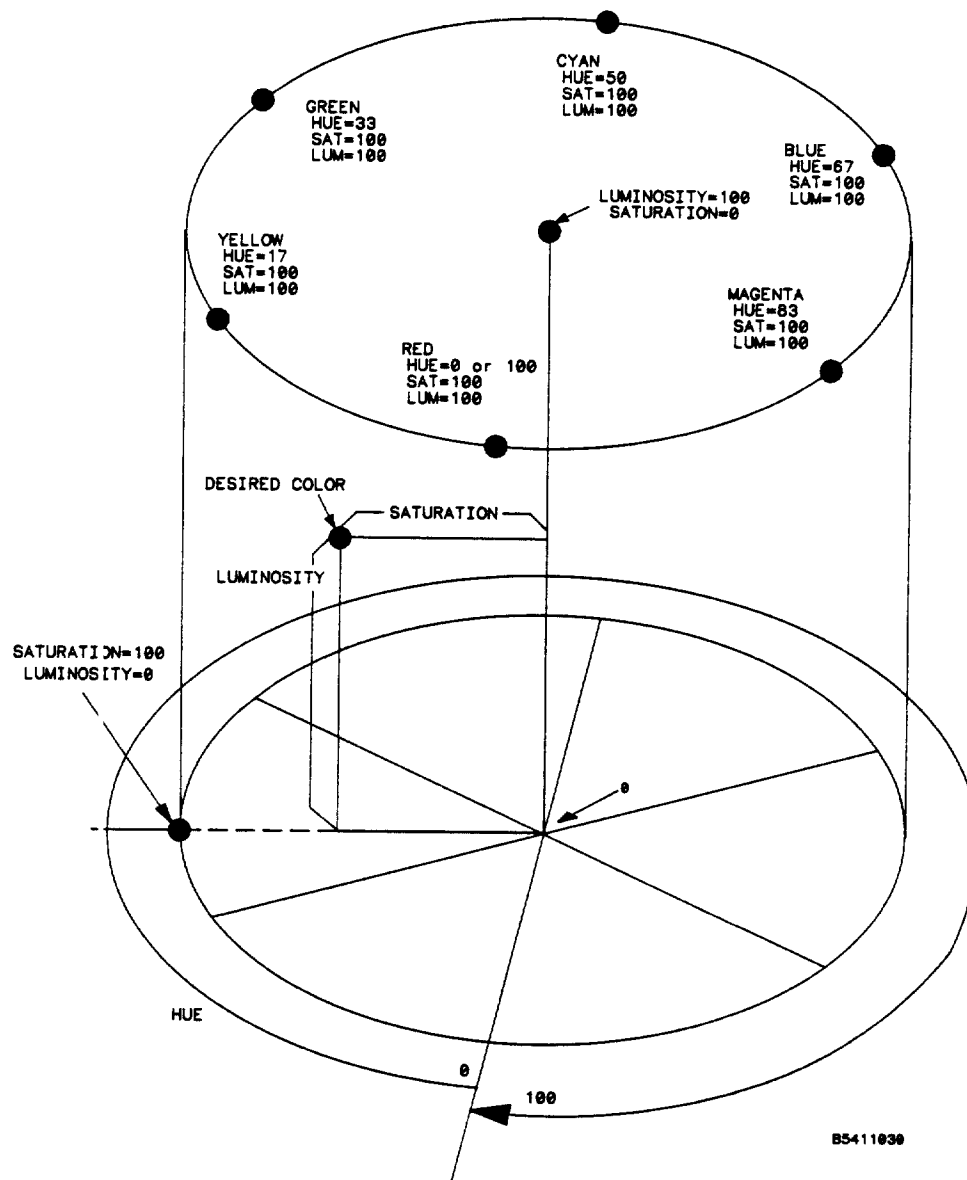


Figure 9-2. The Color Model

Selecting the Color, Hue, Saturation, and Luminosity Fields

To select the **Color**, **Hue**, **Saturation**, or **Luminosity** fields, see if the field you want has a different background than the other fields (light blue for the default colors). If it already has a different background, rotate the knob to change the value in that field. Otherwise, touch the field once and its background will change color, indicating that it has been selected. Then rotate the knob to change the value. If you look at the large field in the center of the display, you can see how the knob affects the color.

If you know the value you want in a particular field, see if that field has a different background than the other fields (light blue for the default colors). If it already has a different background, touch this field and a pop-up keypad will appear. Otherwise, touch the field once to select it and a second time to bring up the pop-up keypad. Then enter the value you want with the keypad and touch **Done**. The pop-up will disappear, placing your new value in the appropriate field and changing the color.

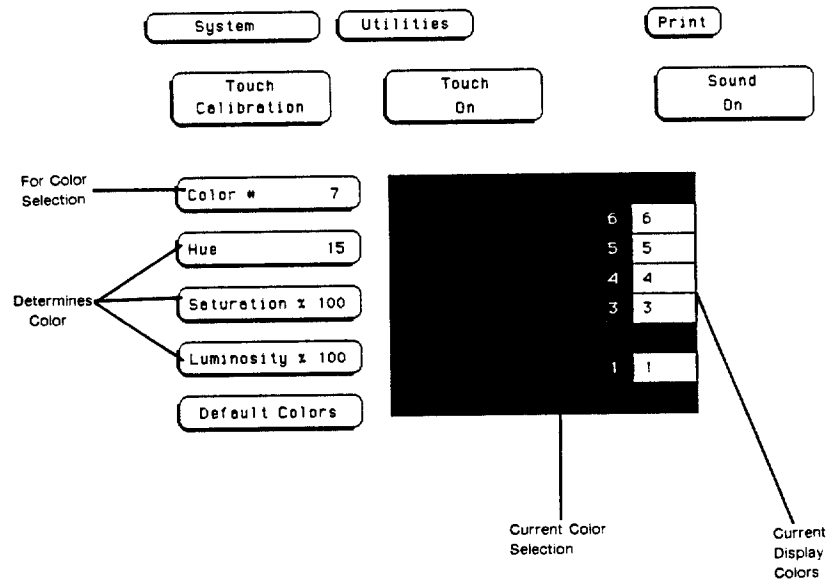


Figure 9-3. Color Selection

For example, to use the **knob** to change the value of **Hue** to 45:

1. Touch the **Hue** field once.
2. When the background of the **Hue** field changes color (light blue for default colors), turn the **knob** to change the value for **Hue** to 45. You can see how the knob affects the color in the large field at the center of the display.

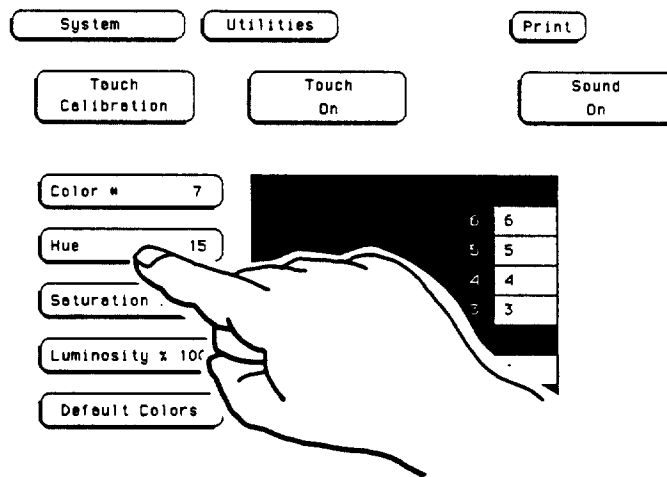


Figure 9-4. Changing the Value for Hue

To use the pop-up keypad to change the value of **Luminosity** to 65:

1. Touch the **Luminosity** field once and its background changes color (light blue for default colors).
2. Touch the **Luminosity** field a second time and a pop-up keypad appears.
3. Enter 65 with the keypad and notice that your value appears in the box at the top of the keypad.
4. When you are finished, touch **Done** and the pop-up keypad will disappear, placing your value in the appropriate field and changing the appropriate color.

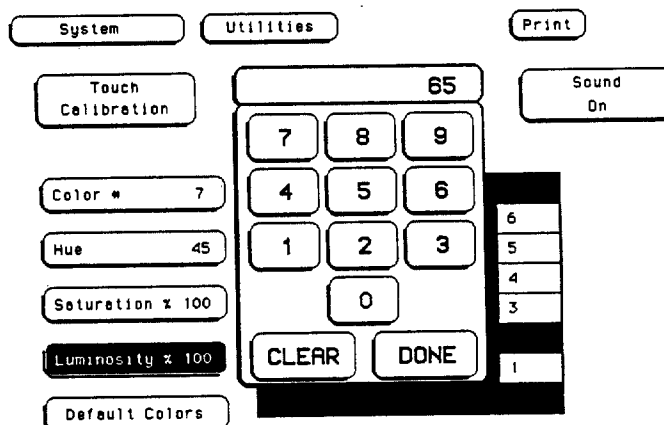


Figure 9-5. Changing the Value for Luminosity

The Color Field

Once the **Color** field has been selected, you can select any one of seven variable display colors by rotating the knob on the front panel. The **Color** field displays your choice (1-7). The large field to the right of the **Color** field displays the color you are working with, and the small numbered fields within this large field display the other colors available. Table 9-1 lists the display colors for the HP 16500A.

Note

*The screen may be turned off when using an external controller by setting the **Luminosity** of each color to zero.*

Table 9-1. HP 16500A Display Colors

Color	Default Color	Hue	Saturation	Luminosity	Uses
1	Tan	13	43%	76%	Main background color for the display
2	White	0	0%	100%	Light text and timing waveforms on certain modules
3	Dark Blue	60	100%	60%	For touch items (touch-sensitive fields)
4	Light Blue	60	45%	90%	For selected items, items that the knob is assigned to, limited background use, and certain display channels on the oscilloscope module
5	Green	33	100%	75%	For the Run field, advisory fields, the X marker on certain modules, certain display channels for the oscilloscope module, and miscellaneous other uses

Table 9-1. HP 16500A Display Colors (Continued)

Color	Default Color	Hue	Saturation	Luminosity	Uses
6	Red	0	100%	100%	For the Stop field, error fields, the Cancel Print field, the trigger point, and certain display channels on the oscilloscope module
7	Yellow	15	100%	100%	For warning or advisory fields, the 0 marker on certain modules, certain display channels on the oscilloscope module, and miscellaneous other uses
0*	Black	--	--	0%	For dark text, background, and waveform areas

* Color "0" is a non-variable color.

Returning to the Default Colors

The **Default Colors** field, below the **Luminosity** field, allows you to return to the default colors simply by touching that field. These default colors are listed in Table 9-1.

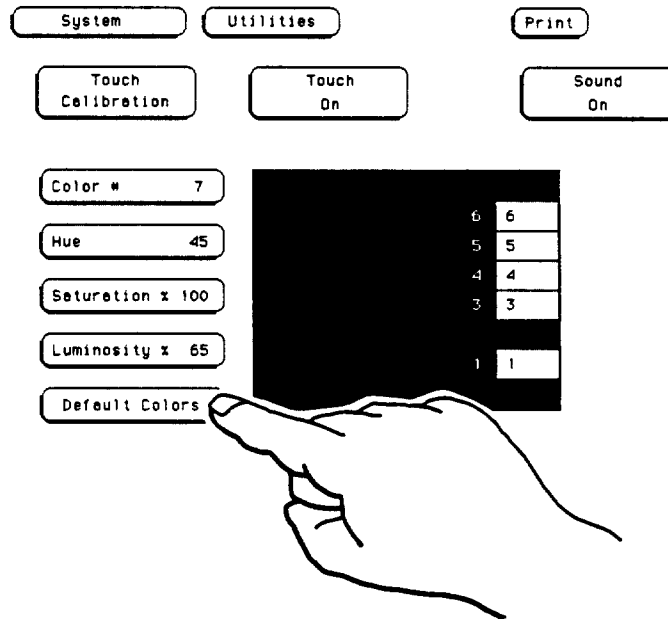


Figure 9-6. Returning to the Default Colors

10

Intermodule Measurements

Introduction

The HP 16500A can be configured with several different modules inside the instrument at one time. The **Intermodule** menu allows you to make interactive measurements between these modules. This also includes making measurements that use one or more modules in conjunction with an external instrument.

The basic functions of the **Intermodule** menu give you the ability to configure modules to run simultaneously, set up arming sequences between modules, adjust skew between modules, and synchronize with external equipment. The **Intermodule** menu also lets you to display the resulting waveforms and state listings for several modules together on one screen.

Getting into the Intermodule Menu

To bring up the **Intermodule** menu, touch the module field (System) in the upper-left corner of the display. When the pop-up appears, touch **Intermodule** to bring up the **Intermodule** menu (see figure 10-1).

The Intermodule Menu

There are three different types of operations that can be performed from the **Intermodule** menu.

1. You can set up modules to run independently or within an intermodule measurement. Initially, the intermodule configuration tree (see figure 10-1) is empty with all the modules running independently. By adding modules to the intermodule configuration tree, intermodule measurements are configured. Modules that appear directly below the large **Group Run** field are armed immediately after the **Group Run/Stop** field in the upper-right corner is touched. Modules that appear below other modules are armed when the preceding module finds its trigger.

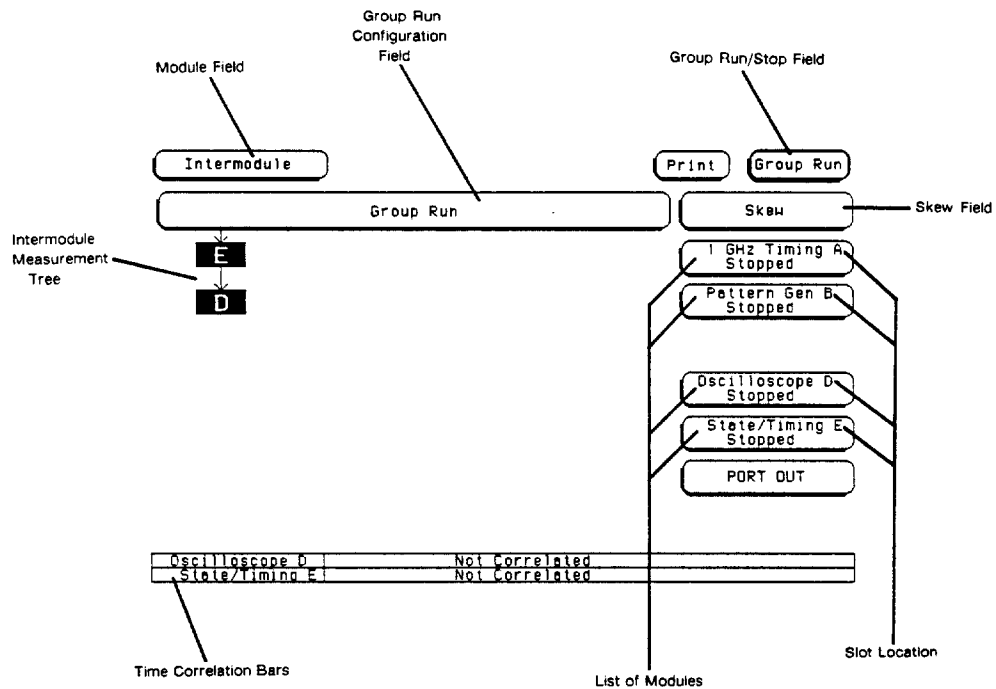


Figure 10-1. The Intermodule Menu

2. You can synchronize with external equipment.

- Once a module is added to the intermodule configuration tree, the **PORT OUT** signal can be added beneath that module or any other module appearing on the tree. When the module preceding PORT OUT triggers, a signal is sent to the PORT OUT BNC of the instrument to arm an external device.
- The **PORT IN** signal can be selected to arm the intermodule configurations in conjunction with the **Group Run/Stop** field. When **PORT IN** is activated and the measurement is configured, touch the **Group Run/Stop** field. The intermodule measurement begins when the proper signal is sent to the PORT IN BNC on the rear panel of the instrument.

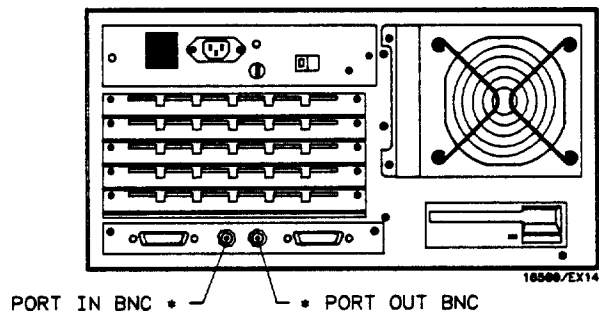
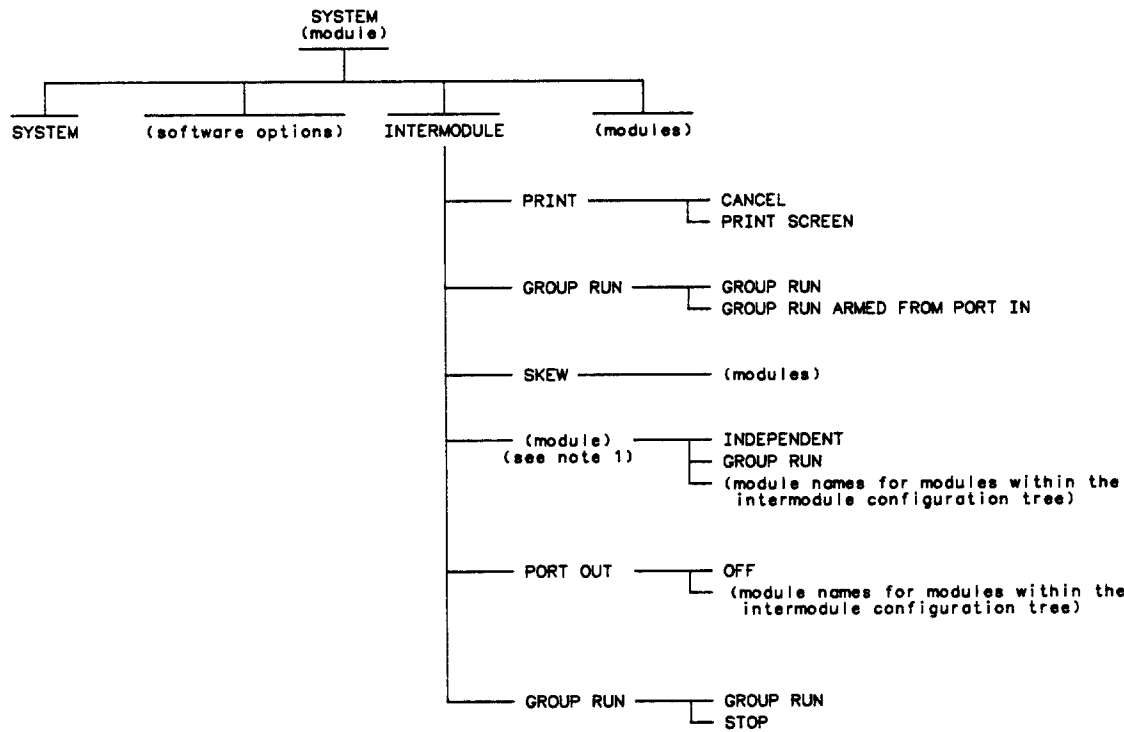


Figure 10-2. HP 16500A Rear Panel

3. You can modify the intermodule skew offsets with the **Skew** pop-up of the **Intermodule** menu to adjust skew or timing deviation between the modules within the intermodule measurement. This allows you to compensate for any known delay of the system under test or compare two signals by removing any displayed skew between the signals.

Menu Map

Figure 10-3 displays the menu map for the **Intermodule** menu of the HP 16500A.



NOTE 1: THE WORD MODULE IN PARANTHESES REPRESENTS THE NAME OF THE MODULES CONFIGURED IN YOUR SYSTEM. THIS PART OF THE MENU MAP REPEATS ITSELF FOR EACH MODULE.

16500/BL10

Figure 10-3. Menu Map for the Intermodule Menu

What Happens When You Touch Group Run?

This is a brief overview of the operation of the **Intermodule** menu as it is configured in figure 10-4. When you touch the **Group Run/Stop** field in the upper-right corner:

1. The status for each module involved changes to **Running** (as shown in the individual module fields).
2. The status of module D and module E is checked until their pre-store qualifications are met.
3. When the pre-store qualifications of D and E are met, module B is armed and its appropriate measurement is run.
4. When module B triggers, module B simultaneously arms modules D and E.

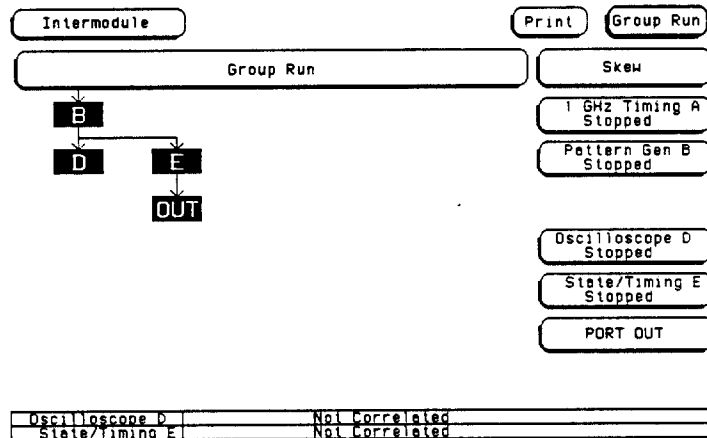


Figure 10-4. Intermodule Menu

5. When module E triggers, module E sends a signal to an external device through "PORT OUT."
6. The status of each module changes to **Stopped** when the module finishes its operations. After all the modules are finished, the data is displayed in the individual waveforms or display menus of the modules.

The time correlation bars at the bottom of the menu display the start and stop acquisition window of each module relative to the other modules.

Why Use Intermodule Measurements?

Intermodule measurements can be used when you need the acquisition capabilities of one module to look at a signal, but you need the triggering capabilities of another module to properly trigger the measurement.

What Are Some Typical Intermodule Measurements?

Intermodule measurements may be as simple as configuring the **Intermodule** menu to start several modules at once, or very complex with multiple arming sequences between modules and external equipment. Examples 1 through 3 explain some typical intermodule measurements.

Example 1:
Analyzing a Glitch

A glitch is defined as two or more transitions between the samples of a timing analyzer that cross the logic threshold. A timing analyzer can trigger on a glitch and capture it, but doesn't have the voltage or timing resolution to look at the glitch in detail.

On the other hand, an oscilloscope can acquire waveforms with a great deal of resolution, but it can't trigger on glitches.

To analyze a glitch, use a timing analyzer and an oscilloscope interactively. Set up the timing analyzer to trigger on a glitch and when the timing analyzer triggers, capture the glitch with the oscilloscope. Then use the oscilloscope to look at the waveform parameters of the glitch, including its width, shape, and amplitude.

For this intermodule measurement, you are using the triggering capabilities of the timing analyzer and the acquisition capabilities of the oscilloscope.

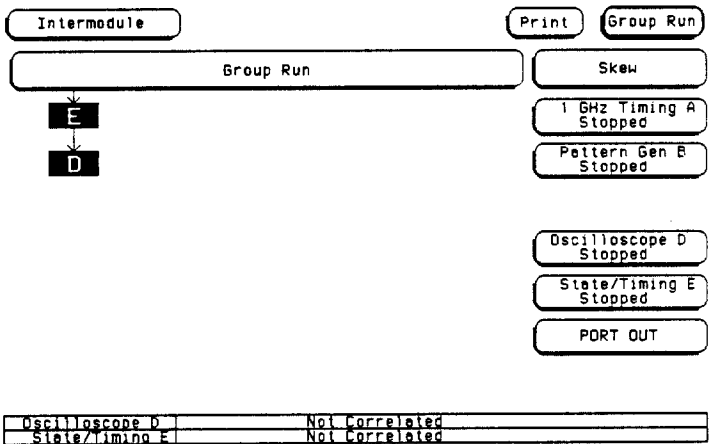


Figure 10-5. Intermodule Menu Configured for Example 1

**Example 2:
Analyzing Interrupt
Handling in a
CPU System**

Most microprocessor programs can be interrupted by an asynchronous hardware signal. Software designers are interested in the processor's real-time response to interrupts. In particular, they need to answer these kinds of questions:

- Does the processor branch to the proper interrupt handling routine?
- Are registers and status information saved properly?
- How long does it take to service the interrupt?
- Is the interrupt acknowledged properly?
- After the interrupt is serviced, does the processor restore registers and status information and continue with the previous routine as expected?

Usually, software designers want to look at the program flow of their microprocessor system around an asynchronous event.

A state analyzer, coupled with a preprocessor and an inverse assembler, is useful for tracing the flow of a microprocessor program. A timing analyzer or an oscilloscope is designed to trigger on asynchronous events like edges.

In this example, use an oscilloscope with a sample rate faster than the microprocessor clock to trigger on the asynchronous event and to arm the state analyzer. Then use the state analyzer to check the address of the interrupt routine. You may also use the state analyzer to see if the microprocessor is properly servicing interrupts and returning to the correct address after each interrupt routine.

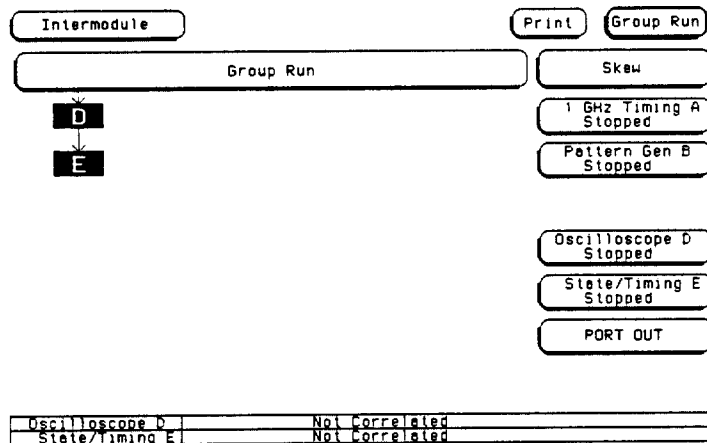


Figure 10-6. Intermodule Menu Configured for Example 2

Set up the oscilloscope to trigger on the asynchronous interrupt line. This is usually an edge-sensitive line on which the oscilloscope can trigger.

The state analyzer should be armed by the oscilloscope. Set the state analyzer to trigger on all "don't cares" and it will capture the interrupt service routine when the arm signal is received.

For this intermodule measurement, arming the state analyzer with the oscilloscope allows a software designer to track the flow of a microprocessor program around a hardware interrupt.

**Example 3:
A Simple Stimulus/
Response System**

During system development, designers are often faced with verifying a part of a design when the input signals for that part are unavailable. Here are some common examples of this problem:

- * Verifying hardware operation when a part of the hardware is unavailable to drive the circuit.
- * Testing a PC board without a board test system.

The traditional solution is to use word generators to emulate the missing part of the design, and to use logic analyzers and oscilloscopes to capture the system response. Unfortunately, the user is often faced with an awkward solution of stacking several boxes on top of each other, with a maze of cables tying them together, and a different interface for each instrument.

The HP 16520A/21A Pattern Generator in the HP 16500A can act as the stack of word generators in this problem. State, timing, and analog modules can all be used to capture the response of the system.

The HP 16520A/21A Pattern Generator is loaded with the proper patterns and when it starts sending patterns, it sends an arm signal over the intermodule bus.

The acquisition modules are armed from the pattern generator module and set to trigger on the appropriate event in the system.

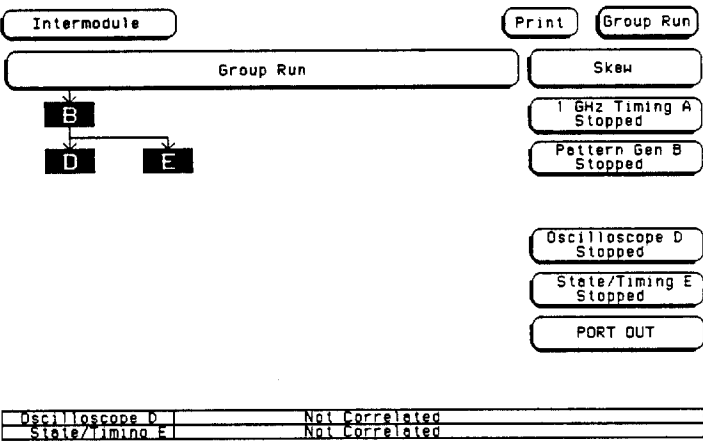


Figure 10-7. Intermodule Menu Configured for Example 3

How Are Intermodule Measurements Set Up?

Intermodule measurements are set up in the **Intermodule** menu of the HP 16500A by arranging the modules for the needed intermodule sequences. Each module may be used only once and any unused modules can be left to run independently of the intermodule measurement.

To select the **Intermodule** menu:

1. Touch the module field (System) in the upper-left corner of the display.
2. When the pop-up appears, touch **Intermodule** to bring up the **Intermodule** menu.

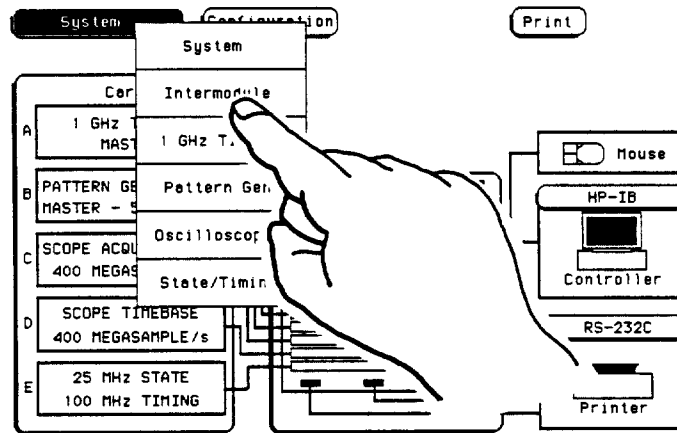


Figure 10-8. Selecting the Intermodule Menu

The Group Run Configuration Field

The large **Group Run** field, below the Intermodule field, is used in the configuration of this menu. This field is the base of the intermodule configuration tree. This tree displays how the modules interact and which modules are armed when the intermodule measurement is run. Modules that appear directly below the large **Group Run** configuration field are armed immediately after the **Group Run/Stop** field in the upper-right corner is touched. Modules that appear below other modules are armed when the preceding module finds its trigger.

Touch this field and a pop-up appears displaying:

- * **Group Run**; and
- * **Group Run Armed from PORT IN** which allows you to use an external input to arm the Group Run measurement. This input requires a minimum input of 2.4 V for a high and a maximum of 0.4 V for a low. It is high active and the actual PORT IN BNC input is located on the rear panel.

Touch **Group Run** and the pop-up disappears.



*To use **PORT IN**, an external device must be connected to the PORT IN BNC on the rear panel. If an external device isn't connected, or is accidentally disconnected from the PORT IN BNC, the instrument will go to the Trigger Immediate mode.*

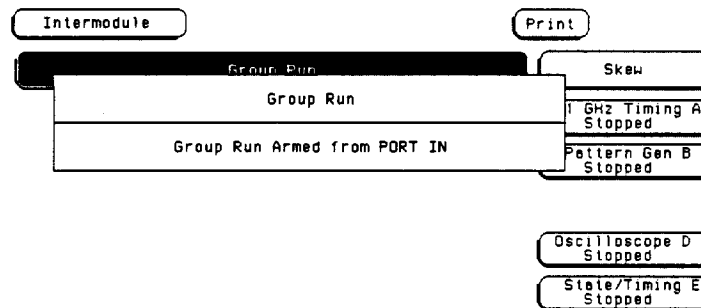


Figure 10-9. The Group Run Configuration Field

The Group Run/Stop Field

When a module is added to the intermodule configuration tree, the module's **Run/Stop** field changes to the **Group Run/Stop** field. The **Group Run/Stop** field is the **Run/Stop** field for the modules in the **Intermodule** menu. This field appears in the **Intermodule** menu so that the measurement can be started from this menu and the results monitored with the **Running/Stopped** status indicators and time correlation bars.

If you touch and hold the **Group Run/Stop** field, a pop-up appears with your choices for acquiring data.

- **Single**, which is the default, allows you to run the measurement once.
- **Repetitive** allows you to run the measurement as many times as you want to collect data for statistical measurements, etc. Press **Stop** when you want to stop collecting data.
- **Cancel** allows you to cancel the measurement.

Touch the field you want while you are still touching the **Group Run/Stop** field and your choice will be displayed with a light-blue background. Releasing the **Group Run/Stop** field before making your selection or without changing the selection results in the instrument running the measurement according to the last input to this field.

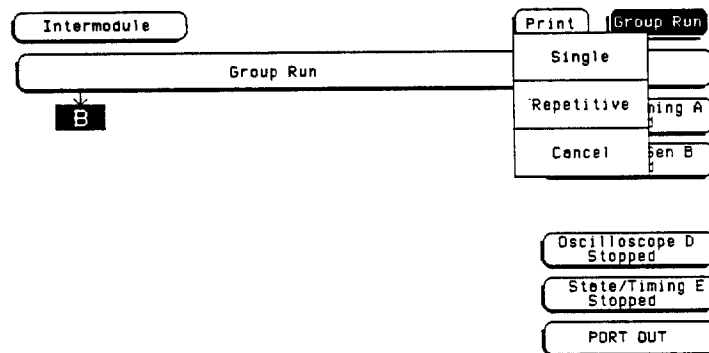


Figure 10-10. The Group Run/Stop Field

The Modules

On the right side of the screen are fields listing the different modules that can be configured in the **Intermodule** menu. When you touch one of the "module" fields, a pop-up appears displaying the possible locations of the module in the Intermodule configuration tree.

- **Independent** allows the module to run independently of the other modules and removes it from the intermodule configuration tree.
- **Group Run** places the module directly below the large Group Run Configuration field. This module is armed immediately after the **Group Run/Stop** field is touched.
- The other fields in the pop-up list the name of the modules that are already part of the intermodule configuration tree and can be used to arm this module. Touching one of these fields places the current module below the module indicated by the field you selected. The current module is then armed when the preceding module finds its trigger.

After you make your selection, a box appears in the intermodule configuration tree with the module's slot location (A, B, C, D, or E) representing the location of the module in the tree.

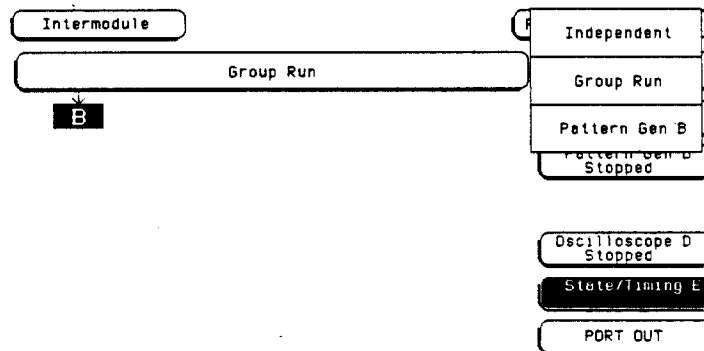


Figure 10-11. The Module Pop-Up Menu

Port Out **PORT OUT** is used to enable an external device from another module in the intermodule configuration tree. This field only appears when a module is present in the intermodule configuration tree.

To use the **PORT OUT** feature:

1. Touch the **PORT OUT** field below the last module field on the right side of the display and a pop-up appears listing all of the modules that appear in the intermodule configuration tree.
2. Touch the field displaying the name of the module that needs to arm the external device and the pop-up disappears. **OUT** (for **PORT OUT**) now appears in the intermodule configuration tree below the module you selected.

The actual BNC connection for the **PORT OUT** feature is on the rear panel of the instrument. When activated, **PORT OUT** outputs a positive-going TTL pulse whose width varies depending on the module that is driving it. This port may be terminated by a 50 ohm load to reduce ringing on the signal. If terminated, the signal will be less than or equal to 0.4 V when low and at least 2.0 V when high.

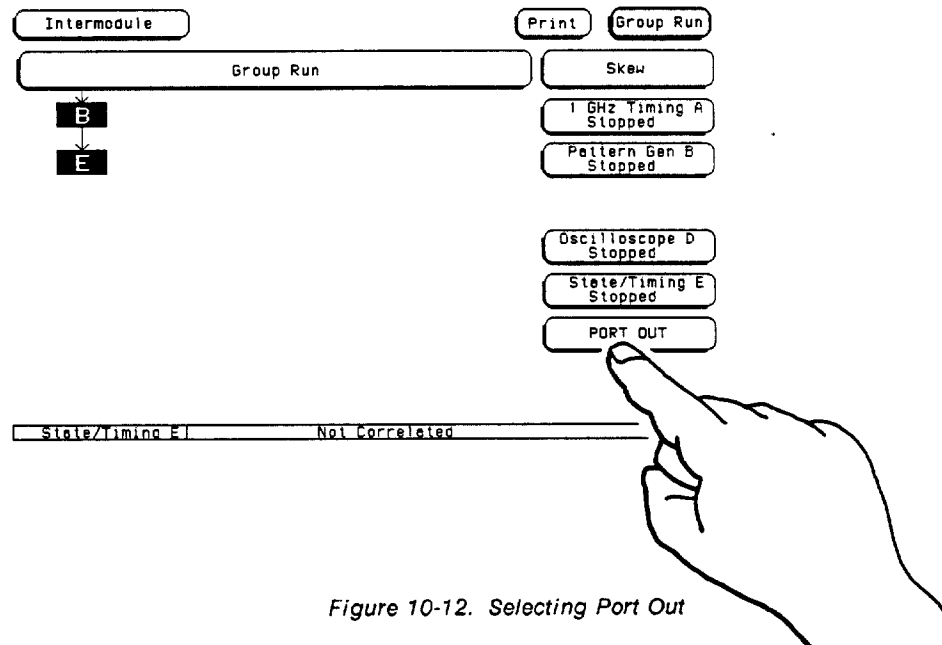


Figure 10-12. Selecting Port Out

Status Indicators and Time Correlation Bars

Running or Stopped appears below the names of the individual modules that are listed on the right side of the **Intermodule** menu. This indicates the current status for each module and can be used to monitor the intermodule measurement. If there is a problem with the measurement, a quick check of these status indicators can show you which modules have completed their operations (**Stopped**) and which ones are still **Running**. Generally:

- If a module was running and is stopped now, you can assume it received its arming signal and triggered properly.
- A module below a stopped module on the intermodule configuration tree has received its arming signal. If it's still running, then it may have trouble triggering or completing its task.
- A module below a running module on the intermodule configuration tree has not received its arming signal yet.

The time correlation bars at the bottom of the menu display the start and stop time of each module relative to the other modules.

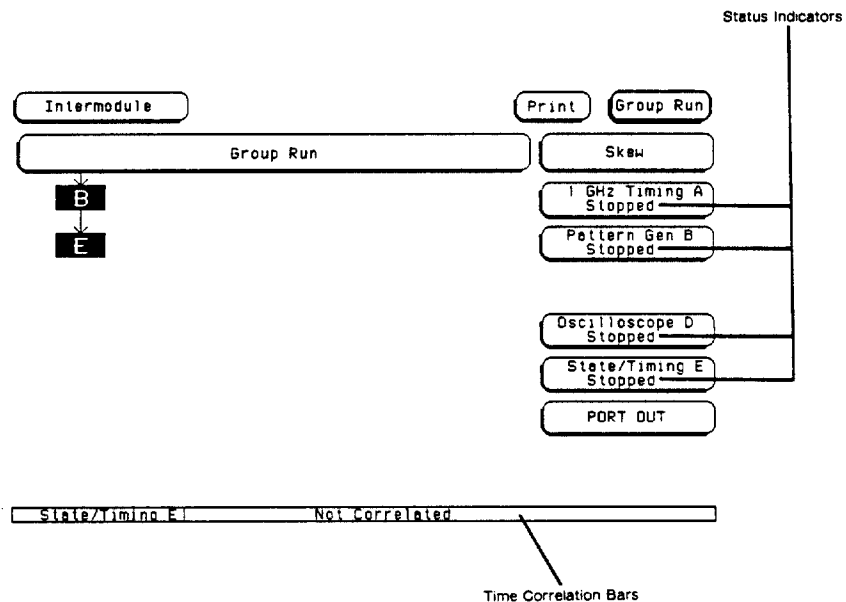


Figure 10-13. Status Indicators and Time Correlation Bars

The Skew Menu

Touch the **Skew** field to bring up the **Skew** pop-up menu.

The **Skew** pop-up of the **Intermodule** menu is used to skew waveforms or state listings between modules on the display. This allows for display adjustment to within 1 ns between modules. The major purpose of this adjustment is to compensate for variances in internal probing delays across modules.

To adjust the skew of the module, use the **Skew** pop-up to add or subtract a known module skew value. This value may be calculated with the markers by measuring the skew between some common signal sampled by both modules.

To enter a value of skew, touch the field for the module you want and, after it turns light blue, input the skew with the knob. If you touch the field a second time, a pop-up keypad appears to input the skew.

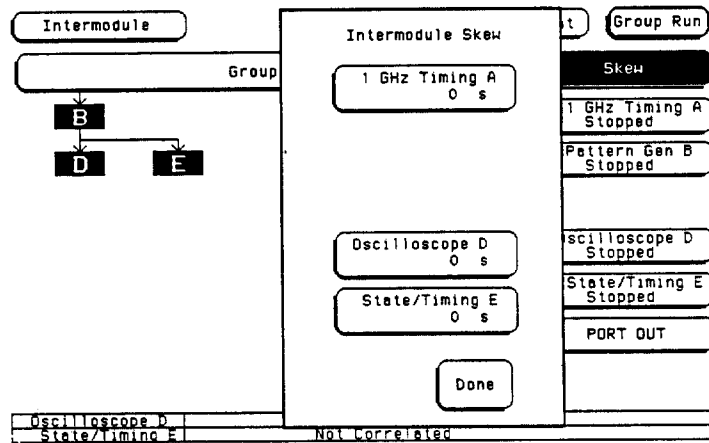


Figure 10-14. The Skew Pop-up

Displaying Multiple Module Data on One Screen

When you are making intermodule measurements, you can display the resulting waveforms or state listings for several modules together on one screen. For example, to display the waveform data for the HP 16530A/31A Oscilloscope and the HP 16510 Timing Analyzer on an oscilloscope menu:

1. Touch the module field in the upper-left corner of the screen.
2. When the pop-up appears, select the HP 16530A/31A oscilloscope module (**Oscilloscope D**).
3. When the HP 16530A/31A menu appears, select the menu in which you want to view the data (for this example, **Auto-Measure**).
4. Touch the channel label field to the right of the waveform display.

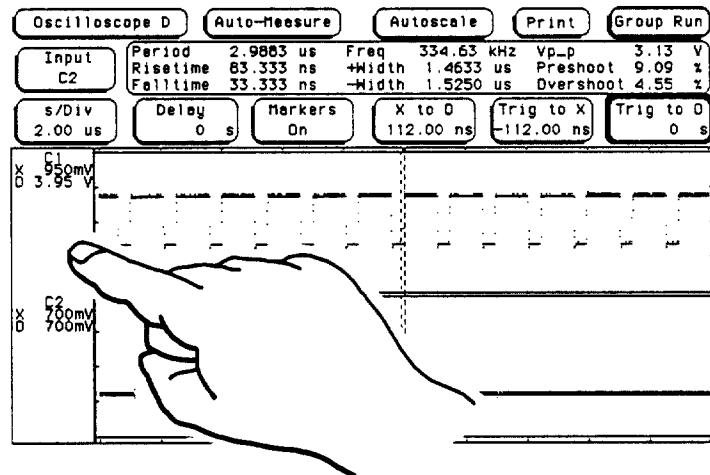


Figure 10-15. Selecting the Waveform Selection Pop-up

5. When the **WAVEFORM SELECTION** pop-up appears, touch the field displaying **Module Oscilloscope D**.

6. When the pop-up appears, touch **State/Timing E**. After the pop-up disappears, the appropriate labels for the channels of the HP 16510A State/Timing Analyzer will be listed on the left side of the pop-up.

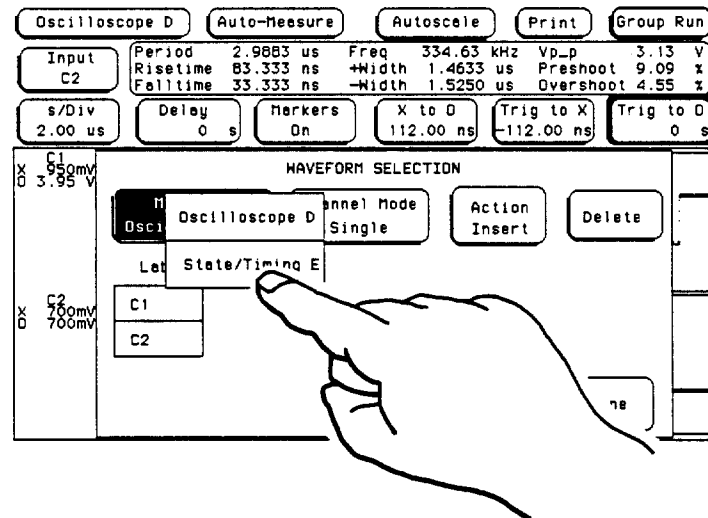


Figure 10-16. Selecting State/Timing E

7. Touch the labels for the channels that you want displayed. For this example, touch **OUT_4**.

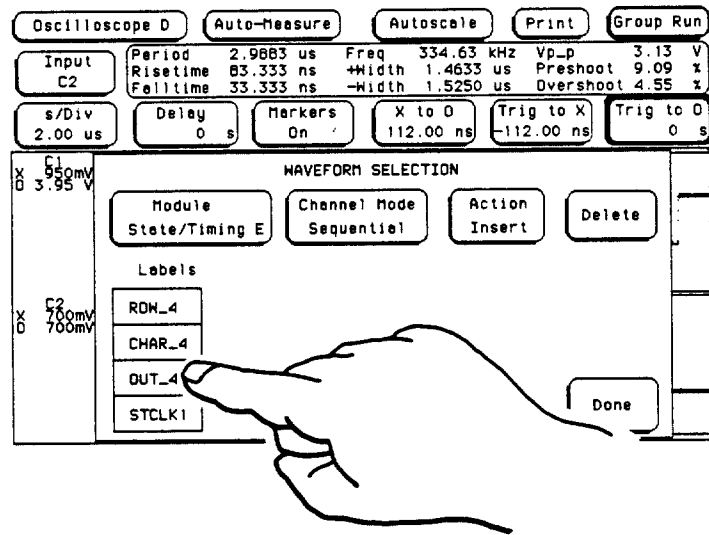


Figure 10-17. Selecting HP 16510A Channels

8. Touch **DONE** and the **WAVEFORM SELECTION** pop-up will disappear, returning you to the waveform display. As shown in figure 10-18, the five HP 16510A timing analyzer channels (OUT_4) are now displayed with the HP 16530A/31A oscilloscope channels C1 and C2 on the **Oscilloscope D Auto-Measure** menu.

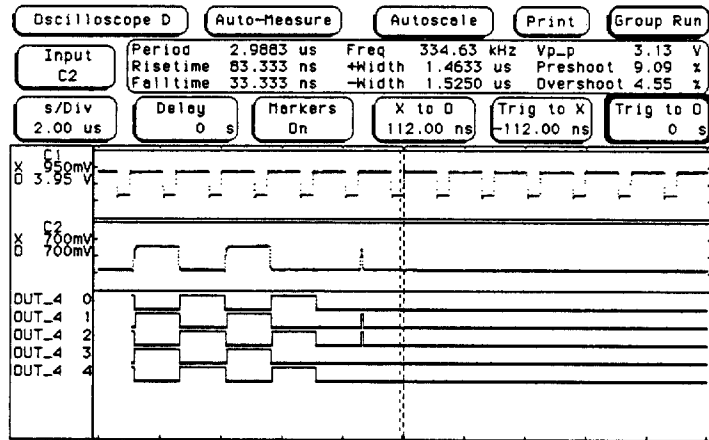


Figure 10-18. Displaying Multiple Module Data on One Screen

Helpful Hints

1. When setting up measurements, start with simple setups and work up to more complex ones. For example, set up the module that will trigger first and take a measurement with only this module. Once you've verified that this first trigger works properly, start adding additional modules to be armed by this trigger.
2. Before starting the measurement, set all modules to store data while they search for the trigger condition. This way, you can see information on both sides of the trigger condition as you fine-tune the measurement.
3. For time correlation between modules, initially set the modules that are armed from the intermodule bus to trigger on all "don't cares" or to "trigger immediately." Then increase the triggering requirements in stages by starting with the first modules that are armed and working from the top to the bottom of the intermodule configuration tree.

Exercise

The following is a brief exercise to help you become more familiar with the **Intermodule** menu of the HP 16500A. The steps are both numbered and lettered. The numbered steps state the objective and the lettered steps explain how to accomplish each step objective. You may be able to go through the exercise by just following the numbered steps. When you need more information on how to accomplish the step objective, refer to the lettered steps.

For this example, assume that you are using an external device to arm the intermodule measurement. When the arm signal is received, use the module in slot A (the 1 GHz Timing Analyzer) to capture the data. Then use the acquisition capabilities of the modules in slot D and E (the Oscilloscope and State/Timing Analyzer) to analyze the data.

1. Remove any previous assignments from the intermodule configuration tree.
 - a. Touch the field for each of the upper-most modules in the intermodule configuration tree.
 - b. When the pop-up appears, touch **Independent**.
 - c. Repeat steps a and b for each of the upper-most modules in intermodule configuration tree.

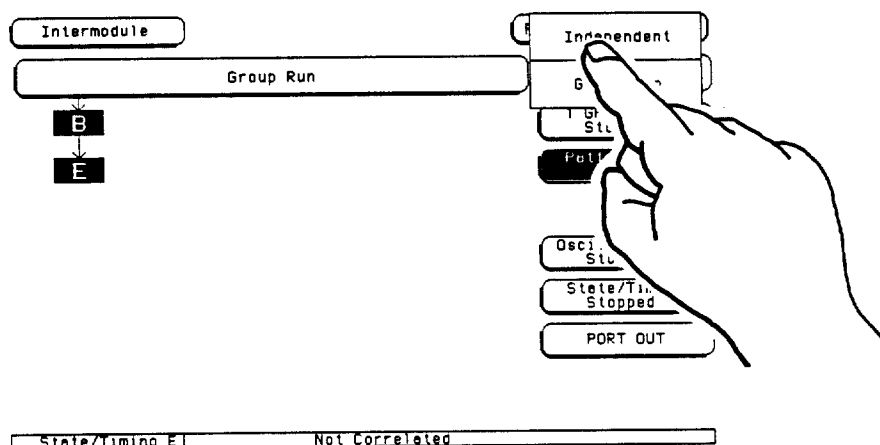


Figure 10-19. Clearing the Intermodule Configuration Tree

2. Select **Group Run Armed from PORT IN**.

a. Touch the large **Group Run** field.

b. When the pop-up appears, touch **Group Run Armed from PORT IN**.

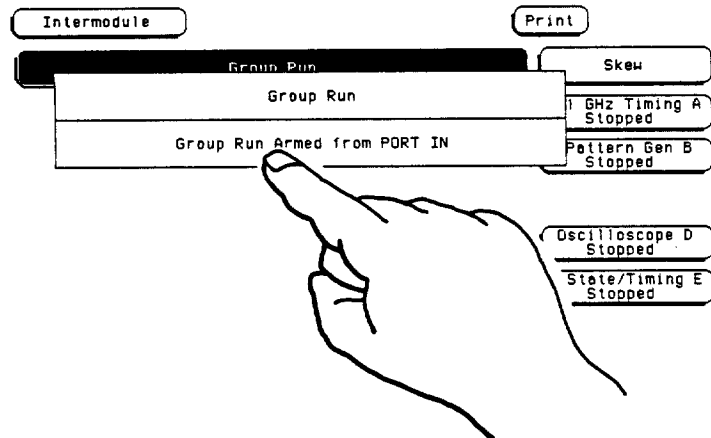


Figure 10-20. Selecting Group Run Armed from PORT IN

3. Configure the module in slot A (**1 GHz Timing A**) to be armed by the **Group Run** configuration field.
 - a. Touch the field for the module in slot A (**1 GHz Timing A**).
 - b. When the pop-up appears, touch **Group Run**.

Note

*Notice that the **PORT OUT** field appears when the module in slot A appears in the intermodule configuration tree.*

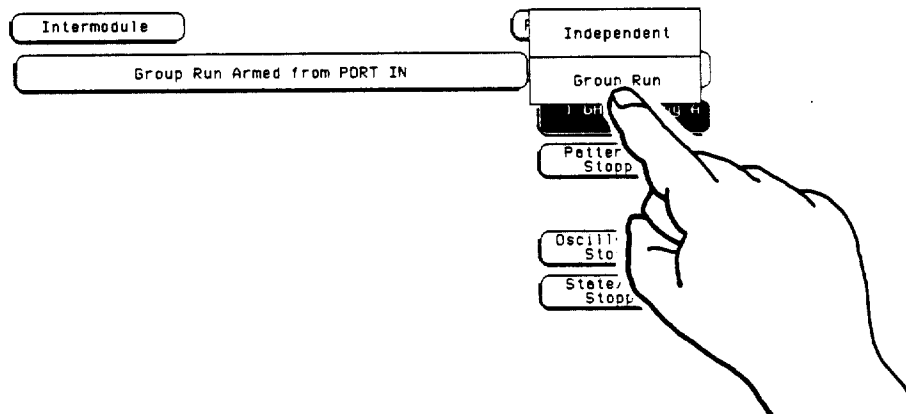


Figure 10-21. Selecting Group Run

4. Configure the module in slot D (**Oscilloscope D**) to be armed by the module in slot A (**1 GHz Timing A**).
 - a. Touch the field for the module in slot D (**Oscilloscope D**).
 - b. When the pop-up appears, touch the field displaying the name of the module in slot A (**1 GHz Timing A**).

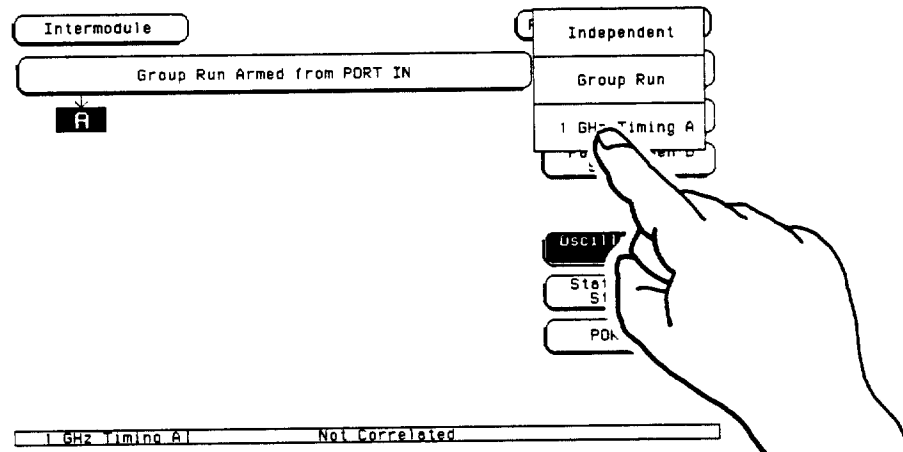


Figure 10-22. Configuring the Intermodule Menu

5. Configure the module in slot E (**State/Timing E**) to be armed by the module in slot A (**1 GHz Timing A**).
 - a. Touch the field for the module in slot E (**State/Timing E**).
 - b. When the pop-up appears, touch the field displaying the name of the module in slot A (**1 GHz Timing A**).

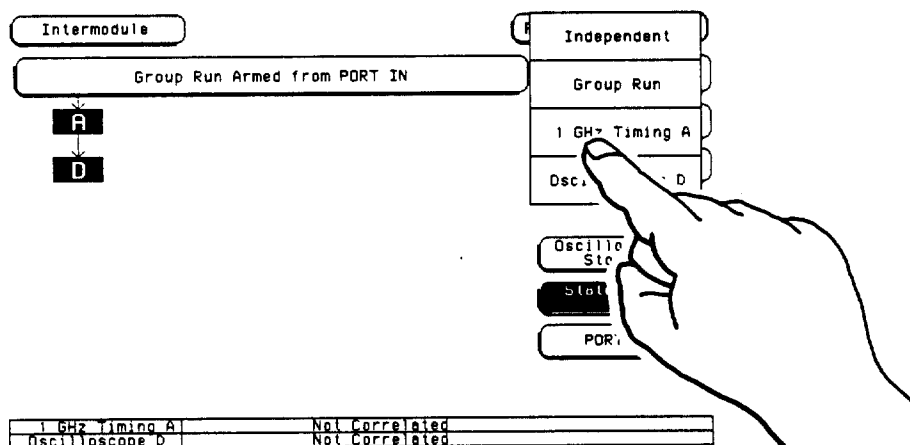


Figure 10-23. Configuring the Intermodule Menu

Figure 10-24 shows the **Intermodule** menu configured for this example.

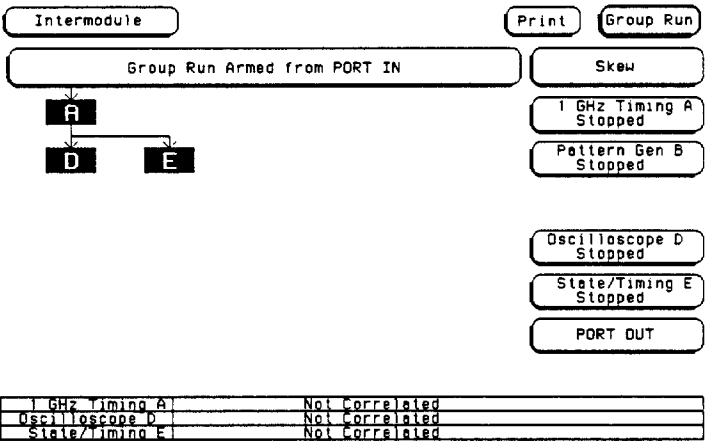


Figure 10-24. Configured Intermodule Menu

A

General Characteristics

Interface

Nine Inch Color Monitor

Touchscreen - sensitive to 43 X 57 points

Controls:

Screen - color encoded field types
- pop-up error and status messages

Touch - touch assignment of the knob to fields
- soft keypad or knob for numeric entry
- pop-up fields presenting all available choices

Knob - scrolling of waveforms, lists, and labels
- vernier measurement parameters
- scrolling of specifications too large for display

Mouse - optional input device (HP Model No. 46060A)
- copies the function of the touch/knob interface with the addition of a pointer icon. The buttons of the mouse activate fields and duplicate the function of the knob.
- connects to front-panel HP-HIL port provided for human interface devices

Beeper - clicks for feedback of touch display
- beeps on error conditions

Cursor - indicates where next character to be input appears
- indicates current line selection

Display Colors - seven with variable hue, saturation, and luminosity
- one non-variable (black)

Two Marker System - for time-interval measurements

Hardware Connectivity

5 Module Slots - modules are interconnected through a five-line TTL bus

- analog, timing, state, and pattern generator modules are currently available

Built-In Disc Drives

Dual Disc Drives - 3.5 inch flexible disc drives

- double-sided to record data on both sides of the disc
- use HP double-sided discs part no. 92192A (package of ten comes with this part number)

File Types - system software (xxxxx_system)

- configuration (contains instrument configuration, data, and pointer to inverse assembler file) (xxxxx_config)
- inverse assembler (inverse_assem)
- autoloader (autoloader_file)
- optional software (16500A_option)

Autoloader Designation - a pre-defined configuration file that is loaded at power-up by enabling Autoloader.

Disc Operations - store, load, copy, duplicate disc, pack disc, rename, purge, and format disc

Programmability

Instrument settings and operating modes, including automatic measurements, may be remotely programmed via the RS-232C and HP-IB (IEEE-488).

General Characteristics

Hardcopy Capability

Printers Supported - HP ThinkJet, HP QuietJet, HP LaserJet, HP PaintJet, Epson and Epson-compatible (e.g., Epson FX80) printers via the RS-232C or HP-IB (IEEE-488)

RS-232C Configurations - Protocols: Xon/Xoff or None

- Data Bits: 7 or 8
- Stop Bits: 1, 1 1/2, or 2
- Parity: None, Odd, or Even
- Baud Rates: 110, 300, 600, 1200, 4800, 9600, or 19,200

Input/Output Rear-Panel BNCs

Input BNC - labeled PORT IN on rear panel

- input signal must drive two LS TTL loads
- used to arm trigger sequence or as a wait event in stimulus

Output BNC - labeled PORT OUT on rear panel

- output signal is active high, TTL output level (high ≥ 2 V into 50 ohms, low ≤ 0.4 V into 50 ohms)
- can be driven by a signal from a module

Interactive Measurements

Acquisition - oscilloscope, timing, state, and pattern generation can be made to occur simultaneously or in series

Arming - each module can arm one or more other modules

- external BNC (PORT IN) can arm one or more modules
- any number of modules can arm in sequence
- trigger immediate performed with "don't care" trigger on armed module
- modules drive the output BNC (PORT OUT)

General Characteristics

A-3

Time Interval Accuracy - equals the sum of the channel-to-channel time interval accuracies of each module used in the measurement (for a deskewed measurement)
Between Modules

Skew - fine adjustment (1 ns resolution) between modules for plus or minus time correlation.

Operating Environment

The HP 16500A will operate to all specifications within the following temperature and humidity range:

Hardware:

Temperature: 0 to +55 degrees C (+32 to +131 degrees F)

Humidity: Up to 95% relative humidity (non-condensing)
at +40 degrees C (104 degrees F)

Disc Drive and Media

Temperature: +10 to +50 degrees C (+50 to +104 degrees F)

Humidity: 8% to 80% relative humidity at +40 degrees C
(104 degrees F)

Note

Avoid high temperature/humidity combinations to protect the instrument against internal condensation.

Altitude: to 4600 m (15,000 ft)

Vibration

Operating: random vibration 5 to 500 Hz, 10 minutes per axis,
0.3 g rms

Non-Operating: random vibration 5 to 500 Hz, 10 minutes per axis,
2.41 g rms; and swept sine resonant search,
5 to 500Hz, 0.75 g (0-peak), 5 minute resonant
dwell @ 4 resonances per axis

General Characteristics

A-4

Ventilation Requirements

You must provide an unrestricted airflow for the fan and ventilation openings in the rear and side panels of the HP 16500A. However, you may stack the HP 16500A under or over other instruments as long as the surfaces of the other instruments aren't needed for their ventilation.

When you mount the HP 16500A in a rack, take into account the direction and quantity of airflow through the instrument. For ventilation, air is brought into the instrument through the left side cover and rear panel at a rate of 120 cfm. The air is then routed through the instrument and exits through ventilation holes in the right side cover. The approximate rise in temperature of this airflow is 10 degrees from ambient.

Power Requirements

The HP 16500A requires a power source of either 115 or 230 VAC, -22% to +10%, single phase, 48 to 66 Hz, 475 watts maximum.

Weight

Net: 18.1 kg (40 lbs) + (0.7 kg(1.6 lbs) X the number of cards)

Shipping: 25.9 kg (57 lbs) + (3.6 kg (8 lbs) X the number of cards)

Dimensions

Dimensions are for general information only. If dimensions are required for building special enclosures, contact your Hewlett-Packard field engineer.

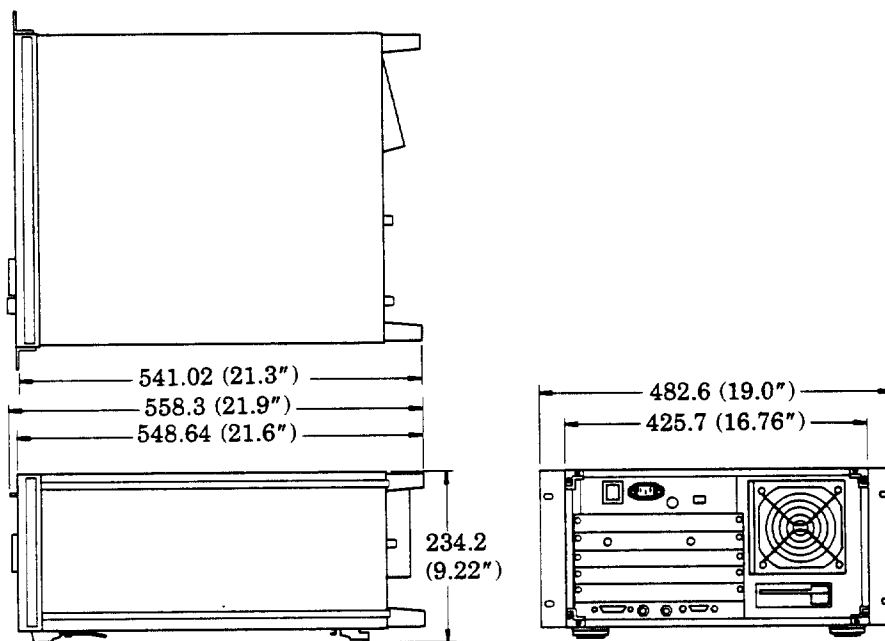


Figure A-1. Dimensions

Note

Dimensions are given in millimetres and inches.

General Characteristics

A-6

B

Repackaging for Shipment

The Storage and Shipment Environment

The instrument may be stored or shipped in environments within these limits:

Temperature: -40 to +70 degrees C

Humidity: Up to 90% relative humidity at 65 degrees C

Altitude: Up to 15,300 metres (50,000 ft)

The instrument should also be protected from temperature extremes which could cause condensation within the instrument. Condensation within the instrument may cause it to malfunction.

Tagging the Instrument for Service

If the instrument is to be shipped to a Hewlett-Packard office for service or repair, attach a tag with the owner's name and address, the model number, the complete serial number, and a description of the service required. In any correspondence, refer to the instrument by model number and serial number.

Repacking the Instrument

Before repacking the instrument, insert a yellow shipping disc into both the front and rear disc drives. The shipping discs help protect the disc drives from damage during shipping.

If the original packing material is unavailable or unserviceable, material identical to factory packaging is available through Hewlett-Packard offices. Always mark the container **FRAGILE** to ensure careful handling.

If you use other packaging, follow these general instructions:

1. Wrap the instrument in heavy paper or plastic.
2. Use a strong shipping container. A double-wall carton made of 350-lb test material is adequate.
3. Protect the control panel with a piece of cardboard.
4. Put a layer of shock-absorbing material 70- to 100-mm (3- to 4-in.) thick around the instrument to firmly cushion it and prevent any movement inside the container.
5. Seal the shipping container securely.
6. Mark the container **FRAGILE** to ensure careful handling.

C

Maintaining the HP 16500A

Cleaning Requirements

When cleaning the HP 16500A, USE MILD SOAP AND WATER only. A harsh soap or solvent may damage the water-base paint finish.

Clean the CRT display and surrounding area regularly. DO NOT place tape or other foreign material on the screen.

Vacuum the ventilation slots on the sides of the instrument and the fan on the rear panel whenever there is a visible amount of dust on them.

Degaussing

After you have used the instrument for a while, the CRT may become magnetized and start to distort the colors on the screen or other display data. To remedy this problem, simply degauss the CRT by pressing and releasing the button on the rear panel marked DEGAUSS. If the screen is in particularly bad condition, repeat this procedure several times until the screen clears up.

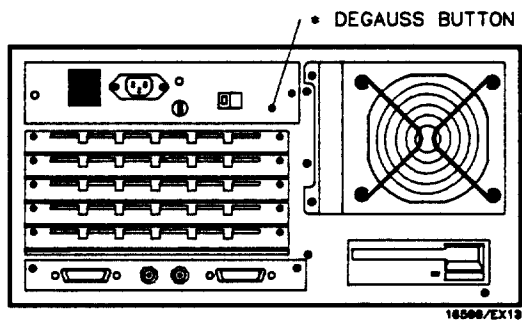


Figure C-1. The Degaussing Button

Service and Calibration

If at any time the instrument fails to operate properly or needs to be recalibrated, refer to the *HP 16500A Service Manual*.

The System Test Menu

The **System Test** menu is used to test portions of the microprocessor board including the system peripheral interfaces and the disc drives. It also allows you to check the color module for color purity. For more information on this menu, refer to the *HP 16500A Service Manual*.

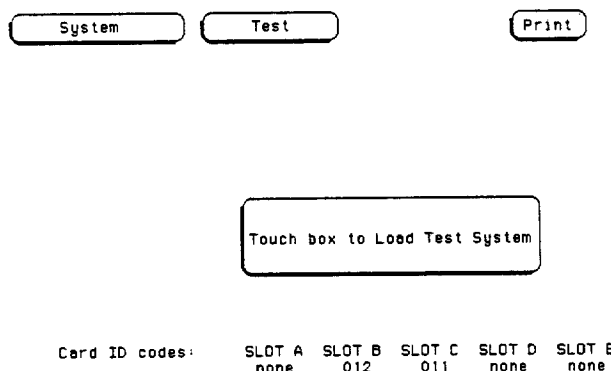


Figure C-2. The System Test Menu

D

Self-Test Documentation

Introduction

When you turn on the HP 16500A, it will initiate a set of self-tests to check the basic condition of the instrument and the operating system disc. This is a limited set of tests that checks whether or not the CPU board is working well enough to boot the rest of the software from the flexible disc.

If a test fails, consult your *HP 16500A Service Manual*.

Note

There are no self-test routines performed for any modules at power-up.

(c) COPYRIGHT 1987 HEWLETT-PACKARD COMPANY HP16500A VXX.XX

PERFORMING POWERUP SELF TESTS

passed Rom Test
passed Ram Test
passed Interrupt Test
passed Display Test
passed HIL Controller Test
passed Front Panel Test
passed Touch Screen Test
passed Front Disc Test
passed Rear Disc Test

LOADING SYSTEM FILE (FAILURE SHOWN HERE)

LOADING MODULE FILES

LOADING SOFTWARE OPTIONS

AUTOLOADING CONFIGURATION

Figure D-1. Self-Test Display

Fail Codes

The type of fail codes you might encounter are:

Disc Test	- passed
	- failed
	- no disc - install a disc or re-install the current disc.
Touchscreen	- passed
	- impaired - not a complete touchscreen, but the instrument can still be operated; or the touch failed, but a mouse was detected on the interface loop.
	Try wiping the bevel on the display and make sure no objects are blocking the screen on power-up.
	- failed - not enough touchscreen to operate the instrument (major failure).
all others	- passed or failed

Critical Errors

Critical errors are system load errors detected at power-up. When one of these is detected, they are displayed on the screen in yellow and the self-test routine is stopped IMMEDIATELY. These include:

SYSTEM FILE NOT FOUND - Indicates the last drive searched for a system file had a disc, but no system file was found on the disc.

SYSTEM DISC NOT FOUND - Indicates the last drive checked had no disc on it.

SYSTEM FILE READ ERROR - Indicates an error was detected during all three attempts to load the system file.

SYSTEM DISC ERROR - Indicates the drive the system file was on failed during load.

Non-Critical Errors

Non-critical errors allow sequences to continue and won't stop the power-up routine. These include "impaired" and "no disc."

E

Disc Error Messages

Disc Error Messages

The following is a list and description of error messages that may be displayed on the disc menus.

Too many files open - A previously open file was not closed properly. Reset the disc directory in memory.

Note

Resetting the disc directory in memory is performed by removing the current disc from the disc drive, re-inserting it, and scrolling the directory or selecting a different disc command. Switching between the front and rear disc menu (and vice-versa) also resets the directory in memory.

No room in directory - The directory on the disc is full. Discs generated on the HP 16500A can hold up to 144 files. Purge any files no longer needed.

File not found - The specified file is not on the disc.

Filename exists with different type - A file with the same name of a different file type already exists on the current disc. Select a different destination name.

Unsupported disc format - The disc in the disc drive is unformatted or formatted on a non-compatible system. If the contents of the disc are NOT needed, format it.

No disc - No disc is installed in the current disc drive.

Disc is write-protected - The current disc is write-protected. Disengage the write-protect tab on the disc.

Invalid file type - The current operation may not be performed with a file of the current type.

No destination disc - No disc is currently installed in the destination disc drive.

Disc Error Messages

E-1

Incompatible source format - The source format must be 1024 byte/sector LIF to be duplicated to an unsupported format destination disc.

No room on disc - The disc is full and the currently written file does not fit. Deleting unneeded files and/or packing the disc may correct the problem.

End of file encountered - Trying to read data beyond the end of the file. The file was generated improperly or its contents have been altered.

Configuration not storable - This module or option does not have the ability to store a configuration.

Configuration not loadable - This module or option does not have the ability to load a configuration.

Invalid configuration file - The contents of this file are incorrect.

Selected file is incompatible - The file being loaded is incompatible for this module or option.

Disc CRC error - Cyclical Redundancy Check (CRC) failed on this disc. Try to recover any needed files and reformat the disc (see Note 1).

Disc record not found - The disc format has been damaged. Recover any needed files and reformat the disc (see Note 1).

Disc data lost - Unable to read the disc; try re-installing the disc or cycling the power.

Disc not ready - The disc drive may not be working properly.

Disc timeout - The disc drive may not be working properly or the media was removed while being accessed.

Note 1: *Formatting the disc may not correct the current problem. If it doesn't correct the problem, discard the disc.*

Disc Warning Messages

Disc warning messages are displayed when the contents of a file or a disc are in danger of being destroyed by an operation. For example:

Duplicate Disc destroys contents of destination - A warning that the duplicate disc command does not append the source files to the destination. It overwrites any files on the destination disc in a packed form.

Filenames must begin with a capital letter - (self-explanatory)

Embedded blanks not allowed in filename - (self-explanatory)

F

Installing and Removing Boards

Introduction

The HP 16500A can be ordered without the cards (PC boards) installed and the modular capability allows you to move the cards from one mainframe to another. This appendix explains how and where to install the cards (boards) in the HP 16500A. For more specific instructions, refer to the reference manual for each module.

CAUTION

Do not install, remove, or replace cards in the instrument unless the instrument is shut off and the power cord is disconnected.

Some cards may be hooked together by intercard connecting cables. Before removing or installing cards, refer to the reference manual for your particular modules.

Where Do Cards Mount?

Turn off the HP 16500A system and unplug it. Then turn the HP 16500A around so that the rear panel is facing you. Notice that there are six sets of slots in which to mount the cards (boards). Each slot has a label to its right, with the top slot being A, the next one down is B, then C, D, and E. The last slot is labeled CPU for the CPU board of the mainframe.

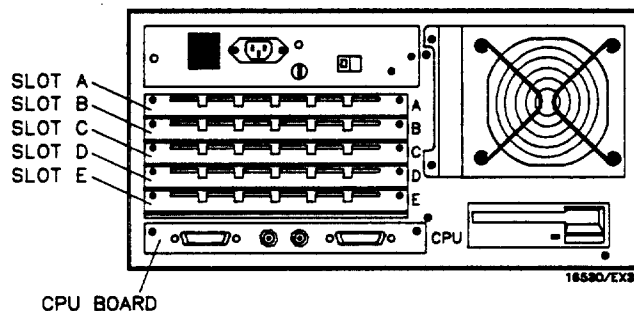


Figure F-1. The HP 16500A Card Cage

Installing Cards in the HP 16500A

CAUTION

The effects of ELECTROSTATIC DISCHARGE can damage electronic components. Grounded wriststraps and mats should be used when you perform any kind of service to this instrument or the cards in it.

1. Starting from the top of the card cage, loosen the thumb screws on the filler panel(s) and pull them out of the HP 16500A.

Note

Since the endplates of the cards overlap, you must start with the top slot and work down when removing cards. To install cards, start with the first open slot at the bottom of the card cage and work up.

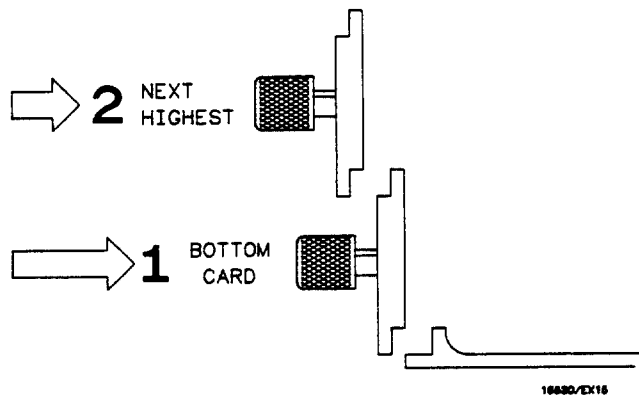


Figure F-2. Endplate Overhang

2. Hold the card (or set of cards) so that the components are facing upward and the main connector is pointing away from you.
3. Align the card (or set of cards) with an appropriate set of slots on the rear panel, filling the slots closest to the bottom first. Gently slide the card in until the connector on the card touches the connector on the mainframe.

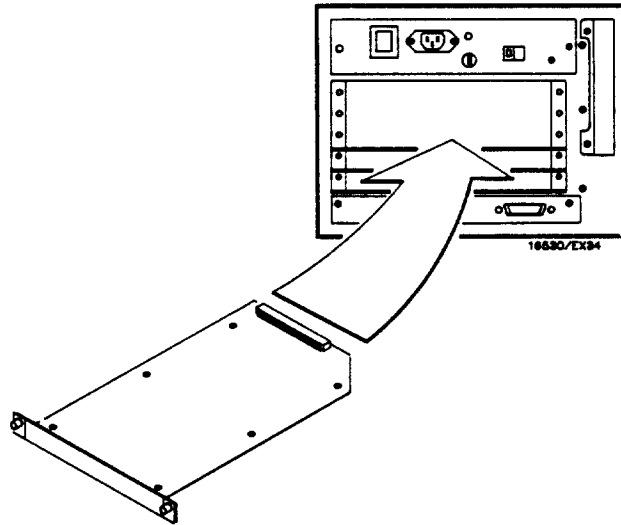


Figure F-3. Installing Cards

4. Gently, but firmly, push the card in until the endplate on the card is flush with the rear panel.
5. While applying pressure to the center of the card endplate, tighten down the thumb screws on either side of the endplate.
6. After you are finished installing cards, install filler panels in all unused slots.

Note

*Filler panels **must** be installed in all unused card slots for correct air circulation.*

Removing Cards from the HP 16500A

To remove the cards from the mainframe, you must start with the card in the top position and remove each one until you get to the one you need. To remove them:

1. Loosen the thumb screws on either side of the endplate of the card until the thumb screws are free from the mainframe. If two cards need to be removed together, loosen the screws from both cards before trying to remove the cards.
2. Gently, but firmly, pull on the heads of the thumb screws and slide the cards out.

G

Creating a Systemized Disc

Introduction

Generally your instrument will come from the factory with a fully configured systemized operating disc, but occasionally you may need to create a systemized disc or update an existing systemized disc. This appendix explains how to create, update, and add files to a systemized disc.

What Files are Required on the Systemized Operating Disc?

A systemized operating disc consists of the software required to operate the mainframe and each module in the system. For the mainframe, this is the file **SYSTEM_** of the file type **16500A_system**. For the individual modules, it would be the file **SYSTEM_XXX** of the file type **XXXXXX_system**. The three characters (XXX) in the filename represent the identification code for each individual module. The six characters (XXXXXX) in the file type represent the product model number for each module. The identification codes for the HP 16500A modules are:

- 001 - for the HP 16515A 1 GHz Timing Analyzer
- 011 - for the HP 16530A/31A 400 Msample/second Oscilloscope
- 021 - for the HP 16520A 50 Mbit/second Pattern Generator
- 031 - for the HP 16510A 25 MHz State/100 MHz Timing Analyzer

Creating a New Systemized Operating Disc

Before you start creating a new systemized operating disc, format the disc you plan to use for the systemized disc. Then insert the formatted disc in the rear disc drive of the HP 16500A. To create a new systemized operating disc:

1. Insert the HP 16500A System Master Disc in the front disc drive of the HP 16500A.
2. Select the **System Front Disc** menu and when it appears on screen, select the **Copy** operation.
3. Configure the **Copy** operation to **Copy** the file **SYSTEM_** of the file type **16500A_system** to the file **SYSTEM_** on the **Rear Disc** (see figure G-1).
4. Touch **Execute** to execute the **Copy** operation.

The screenshot shows a menu interface with three buttons at the top: "System", "Front Disc", and "Print". Below these is a large rectangular box containing the configuration for a "Copy" operation. Inside the box, the word "Copy" is followed by "file" and a text field containing "SYSTEM_". This is followed by "type" and a text field containing "16500A_system". Below this line, it says "to" followed by a text field containing "SYSTEM_", then "on" followed by a text field containing "Rear Disc". To the right of the "Rear Disc" field is an "Execute" button. Below the configuration box is a table with three columns: "Filename", "File Type", and "File Description".

Filename	File Type	File Description
PVTEST_	16500A_system	HP16500A System Test Prog V00.XX
SYSTEM_	16500A_system	HP16500A System Software V00.XX

Filename	File Type	File Description
PVTEST_	16500A_system	HP16500A System Test Prog V00.XX
SYSTEM_	16500A_system	HP16500A System Software V00.XX

Figure G-1. Copying the HP 16500A System File

5. Remove the disc from the front disc drive and insert one of the "module master discs" in this disc drive.
6. Rotate the knob on the front panel to read the current files on this module disc.
7. Configure the **Copy** operation to **Copy** the file **SYSTEM_XXX** of the file type **XXXXXX_system** to the file **SYSTEM_XXX** on the **Rear Disc**. The three characters (XXX) in the filenames represent the Identification code for each individual module. The six characters (XXXXXX) in the file type represent the product model number for each module. Figure G-2 shows the **Copy** operation configured to copy the HP 16530A oscilloscope module to the systemized disc.
8. Touch **Execute** to execute the **Copy** operation.
9. Repeat steps 5 through 8 for each of the modules in your mainframe.

System
Front Disc
Print

Copy
file
SYSTEM_011
type
16530A_system

to
SYSTEM_011
on
Rear Disc
Execute

Filename	File Type	File Description
PVTEST_011	16530A_system	400MSample/s Dig. Scope
SYSTEM_011	16530A_system	400MSample/s Dig. Scope

Figure G-2. Copying the HP 16530A Oscilloscope System File

Adding a Module to the Systemized Disc

To add a module to a current systemized disc:

1. Insert the systemized disc in the rear disc drive of the HP 16500A.
2. Insert the "module master disc" in the front disc drive.
3. Select the **System Front Disc** menu and when it appears on screen, select the **Copy** operation.
4. Configure the **Copy** operation to **Copy** the file **SYSTEM_XXX** of the file type **XXXXXX_system** to the file **SYSTEM_XXX** on the **Rear Disc**. The three characters (XXX) in the filename represent the identification code for each individual module. The six characters (XXXXXX) in the file type represent the product model number for each module. Figure G-3 shows the **Copy** operation configured to copy the HP 16530A oscilloscope module to the systemized disc.
5. Touch **Execute** to execute the **Copy** operation.

Filename	File Type	File Description	
PVTEST_011	16530A_system	400MSample/s Dig. Scope	V00.XX
SYSTEM_011	16530A_system	400MSample/s Dig. Scope	V00.XX

Figure G-3. Adding a Module to the Systemized Disc

**Updating a
Systemized Disc**

To update a current systemized disc:

- 1. Insert the systemized disc in the front disc drive of the HP 16500A.
- 2. Select the **System Front Disc** menu and when it appears on screen, select the **Purge** operation.
- 3. Purge the file you want to update from the disc. Figure G-4 shows how the **Purge** operation would be configured to purge the HP 16530A oscilloscope file from the disc.

SystemFront DiscPrint

Purge

fileSYSTEM_011type16530A_systemExecute

Filename	File Type	File Description	
SYSTEM_	16500A_system	HP16500A System Software	V00.00
SYSTEM_001	001_system	1 GHz Timing Analyzer	V00.00
SYSTEM_011	16530A_system	400MSample/s Dig. Scope	V00.00
SYSTEM_021	16520A_system	50Mbit/s Pattern Gen.	V00.00
SYSTEM_031	16510A_system	25MHz State/100MHz Timing	V00.00

Figure G-4. Purging the HP 16530A File from the Disc

- 4. Remove the systemized disc from the front disc drive and insert it in the rear disc drive of the HP 16500A.
- 5. Insert the "module master disc" in the front disc drive of the HP 16500A.
- 6. Select the **Copy** operation.

7. Configure the **Copy** operation to **Copy** the file **SYSTEM_XXX** of the file type **XXXXXX_system** to the file **SYSTEM_XXX** on the **Rear Disc**. The three characters (XXX) in the filename represent the identification code for each individual module. These characters do not appear when you are copying a file for the HP 16500A mainframe (SYSTEM_).

The six characters (XXXXXX) in the file type represent the product model number for each module. Figure G-5 shows the **Copy** operation configured to copy the HP 16530A oscilloscope module to the systemized disc.

8. Touch **Execute** to execute the **Copy** operation.

Note

Try packing the disc if you have problems copying a new file to an existing systemized disc. Then repeat the **Copy operation**.

SystemFront DiscPrint

Copy

file

SYSTEM_011

type

16530A_system

to

SYSTEM_011

on

Rear Disc

Execute

Filename	File Type	File Description
PVTEST_011	16530A_system	400MSample/s Dig. Scope
SYSTEM_011	16530A_system	400MSample/s Dig. Scope

Figure G-5. Updating the Systemized Disc

Creating a Systemized Disc
G-6

System
Rear Disc
Print

Load
All
from file
SYSTEM_

Execute

Filename	File Type	File Description
SYSTEM_	16500A_system	HP16500A System Software V00.00
SYSTEM_001	001_system	1 GHz Timing Analyzer V00.00
SYSTEM_011	16530A_system	400MSample/s Dig. Scope V00.XX
SYSTEM_021	16520A_system	50Mbit/s Pattern Gen. V00.00
SYSTEM_031	16510A_system	25MHz State/100MHz Timing V00.00

Figure G-6. Systemized Disc Directory
with Updated Oscilloscope Software

What Is a Systemized Performance Verification Disc?

A systemized performance verification disc is a disc that contains all the performance verification software required to run the performance verification tests for the HP 16500A mainframe and the corresponding modules configured in the system. For more information on the performance verification tests, refer to the *HP 16500A Service Manual*.

**Creating a
Systemized
Performance
Verification Disc**

Generally, whenever you create, update, or add modules to your systemized operating disc, you should do the same for your systemized performance verification disc. This way both discs always have the most current software.

The process for creating, updating, and adding files to a systemized performance verification disc is the same as the process for a systemized operating disc. The only difference are the filenames that you select for the HP 16500A and for the individual modules. For the HP 16500A, copy the file **PVTEST_** instead of the file **SYSTEM_**. For each module, copy the file **PVTEST_XXX**. The three characters (XXX) in the filename represent the identification code for each individual module. Figure G-7 shows how to configure the **Copy** operation to copy the HP 16500A performance verification software to the systemized performance verification disc. Figure G-8 shows how to configure the **Copy** operation for the HP 16530A oscilloscope module.

System

Front Disc

Print

Copy

file

PVTEST_

type

16500A_system

to

PVTEST_

on

Rear Disc

Execute

Filename	File Type	File Description
PVTEST_	16500A_system	HP16500A System Test Prog V00.XX
SYSTEM_	16500A_system	HP16500A System Software V00.XX

Figure G-7. Copying the File PVTEST_ to the Disc

System
Front Disc
Print

Copy

file

PVTEST_011

type

16530A_system

to

PVTEST_011

on

Rear Disc

Execute

Filename	File Type	File Description
----------	-----------	------------------

PVTEST_011	16530A_system	400MSample/s Dig. Scope	V00.XX
SYSTEM_011	16530A_system	400MSample/s Dig. Scope	V00.XX

Figure G-8. Copying the File PVTEST_011 to the Disc

H

Using Flexible Discs

Proper Handling of Flexible Discs

Because the disc has a plastic case and metal shutter, the HP 3 1/2-inch flexible disc is more reliable than comparable 5 1/4-inch products. However, because your discs contain valuable data and programs, a good rule of thumb is to treat your discs as you would treat valuable record albums. The following guidelines will help you prolong the life of both your flexible discs and your disc drives.

- * Make sure the shutter is closed when the disc is not in use. This protects the disc from dust, fingerprints, and scratches, which can cause loss of data.
- * Use the disc in a clean environment to minimize the risk of dust and dirt particles scratching the disc and causing loss of data.
- * Store the discs in a cool, dry place to prevent moisture and heat damage.
- * Avoid magnetic fields, such as appliances with motors, to prevent data on your discs from being magnetically erased.
- * DON'T touch the surface of the disc. Particle contamination can scratch the disc or cause the disc to wear out sooner than normal, and may result in the loss of data.
- * DON'T try to clean the disc. The plastic jacket of the disc contains a mechanism for cleaning the disc surface. Other cleaning methods may damage the disc.

The Window and Auto-Shutter

The disc drive reads the data from the disc and writes data on the disc in the space under the window. The window is covered by a metal shutter that helps protect the disc surface from particles and fingerprints.

The flexible disc is equipped with an auto-shutter that automatically opens to expose the disc surface when the disc is placed in the drive. This eliminates the need to manually open the shutter before you insert the disc.

Note

Only flexible discs that have auto-shutters will work with the HP 16500A disc drives.

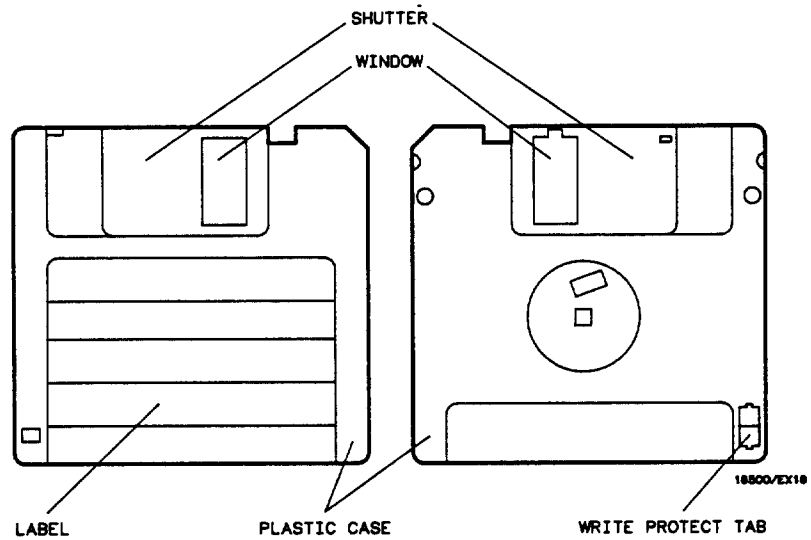


Figure H-1. Parts of the Disc

Ordering Discs

The disc drives of the HP 16500A are double-sided. This means that they have two read-write heads and record data on both sides of the disc. Likewise, the flexible discs used with the drives must be double-sided so that data can be recorded on both sides. The Hewlett-Packard double-sided discs are gray and are labeled double-sided. These are the recommended discs for the HP 16500A and can be ordered in a package of ten with the Hewlett-Packard part number 92192A.

CAUTION

The performance and reliability of disc drives depends on the type of media used. Disc drive specifications can be assured only when you use Hewlett-Packard media. Improper media can result in premature disc failure or damage to the disc drive.

Labeling the Disc

When you order boxes of flexible discs, you receive a packet of labels with the discs. These labels are in a variety of colors so that you can color-code the discs according to your needs. Position the labels on the disc so that the colored portion of the label is folded over the lower edge of the disc. Then write the name of the disc immediately beneath this colored edge.

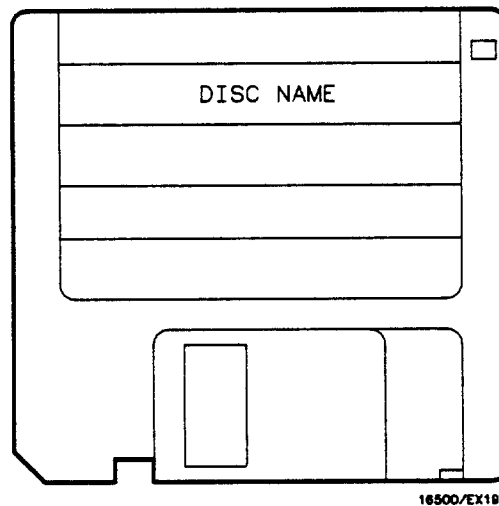


Figure H-2. Positioning of the Disc Label

Installing the Disc

To insert the flexible discs:

1. Hold the disc so that the label is on top and the metal auto shutter is away from you.
2. Push the disc gently, but firmly, into the disc drive until it clicks into place.

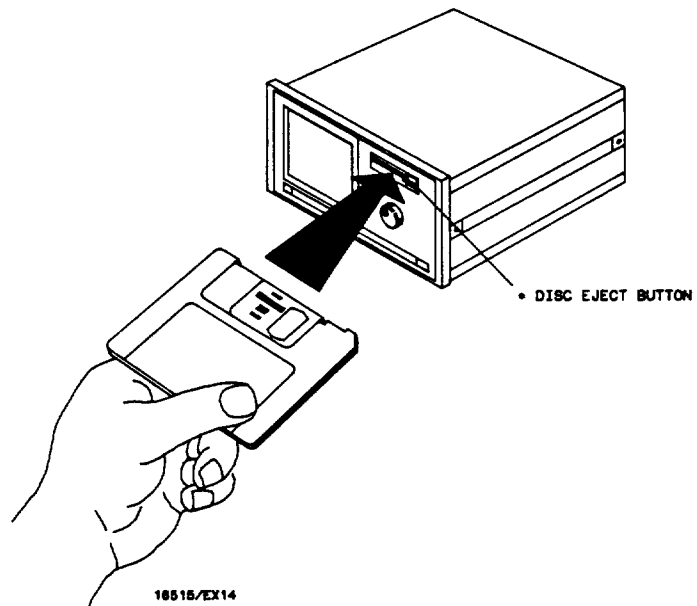


Figure H-3. Installing the Disc

To remove the disc:

1. Press the disc eject button on the lower-right side of the disc drive until the disc pops out.
2. Then remove the disc by pulling it straight out.

CAUTION

To prevent damage to your disc, **DO NOT** remove the disc from the disc drive while it is running. Remove it only after the indicator light has gone out.

Write Protecting a Disc

Write protecting a disc ensures that the disc drive cannot write over or delete information on the disc. This is particularly important for discs that contain valuable or hard-to-replace programs.

To write protect a disc:

1. Place the tip of a pen in the small hole at the top of the write protect tab on the lower corner of the disc.
2. Slide the tab downward until it locks into place, creating a small opening in the disc.

If you no longer wish to write protect the disc, slide the tab upward until it locks in place, closing the opening in the disc.

If your disc is missing the write protect tab, it is always write protected. To override the write protection, place a piece of tape over the tab opening.

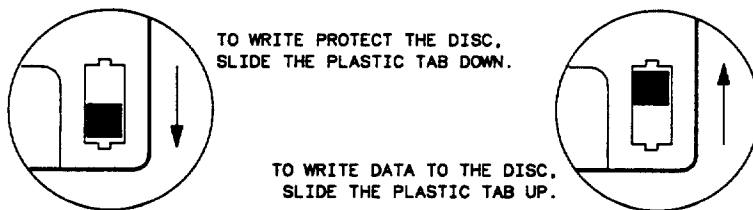
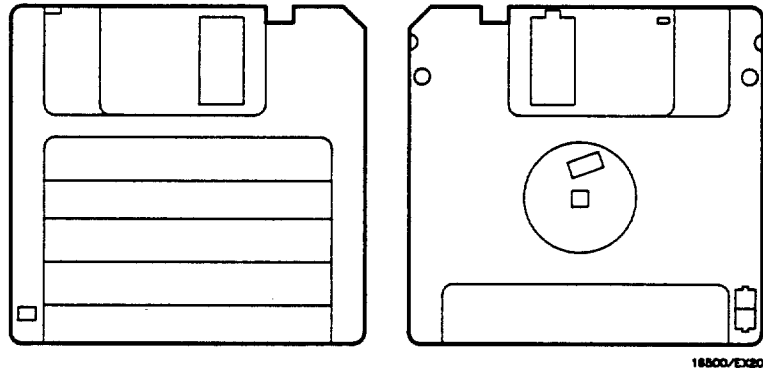


Figure H-4. Write Protect Tab

Index

This index covers the *HP 16500A Reference Manual*. It does not cover *Setting Up the HP 16500A Logic Analysis System*. Sequences of pages are represented with a slash (for example, 6-9/6-17).

A

- Acquisition, A-3
- Address, 4-2,4-3
- Address selection, 4-3
- All types (file type), 6-16,6-20,6-25/6-27
- Alphanumeric keypad, 2-7
- Alternate, 5-3
- Arming, 10-1,10-5,A-3
- Asterisk, 6-3
- Autoload, 6-2,6-22
- Autoload designation, A-2
- Autoload file, 6-23
- Autoload operation, 6-2,6-22
- Autoload status, 6-23
- Auto-shutter, 4-2

B

- Baud rate, 4-4
- Beeper, A-1
- BNC, 10-2,10-3,10-12

C

- Calibration, C-2
- Cancel, 5-11,6-3,6-28,10-14
- Card cage, F-2
- Cards, 2-2
- Card slots, F-1
- Cleaning requirements, C-1
- Color, 9-4
- Color field, 9-4,9-6

- Color model, 9-2
- Color monitor, A-1
- Color selection, 9-1
- Compatible file types, 6-18
- Configuration menu, 2-1,3-1
- Configuration tree, 10-2,10-23
- Configuring the interface, 4-1
- Continue, 6-3,6-28,6-31
- Controller, 4-1
- Controller interface, 4-1
- Controls, interface, A-1
- Copy, operation, 6-2,6-26
- CPU board, F-1
- Critical errors, self-test, D-2
- Cursor 2-9,A-1

D

- Data bits, 4-5
- Default colors, 9-4, 9-7/9-9
- Default Colors field, 9-9
- Default configuration, 1-3,6-12
- Default field, 8-3
- Default values, 6-3
- Degauss, C-1
- Deleting files, 6-3
- Destination disc, 6-8,6-28,6-31
- Destination field, 6-27
- Destination format, 6-30
- Dimensions, A-6
- Disable, Autoload, 6-24
- Disc, 6-9,H-1,H-3
 - part number, 6-9,H-3
- Disc drive, 6-3,6-9,A-2,H-3

- Disc entrys, 6-10
- Disc error messages, E-1
- Disc label, H-4
- Disc menu, 6-1,6-4
- Disc operation parameters, 6-7
- Disc operations, 6-1,6-2,6-5,6-10/6-31,A-2
- Disc warning messages, E-3
- Display, 2-1
- Display colors, 9-1,9-7,9-8,A-1
 - table of, 9-7
- Display color selection, 9-1,9-4
- Double-sided discs, 6-9,H-3
 - part number, 6-9,H-3
- Dual disc drive, A-2
- Duplicate Disc, operation, 6-2,6-30

E

- EIA Recommended Standard RS-232C, 4-4
- Enable, Autoload, 6-22
- Endplates, F-2
- Environment,
 - operating, A-4
 - shipping, B-1
- Epson printer, 5-1,5-3
- Error messages, E-1
- Even parity, 4-5
- Exercises, 2-10, 10-23

F

- Fail codes, D-2
- Field, 2-3,2-8
- Field select, 2-3,2-8
- File description, 6-14
- File identification code, G-1
- Filename, 6-13,6-16,6-27,G-1
- File type, 6-16,6-20,6-25,6-26,A-2
- Filler panels, F-2,F-3

- Flexible disc, 6-9,H-1,H-3
 - part number, 6-9,H-3
- Format, 6-10
- Format Disc, operation, 6-3,6-10
- Front Disc, 6-27,6-30
- Front disc drive, 6-9,H-4
- Front Disc menu, 6-1,6-4
- Front disc menu map, 6-4

G

- General characteristics, A-1
- Graphics printer, 5-1,5-9
- Group Run, 10-1,10-5,10-12,10-15
- Group Run Armed From Port In, 10-12
- Group Run configuration field, 10-1,10-12
- Group Run field, 10-1,10-12
- Group Run/Stop field, 10-1,10-2,10-5,10-13,10-14

H

- Hardcopy output, 7-1,A-3
- Hardware, connecting, A-2
- Hardware handshake, 4-6
- HP-IB, 4-2,4-3
 - address, 4-2,4-3
 - addressing, 4-2
 - configuration, 5-3
 - connector, 5-2
 - interface, 4-3
 - printer pop-up, 5-3
- HSL color model, 9-2
- Hue, 9-2,9-4,9-5
- Hue field, 9-4,9-5

I

- Identification code, G-1
- IEEE Standard 488-1978, 4-3
- Immediate-action field, 2-5
- Independent, intermodule, 10-15
- Input BNC, A-3
- Installing boards, F-1,F-2
- Installing cards, F-1,F-2
- Installing discs, 6-9,H-4
- Interactive measurements, 1-1,10-1,A-3
- Interfaces, 1-2,2-2
- Intermodule,
 - capabilities, 1-1
 - configuration tree, 10-2,10-23
 - measurements, 10-1,10-6/10-10,10-22
 - menu, 10-1,10-2,10-11
 - menu map, 10-4
 - software, 6-16

K

- Key, 2-3
- Key features, 1-1
- Keypad, 2-6,2-7,9-5
- Knob, 1-2,2-6/2-9,A-1
- Knob/numeric fields, 2-6

L

- Label, H-4
- LaserJet printer, 5-6,5-8
- LIF, format, 6-10,6-30
- Listen Always 4-2,5-1,5-2,5-9
- Listen Only, 5-2
- Load All, 6-17 6-18
- Load, operation, 6-2,6-17
- Logical Interchange Format (LIF), 6-10,6-30
- Luminosity, 9-2,9-4/9-6
- Luminosity field, 9-4,9-5

M

- Mainframe, 1-1
- Maintenance, C-1
- Measurement cards, 2-2
- Menu, field, 2-1,2-2
- Menu map, 3-4,6-4,7-3,10-4
- Metal auto-shutter, H-2
- Mode configuration switches, 5-5
- Modular mainframe, 1-1,F-1
- Module, 10-15
 - field, 2-2
 - file, 6-14
 - slots, A-2
- Mouse, 1-2,2-8,A-1
 - part number, A-1
- Multiple-choice listing, 2-5

N

- Non-critical errors, D-3
- None, protocol, 4-6
- Non-variable color, 9-8,A-1
- Numeric field, 2-6
- Numeric keypad, 2-6

O

- Odd parity, 4-5
- Operating environment, A-4
- Optional mouse, 1-2,2-8,A-1
 - part number, A-1
- Options, software, A-2
- Output BNC, A-3

P

- Packaging material, B-1,B-2
- Pack Disc, operation, 6-3,6-29
- PaintJet printer, 5-1,5-4,A-3
- Parameters, 6-7
- Parity, 4-5
- Parity bit, 4-5
- Pattern fields, 2-4
- PC boards, F-1
- PCL printer, 5-1
- Performance Verification software, G-7,G-8
- Pointer, 2-8
- Pop-up, 2-3
- Pop-up menu, 2-3
- Port In, 10-2,10-12,A-3
- Port In BNC, 10-2,10-3,10-12
- Port Out, 10-2,10-6,10-16,A-3
- Port Out BNC, 10-2,10-3
- Power requirements, A-5
- Power up self-test, D-1
- Print All, 5-11
- Print, field, 5-11
- Print length, 5-4,5-8
- Printer, 5-1,5-2
- Printer interface, 4-1
- Printer setup, 5-4
- Printers supported, 5-1,5-9,5-10,A-3
- Print field, 5-11
- Print Screen, 5-11
- Print width, 5-4,5-8
- Programmability, A-2
- Protocol, 4-6
- Purge, operation, 6-3,6-25

Q

- QuietJet printer, 5-1,5-5,5-8,5-9

Index-4

R

- Rack mount, A-5
- Rear Disc, 6-27,6-30
- Rear disc drive, 6-9
- Rear Disc menu, 6-1,6-4
- Rear Disc menu map, 6-4
- Removing boards, F-1,F-4
- Removing cards, F-1,F-4
- Removing discs, H-5
- Rename, operation, 6-3,6-20
- Repacking, B-1
- Repetitive, Group Run, 10-14
- Rolling the display, 2-9
- RS-232C, 4-4
 - cable, 5-4
 - configuration, 5-7,A-3
 - connector, 5-5
 - interface, 4-4
 - printers, 5-4
- Running, status, 10-5,10-17

S

- Saturation, 9-2,9-4
- Saturation field, 9-4
- Screen, A-1
- Selecting fields, 2-3
- Self-test, D-1
- Service request, 5-1
- Service Request Enable, 5-2
- Servicing, C-2
- Shipping environment, B-1
- Shipping container, B-1,B-2
- Shipping disc, B-1
- Single, Group Run, 10-14
- Single-sided discs, 6-9
- Single-sided format, 6-10
- Skew, 10-3,10-18,A-4
- Skew menu, intermodule, 10-18
- Slot, F-1

- Slot designators, 2-2,3-3,6-27,F-1
- Software options, A-2
- Software version, 6-2
- Sound field, 8-1,8-5
- Sound On/Off, 8-1,8-5
- Source disc, 6-8,6-28,6-31
- Source format, 6-30
- Special enclosures, A-6
- Specifications, A-1
- SRQ, 5-1
- SRQ EN, 5-2
- Status indicators, 10-17
- Status, intermodule, 10-5,10-17
- Stop bit, 4-5
- Stop, Group Run, 10-14
- Stopped, status, 10-6,10-17
- Storage environment, B-1
- Store, operation, 6-2,6-12
- Storing default configurations, 1-3,6-12
- System,
 - Configuration menu, 2-1,3-1
 - Configuration menu map, 3-4
 - file, 6-14,G-1
 - Front Disc menu, 6-1,6-4
 - Front Disc menu map, 6-4
 - measurement cards, 2-2
 - menus, 3-1,6-1,7-1,C-2
 - Rear Disc menu, 6-1,6-4
 - Rear Disc menu map, 6-4
 - Test menu, C-2
 - Utilities menu, 7-1,7-2,8-1
 - Utilities menu map, 7-3
- Systemized
 - disc, G-1
 - operating disc, G-1
 - Performance Verification disc, G-7,G-8

T

- Table of display colors, 9-7
- Tagging for service, B-1
- Test menu, C-2

- ThinkJet printer, 5-1,5-2,5-6,5-8,5-9
- Thumb screws, F-2
- Time correlation bars, 10-17
- Time interval accuracy, A-4
- Toggle field, 2-5
- Touch, A-1
 - calibration, 8-1,8-2
 - calibration pop-up, 8-3
 - field, 8-1,8-4
 - On/Off, 8-1,8-4
- Touchscreen, 1-2,2-3,A-1
- Touchscreen field, 1-2,2-3
- Touch-sensitive fields, 2-3
- Track sparing, 6-10
- Transmit On/Transmit Off, 4-6
- Transmitting data, 4-4,4-6
- Two marker system, A-1

U

- Unsupported formats, 6-10,
- User interface, 1-2
- Utilities menu, 7-1,7-2,8-1
- Utilities menu map, 7-3

V

- Variable colors, 9-6,9-7,A-1
- Ventilation requirements, A-5
- Vibration, A-4

W

- Warning messages, disc, E-3
- Waveform selection, 10-19
- Weight, A-5
- Window, disc, H-2
- Write protecting a disc, H-6
- Write protect tab, H-6

X

Xon/Xoff, 4-6

Y

Yellow shipping disc, B-1

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