User Manual

Tektronix

PRISM 3002
System

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Preface: A GUIDE TO PRISM DOCUMENTATION

PRISM documentation consists of a number of different manuals. These manuals provide the information necessary to install, operate, maintain, and service the PRISM mainframe and associated application modules.

The PRISM documentation consists of the following:

- The **system user manual**, which includes a basic introduction to operating the PRISM mainframe, how to use the PRISM system-level menus, and reference information such as procedures to connect external devices, specifications, and a glossary of terms.
- **Online documentation** that consists of notes that explain specific menu functions.
- **Application module user manuals** that explain how to use the PRISM application modules.
- **Application software user manuals** that describe the application software packages that can be used with the application modules.
- **Mnemonic disassembly instruction manuals** that explain how to use the microprocessor support products that allow you to disassemble microprocessor signals into their assembly language equivalents.
- **Prototype debug tool user manuals** that describe how to use the debug tools to troubleshoot and integrate software and hardware on your microprocessor-based prototype.
- **Service manuals** that help qualified technicians maintain, troubleshoot, and repair PRISM mainframes and application modules. These manuals also contain procedures for performing incoming inspections, verifying performance specifications, and making system adjustments.

HOW TO USE THIS MANUAL

If your PRISM hardware has not been set up, read and follow the installation procedures of Appendix A of this manual.

This PRISM 3002 System User's Manual is the master reference document for the entire PRISM system. If you are unfamiliar with the PRISM, use this manual to learn how to use the mainframe and the system-level menus. If you are an experienced PRISM user, use this manual as a reference document to look up specific functions and to acquaint yourself with the various configurations, options, and accessories available for the system. This manual comprises the following sections:

If you are unfamiliar with operating the PRISM system, read the orientation in Section 2 of this manual.

- **Section 1: PRISM 3002 Description**. Contains an overview of the PRISM system along with descriptions of the PRISM 3002 mainframe, the display devices (color CRT monitor or flat panel), the acquisition modules, and the application software packages. It gives you a general understanding of how the various pieces of the PRISM hardware and software fit together.
- **Section 2: Getting Started**. Familiarizes you with the basic operation of the PRISM system. It explains the functions of the keyboard controls and the structure of the menu-based operating system. After reading Section 2, you will know what the various menus are used for and how to move between and make selections within them.
- **Section 3: Acquiring Data**. Introduces you to the menus in the Setup menu group and to the basic steps involved in acquiring data. Since the menus used to set up PRISM for data acquisition depend on the application modules that are installed, you should use this section in conjunction with the appropriate application module user manual.
- **Section 4: Displaying Data**. Describes the common features of the State Table and Timing Diagram menus and the features specific to the State Table, Timing Diagram, and Graph menus. Be aware that some application software packages provide you with additional menus for displaying data. For information about these additional menus, refer to the appropriate application user manual.

- **Section 5: Using Symbols**. Tells you how to use the Symbol Definition menu in the Edit menu group to assign symbolic names or mnemonics to specific data patterns or ranges. This menu also allows you to read (and edit) the symbol table.
- **Section 6: Using Utilities**. Describes the menus in the Utility menu group. These menus allow you to see how your system is configured, to store and transfer data files, to load application software, to install new versions of system software, and to control communication between PRISM and other devices such as printers, remote controllers, and mainframe computers.
- **Appendix A: Installation and Connections**. Contains procedures for unpacking, inspecting, and setting up the PRISM mainframe at your site, and for connecting the mainframe to other devices.
- **Appendix B: Specifications**. Contains electrical, mechanical, and environmental specifications for all available configurations of the PRISM 3002 mainframe. (Specifications for the individual modules are contained in the module user manuals.)
- **Appendix C: Options and Accessories**. Lists the options and accessories available for the PRISM mainframe.
- **Appendix D: File Formats.** Explains the structure of PRISM data and symbol table files.
- **Glossary**. Defines terms specific to the PRISM system and terms that pertain to logic analysis in general.
- **Index**. At the back of this manual, you will find an index to help you locate information on specific subjects in this manual.

GENERAL SAFETY SUMMARY

The general safety information in this summary is for operating and servicing personnel. Specific warnings and cautions can be found throughout the manual where they apply and may not appear in this summary.

TERMS IN THIS MANUAL

CAUTION

CAUTION statements identify conditions or practices that could result in damage to the equipment or other property.

WARNING

WARNING statements identify conditions or practices that could result in personal injury or loss of life.

TERMS AS MARKED ON EQUIPMENT

CAUTION indicates a hazard to property, including the equipment itself, and could cause minor personal injury.

WARNING indicates solely a personal injury hazard not immediately accessible as you read the marking.

DANGER indicates a personal injury hazard immediately accessible as you read the marking.

SYMBOLS AS MARKED ON EQUIPMENT

DANGER—High voltage.

Protective ground (earth) terminal.

ATTENTION—REFER TO MANUAL.

GROUNDING THE PRODUCT

This product is intended to operate from a power source that does not apply more than 250 volts rms between the supply conductors or between either supply conductor and ground.

WARNING: This product is grounded through the grounding conductor of the power cord. To avoid electrical shock, plug the power cord into a properly wired receptacle. A protective-ground connection by way of the grounding conductor in the power cord is essential for safe operation. (I.E.C. Safety Class I)

DANGER ARISING FROM LOSS OF GROUND

Upon loss of the protective-ground connection, all accessible conductive parts (including knobs and controls that may appear to be insulated) can render an electric shock.

POWER DISCONNECT

The main power disconnect is by means of the power cord or, if provided, an ac power switch.

USE THE PROPER POWER CORD

Use only the power cord and connector specified for your product. Use only a power cord that is in good condition. CSA Certification includes the equipment and power cords appropriate for use on the North America power network. All other power cords supplied are approved for the country of use.

USE THE PROPER FUSE

To avoid fire hazard, use only a fuse of the correct type, voltage rating, and current rating.

USE THE PROPER VOLTAGE SETTING

Make sure the line selector is in the proper position for the power source being used.

REMOVE LOOSE OBJECTS

During disassembly or installation procedures, screws or other small objects may fall to the bottom of the mainframe. To avoid shorting out the power supply, do not power up the instrument until such objects have been removed.

DO NOT OPERATE WITHOUT COVERS

To avoid personal injury or damage to the product, do not operate this product with covers or panels removed.

USE CARE WITH COVERS REMOVED

To avoid personal injury, remove jewelry such as rings, watches, and other metallic objects before removing the cover. Do not touch exposed connections and components within the product while the power cord is connected.

REMOVE FROM OPERATION

If you have reason to believe that the instrument has suffered a component failure, do not operate the instrument until the cause of the failure has been determined and corrected.

DO NOT OPERATE IN EXPLOSIVE ATMOSPHERES

To avoid explosion, do not operate this product in an explosive atmosphere unless it has been specifically certified for such operation.

Section 1: PRISM 3002 DESCRIPTION

The PRISM 3000 Series is a modular family of electronic measurement and analysis tools. The basis of the system is the PRISM 3002 mainframe, which contains two slots for application modules, a hard disk drive, a floppy disk drive, a keyboard, and your choice of either a color monitor or flat-panel display. The slots allow you to configure the mainframe with application modules that specifically meet your electronic measurement needs. The floppy disk drive makes it easy for you to install application software that is targeted towards your special requirements. The result is a custom electronic measurement system tailored to your own applications.

The PRISM 3002 mainframe is shown in Figure 1-1.

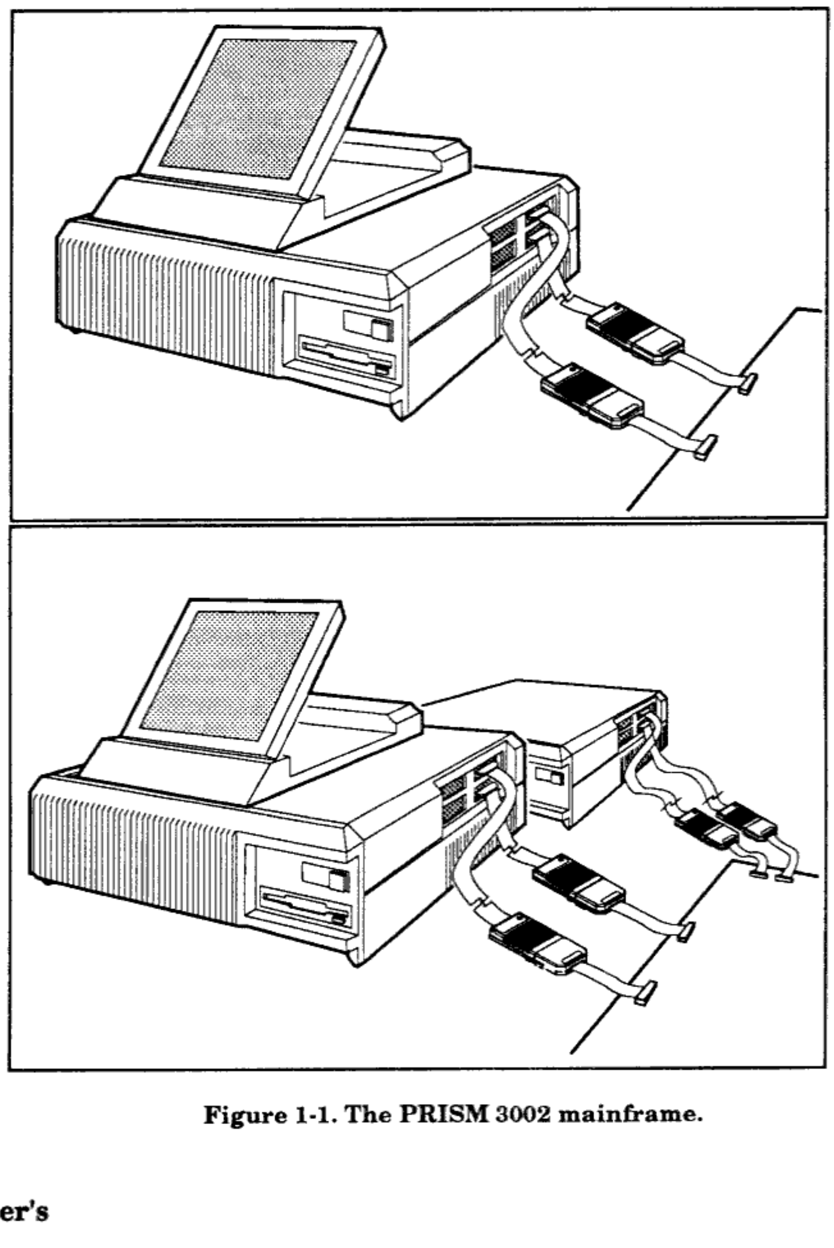


Figure 1-1. The PRISM 3002 mainframe.

MAINFRAME AND DISPLAY

Refer to Appendix C for a list of mainframe options and configurations.

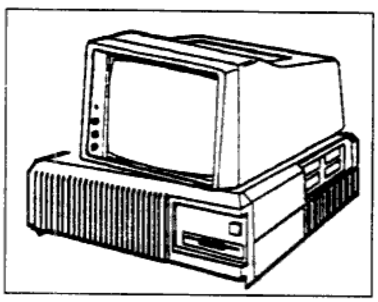
The PRISM 3002 is a general-purpose mainframe that provides basic support for one or two application modules. (You can add additional modules to your system through an expansion mainframe, discussed later in this section.) The mainframe supplies input and output interfaces, file management services, mass storage, and power for the installed modules.

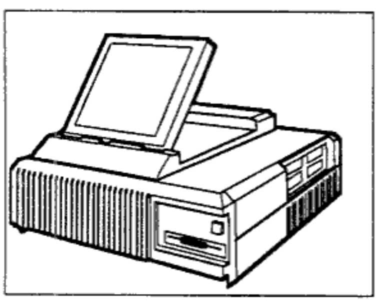
The PRISM 3002 mainframe comes in these versions:

- The PRISM 3002C mainframe is the standard configuration and comes with a color monitor for display.
- The PRISM 3002P mainframe is a portable configuration that substitutes a flat-panel display for the color monitor.

Color Monitor vs. Flat-Panel Display

Two types of displays are available for use with the PRISM 3002: a high-resolution color monitor or an amber flat-panel display.





The color monitor has a larger display area than the flat panel so the screen characters are larger. This, combined with the advantages of using color to differentiate between different types of menu fields, makes the color monitor easier to read than the flat panel.

The flat-panel display is more portable than the color monitor. The flat panel mounts on the top of the mainframe and folds flat. This makes it the display of choice when you need a configuration that you can easily transport. The flat panel is also considerably smaller than the color monitor so it requires less space in a crowded work area.

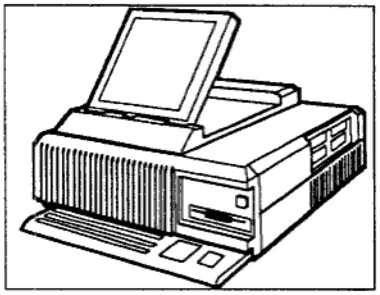
With the color monitor, you can adjust the screen intensity and contrast. These are fixed on the flat panel.

The flat panel always displays amber characters on a black background.

Both the color monitor and the flat panel plug into the DISPLAY/MONITOR port on the back of the mainframe.

Keyboard

Refer to Appendix A for instructions on connecting displays and the keyboard to the mainframe.



The PRISM 3002 mainframe comes with a detachable keyboard that provides the standard QWERTY keys plus a number of special-function keys. The keyboard cable connects to the PRISM 3002 through a port on the left side of the mainframe.

For portability, the keyboard slides like a drawer into a slot on the underside of the mainframe. To release the keyboard from the slot, simultaneously press the buttons on the left and right sides of the mainframe. The keyboard is discussed in detail in Section 2 of this manual.

Mainframe Hardware

The PRISM 3002 mainframe (shown in Figure 1-2) consists of the following major components:

- mechanical enclosure
- MPU board
- floppy disk drive
- hard disk drive
- power supply
- three external communication ports: RS-232C, 1200-series Comm Pack, and TekLink
- external trigger connectors

WARNING

Removing the covers on the mainframe can expose you to hazardous voltages and to unenclosed fan blades. Only qualified service technicians should install, remove, or reposition any PRISM 3002 mainframe component or application module.

Mainframe specifications are given in Appendix B of this manual. For detailed descriptions of the above components, refer to the *671-0058-xx MPU Board Service Manual* and the *PRISM 3002 Service Manual.*

Mechanical Enclosure

The PRISM 3002 mainframe enclosure is made of molded plastic with feet on the bottom and on the rear. It provides protection and connections for the other mainframe components. Fans inside the enclosure cool the power supply and circuit boards.

NOTE

When operating the PRISM 3002, make sure the vents on both sides of the mainframe are unobstructed. Operating the mainframe when the vents are blocked by other objects can cause components inside the mainframe to overheat.

The front of the enclosure has a handle that slides out to make the PRISM 3002 easy to carry. An opening on the right side of the enclosure gives you access to application module probe connectors.

Physical dimensions for the mechanical enclosure are given in Appendix B.

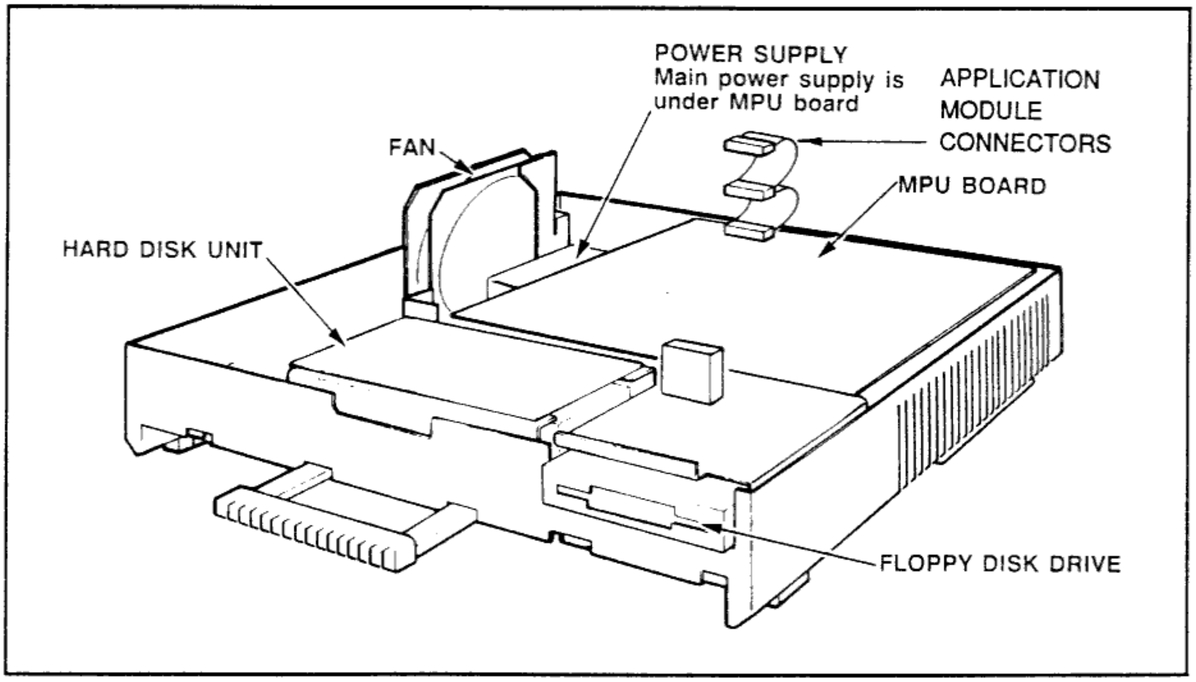


Figure 1-2. PRISM 3002 internal components.

MPU Board

The MPU board provides central control and communication interfaces for the other mainframe components and for any installed application modules. It is based on a 68010 microprocessor with 2 or 4 megabytes of dynamic RAM, 32 kilobytes of boot ROM, and a clock/calendar (with battery backup). Most of the MPU board's functional circuitry is contained in gate arrays. This results in a mainframe that provides powerful functionality while maintaining compact portability. Figure 1-3 is an internal configuration diagram for the PRISM 3002 mainframe.

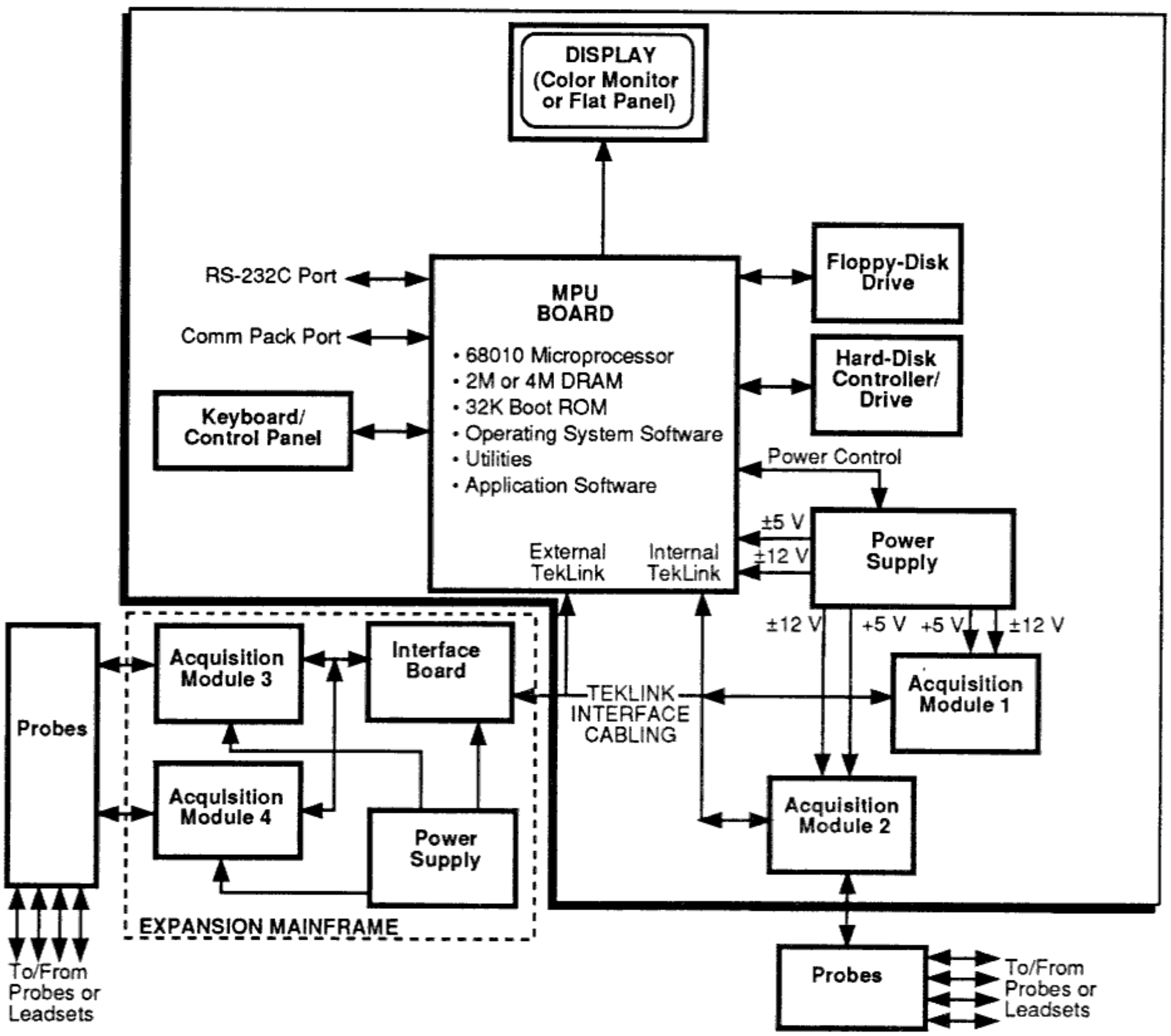


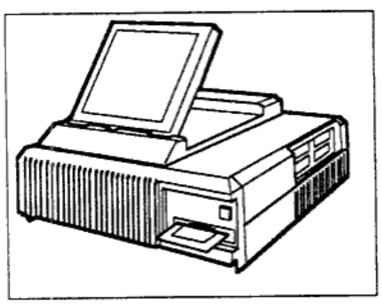
Figure 1-3. PRISM 3002 configuration diagram.

The MPU board contains power-supply control circuitry. This circuitry controls the power-up and power-down processes. The power-down process provides a power-down delay that helps prevent data from being lost. Power is shut down when the STANDBY/ON switch is set to STANDBY, when a power-supply failure occurs, or when an application module overheats.

The MPU board contains interface circuitry to communicate with other components and devices, such as the keyboard, RS-232C remote host interfaces, floppy-disk drive, and monitor or flat-panel display. In addition, Comm Pack circuitry links the MPU board to external devices using one of the 1200-series Comm Pack protocols (RS-232C or GPIB). Modules installed in an expansion mainframe are connected to the MPU board through a TekLink port on the back of the mainframe.

MPU board specifications are listed in Appendix B.

Floppy Disk Drive



The floppy disk drive is mounted on the right front of the mainframe. It takes double-sided, 3.5-inch, hard shell diskettes (prepared according to ANSI X3B8 draft, double-sided, 135 TPI, and certified to track 79). The floppy disk format is MS DOS compatible. Refer to Appendix A for instructions on inserting a disk into the drive.

A disk-eject button is located just under the disk slot. The light under the slot is lit whenever a disk read or write is occurring.

CAUTION

Never remove a floppy disk from the drive when the light is on. Doing so can damage the disk.

If a floppy disk containing the required system software is inserted in the drive when you power up the mainframe, the instrument boots with software on the floppy. If no floppy is installed at power-up, the PRISM boots with hard disk software.

Hard Disk Drive

Data transfers between the MPU board and the hard disk are controlled by a Hard Disk Controller board mounted above the hard disk drive.

Power Supply

The PRISM power supply can operate from either a 115 Vac or 230 Vac single-phase power source. The power cord connector is located on the back of the mainframe, just under the Comm Pack port.

CAUTION

If you must change the power source for the PRISM 3002 (for example, from 115 Vac to 230 Vac), you must set the line voltage switch on the back of the mainframe to match your power source. Never change the position of this switch without first disconnecting the power cord from the mainframe. See Appendix A for details.

Communication Ports

The PRISM has three ports for communicating with other devices: a TekLink port, a standard RS-232C port, and a Comm Pack port.

The TekLink port provides high-speed serial communications with an expansion mainframe.

The standard RS-232C port allows the PRISM mainframe to communicate with other serial communication devices. For example, you can use it to transfer data between the PRISM and a remote host. Or, you can use it to send copies of screens to a printer.

NOTE

Section 6 of this manual explains how to set communication port parameters.

The Comm Pack port gives you a port that you can configure with different protocols. By plugging in a 1200-series Comm Pack, you can use this port to give the PRISM a second RS-232C port or to remotely control the PRISM with a GPIB controller.

NOTE

If you have a 1200-series Comm Pack purchased prior to receiving your PRISM, call your Tektronix sales representative to make sure that your Comm Pack is compatible with the PRISM.

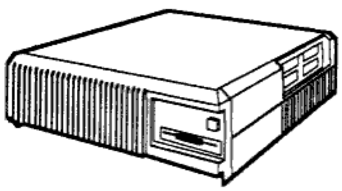
External Trigger Connectors

Two BNC connectors on the back of the PRISM 3002 mainframe let you send or receive trigger signals from other test instruments such as oscilloscopes or other logic analyzers.

Whenever a system trigger occurs, a pulse is sent out through the External Trigger Out port. Conversely, a pulse received through the External Trigger In port causes a system trigger to occur. The specifications for the trigger in and trigger out pulses are given in Table B-14 in Appendix B of this manual. System triggering is part of the Trigger Specification for each module and is discussed in the application module user's manuals.

EXPANSION MAINFRAME

The PRISM 3002E Expansion Mainframe contains slots for two additional application modules.



The expansion mainframe looks very much like the standard PRISM 3002 mainframe. While the expansion mainframe contains fewer internal components than the other PRISM 3002 mainframes, the components it does have are the same as those in the other PRISM 3002 mainframes. The expansion mainframe contains a power supply, a fan, and slots for two application modules. In an expansion mainframe, a TekLink Interface board is substituted for the MPU board.

SYSTEM SOFTWARE

The PRISM is controlled by system-level software stored on disk. System software is loaded into memory (System RAM) at power-up and performs the following tasks:

- manages system resources (for example, memory, MPU, mass storage devices, files and file access, and data communications)
- provides the user interface to the mainframe, to the installed application modules, and to any loaded application software packages
- controls communication between standard subroutines, modules, application software, and I/O devices
- gives you access to online help notes

Sections 2 through 6 of this manual tell you how to use the functions provided by system software.

APPLICATION MODULES

Application modules, consisting of printed circuit boards, are the building blocks of the PRISM 3002 system. You customize the PRISM 3002 to meet your electronic test requirements by choosing appropriate application modules.

When you purchase an application module, you also receive a floppy disk containing the software necessary to set up and run the module. This software must be loaded into memory assigned to the module. There are two ways to accomplish this. The best way is to copy the application module software into the SUPPORT directory on your hard disk. This causes the software to be loaded automatically during power-up (hardware must be configured appropriately). The other way is to manually load the software into memory. These methods are discussed in Section 6 and Appendix A of this manual.

32GPX Acquisition Module

The 32GPX Acquisition Module is a test and measurement tool capable of making high-speed timing and state acquisitions across 80 channels. Using an optional circuit board, you can interconnect two 32GPX modules in your 3002 mainframe to allow data acquisition on 160 channels. You can select 80 or 160 channels via a 32GPX menu. If you design, debug, and manufacture digital or microprocessor-based products, a 32GPX module is an excellent choice for your PRISM system if your application falls into one of the following categories:

- software verification
- software debugging
- software optimization
- hardware analysis
- hardware verification
- hardware debugging
- hardware/software integration
- microprocessor integration
- multiprocessor integration

The 32GPX can acquire data from microprocessors with 8-, 16-, and 32-bit wide data buses. Using the dual time base feature, the 32GPX can acquire the data using synchronous and transitional modes in the same acquisition through the same probe without double probing. By using the transitional storage feature, in which data is acquired only when the state of the input signals change instead of at every sample interval, you can capture data over long periods of time while maintaining maximum resolution. The 32GPX can store up to 8 K timing samples and up to 4 K state samples. This data is time-stamped and correlated with data from other modules in the PRISM system.

When you have a 32GPX module in your system, you can use a number of optional application packages such as microprocessor mnemonic disassemblers, a prototype debug tool (PDT), and performance analysis software.

30HSM Application Module

The 30HSM Hardware Analysis Module is a data acquisition module intended for high-speed hardware applications. It can sample data with a resolution up to 2.5 ns (using the standard leadset) or 500 ps (using the 2 GHz leadset).

The 30HSM trigger tests are simple, yet powerful. They can help you solve a variety of problems that occur with high-speed hardware, such as race conditions, spurious clocks, and setup/hold time violations. There are tests for:

- detecting specified bus values (an event)
- detecting specified bus values extended across several 30HSMs (a 21-bit or wider event)
- measuring the duration of specified bus values
- measuring the period (cycle rate) of a specified bus channel value
- accumulating the total time between a pair of specified bus values that occur and reoccur
- counting the number of times a specified bus value occurs
- accumulating the total time in which a single specified bus value occurs and reoccurs
- measuring the setup time between two specified bus values
- measuring the hold time between two specified bus values

The trigger test specification can consist of one test or two tests that may be performed sequentially or concurrently. Each test can consist of one or two event recognizers, counters, timers, and intermodule signals. Trigger test selections work together to provide you with a powerful trigger machine. You can set the PRISM to perform a variety of actions based on the result of each test.

There are three acquisition modes: the 400 MHz High-Resolution mode for system timing analysis, the 2 GHz mode for precise system characterization, and the Dual-Threshold acquisition mode for detecting glitches and other voltage-related logic problems. In addition, there is the optional Synchronous mode for sampling data on each pulse of an external clock, usually provided by the system under test. This feature can help you track high-speed hardware state machines, synchronous communications interfaces, or other clocked devices.

The 30HSM also features transitional storage, in which data is stored only when the state of the input signals change, instead of at every sample interval. This provides the ability to capture data over long periods of time while maintaining maximum resolution.

30MPX Application Module

The 30MPX application module contains a feature set that helps you solve problems in microprocessor-based systems. A 30MPX module is a good choice for your PRISM system if your application falls into one of the following categories:

- software verification
- software debugging
- software optimization
- hardware/software integration
- microprocessor integration
- multiprocessor integration

The 30MPX module supports 8-, 16-, and 32-bit microprocessors by providing 96 state acquisition channels. In addition to the state acquisition channels, the 30MPX provides nine 200 MHz timing acquisition channels. Data acquired by any channel can be displayed in either a state table or a timing diagram.

NOTE

You may encounter references in this manual to the 30MPM application module. The 30MPM module is similar to the 30MPX module, differing only in the number of acquisition channels it provides. The 30MPM module has 64 state acquisition channels compared to the 30MPX module's 96.

The 30MPX module provides you with the following features:

- support for microprocessors with clock rates up to 33 MHz
- timestamped data storage with 20 ns resolution
- data display that is time correlated with data from all other modules within the system

- storage of up to 8 kilobytes of bus cycles
- eight range recognizers
- eight counter/timers
- seven possible trigger levels

When you have a 30MPX module in your system, you can use a number of optional application software packages such as microprocessor mnemonic disassembly software, prototype debug tool (PDT) software, and performance analysis software. These are described in more detail under *Application Software* later in this section.

30DSM Application Module

The 30DSM Digitizing Oscilloscope Module is a digitizing storage oscilloscope that operates from within the PRISM mainframe, providing you with a combination logic analyzer/oscilloscope. Using the 30DSM with other PRISM application modules, you can combine digital timing and state analysis functions with analog waveform measurement. By adding another 30DSM module to your configuration, you can also make dual-timebase measurements. There are many configurations possible, especially when using an expansion mainframe.

The 30DSM module contains two 8-bit analog-to-digital converters for simultaneous, dual-channel operation. The 8-bit vertical resolution enhances measurement accuracy and provides a clean, easy-to-read waveform.

The 30DSM module can capture single-shot signals of up to 50 MHz (dual-channel mode) or 100 MHz bandwidth (single-channel mode). Each channel input is digitized simultaneously (at 200 megasamples per second) so you can determine the exact relationship between asynchronous events.

The 30DSM module also features a long waveform record length. By varying the sample rate, you can acquire up to 16 seconds of analog data. After you've acquired the signal, 30DSM display features let you see any part of the large data record—up to 32K samples—with a few keystrokes.

GPIB Comm Pack

The GPIB Comm Pack plugs into the back of the PRISM system. It provides parallel communications between the PRISM system and a remote host computer via the IEEE-488 bus. The GPIB lets your PRISM act as a talker and a listener to your host computer. You can use your host computer to control the GPIB interface and the PRISM system.

APPLICATION SOFTWARE

Tektronix offers a number of different application software packages for use in the PRISM system. When you purchase application software, you receive a floppy disk containing the software, a user's manual, and microprocessor-specific probes or leadsets (if appropriate).

To use application software, it must be loaded into memory. There are two ways to do this. You can copy the software into the SUPPORT directory on your hard disk, which causes it to load automatically at power-up. Or, you can manually load it into memory with the Save/Restore menu. These methods are discussed in Section 6 of this manual.

Microprocessor Mnemonic Disassembly Support

The mnemonic disassembly packages provide both hardware and software mnemonic disassembly formats. Additionally, in a dual-processor system, the PRISM lets you display disassembly mnemonics for both microprocessors on the screen at the same time.

NOTE

To run disassembly software, your PRISM must be configured with a 32GPX or 30MPX application module.

Each disassembly package includes a microprocessor-specific probe adapter, which supplies the hardware necessary to properly acquire data from the microprocessor. Probe adapters to support most package styles (both socketed and soldered) are available. Additionally, to make it possible for you to connect to package styles that are not specifically supported, a General Purpose Probe Adapter is available.

Some of the microprocessors currently supported by the PRISM are listed in *Appendix C: Options and Accessories*. For a complete list, contact your local Tektronix representative.

Prototype Debug Tool

The Prototype Debug Tool (PDT) gives you a powerful means of debugging microprocessor-based prototypes. It consists of from one to four PDT probes that plug into your prototype ROM sockets and PDT software that is loaded into the PRISM mainframe. The PDT probes contain RAM that emulates your prototype ROM. With the PDT probe(s) replacing your ROMs, you can run and control your microprocessor system to debug your program interactively. When you are satisfied with the tested and updated code, you can copy the program from the PDT memory to a disk file for use in programming (burning) final ROMs.

NOTE

PDT requires a PRISM configured with a 32GPX or 30MPX module. Microprocessor-specific PDTs for the 30MPX module also require mnemonic disassembly software.

PDT lets you interact with your prototype system without interfering with the system's normal operation. When you use the PDT, you can do the following:

- fill, patch, and dump the contents of emulated ROM memory
- reset your system under test
- transfer code between your emulated ROM and the PRISM file system
- load and execute software tests for bus, timing, and system performance analysis
- debug your system under test using other tools available in the PRISM system together with the PDT

The PDT is available in both general purpose and microprocessor-specific versions. Microprocessor-specific PDTs for the 30MPX include special monitor programs that provide additional capabilities, so that you can perform tasks such as these:

- examine and change register contents
- set and clear software breakpoints
- single-step your prototype microprocessor
- examine and change system RAM contents
- set and clear hardware breakpoints

Performance Analysis Application

A Performance Analysis (PA) application evaluates software performance of microprocessor-based systems. It is the most effective means of identifying inefficient code that can be optimized.

NOTE

PA requires a PRISM configured with a 32GPX or 30MPX module.

Using a PRISM Performance Analysis application, you can perform the following optimization tasks:

- record events as they occur in the system under test
- statistically analyze the activity of the system under test in real time to identify inefficient routines
- determine execution times and monitor their effects
- analyze memory use
- observe the bus efficiency of program instructions
- monitor the effects of interrupts
- count the occurrences or duration of a software event

PA software processes raw data from a system under test (SUT) into a form that provides meaningful information about the system's performance. For the PRISM system, the raw data consists of data acquired from the address lines of a microprocessor-based system. PA then sorts this data into user-defined ranges and displays a bar chart and table of the results. You can display overall system activity, the number of times a routine executes, or the amount of time the system spends in user-defined regions. This shows where your system under test is spending (or wasting) time, so you can then optimize your system by refining the code that is executed the most.

PA is a flexible analysis tool whose use varies with your application. PA offers two ways to analyze your system under test: real-time and statistical sampling.

Section 2: GETTING STARTED

This section is an introduction to the PRISM 3002 controls and displays. Use it initially to familiarize yourself with the basic operation of the logic analyzer. As you become more experienced, use it as a reference on specific controls and display functions.

This section assumes that your PRISM 3002 is installed and ready for operation. Instructions for installing and powering up the PRISM 3002 are contained in Appendix A. Appendix A also contains information on how to connect probes, use the floppy disk drive, and connect the PRISM 3002 to other devices.

This section tells you:

- how to power up the system
- the layout and function of the keyboard controls
- the basic menu structure
- how to call up online Help Notes
- how to make field selections and enter field values

POWER-UP PROCEDURE

Connect probes and leadsets to the PRISM mainframe and to the SUT. After probes and leadsets have been properly connected, power up the PRISM 3002 as follows:

CAUTION

Do not "hot plug" the probes or leadsets (do not connect them while they or the PRISM are powered up). Hot plugging may damage probes, leadsets, or the PRISM mainframe.

1. Connect the display monitor (or flat-panel display), keyboard, and power cord to the mainframe, then plug the power cord into a grounded outlet. (See Figure 2-1 and Appendix A for more information).
2. Switch the PRISM 3002 on by pressing the On/Standby switch on the front of the mainframe. This switch is lighted when the mainframe is turned on.

NOTE

Do not touch any keys until after power up is complete. If a key is depressed during power up, the power-up diagnostic tests may fail.

3. If your mainframe does not contain a preconfigured hard disk, insert the PRISM system disk, label side up, in the floppy disk drive slot on the front of the mainframe. If your mainframe contains a preconfigured hard disk, you do not need to insert the disk as your mainframe will start up with operating system software on the hard disk.

NOTE

The PRISM has a disk-based operating system. The basic software that tells your system what to do is stored on a floppy (or hard) disk. If your mainframe does not contain a hard disk, the system will not function until a system disk has been inserted.

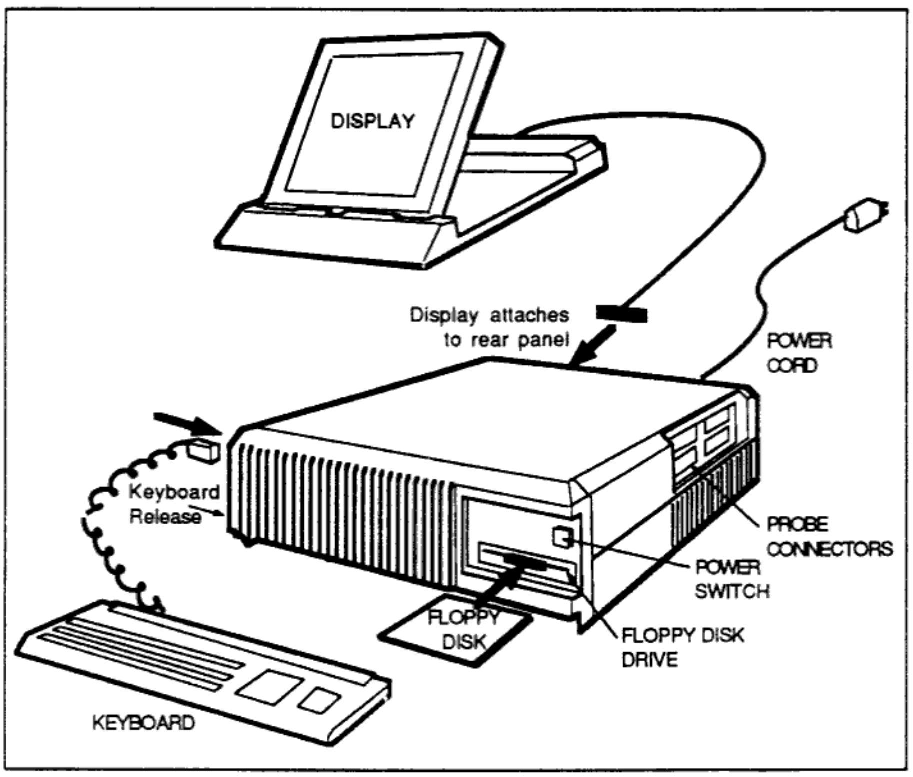


Figure 2-1. PRISM 3002 mainframe connections.

4. Wait until power-up diagnostic tests finish running and the screen displays the System Configuration menu (shown in the *Using Utilities* section of this manual).

   If the System Configuration menu does not come up and the screen continues to display one of the Diagnostics menus, some component of the system failed to pass diagnostics. Check to make sure that the keyboard, display, and power cord are firmly connected to the mainframe and that you are using the correct system disk to boot from.

Your PRISM is now ready for you to set up to acquire data (instructions for making data acquisitions are given in your application modules user's manual and in Section 3 of this manual). Before you start using the system, take the time to make backup copies of all your PRISM floppy disks using the Duplicate Floppy Disk operation described in Section 6 of this manual. Store the master disks in a safe place and use copies for operating your PRISM system.

NOTE

Your PRISM loads all the software it needs during power-up, so you do not have to leave a floppy disk installed to operate the system after power-up is complete.

MENU OVERVIEW

A menu is an interactive screen display that offers selections. All PRISM operations are controlled by selections that you make in menus. There are three levels to the menu hierarchy: menu groups, menus, and submenus. Figure 2-2 shows the menu hierarchy. The menus available in each group depends on the modules and application software installed.

There are four menu groups, each consisting of menus that perform related functions:

1. Setup menus control data acquisition and storage. Since these menus are specific to the modules and applications being used, they are described briefly in this manual. For detailed instructions on how to use Setup menus, refer to the user's manual for the modules installed in your system.
2. Edit menus allow you to assign symbolic names or mnemonics to channel group values.

3. Display menus let you view acquired data in a number of different formats.
4. Utility menus allow you to manage memory and to control communication between the PRISM 3002 and other devices.

Submenus contain fields that let you set parameters for operations that are associated with the specific menus. For example, some Display submenus control how data looks on the screen.

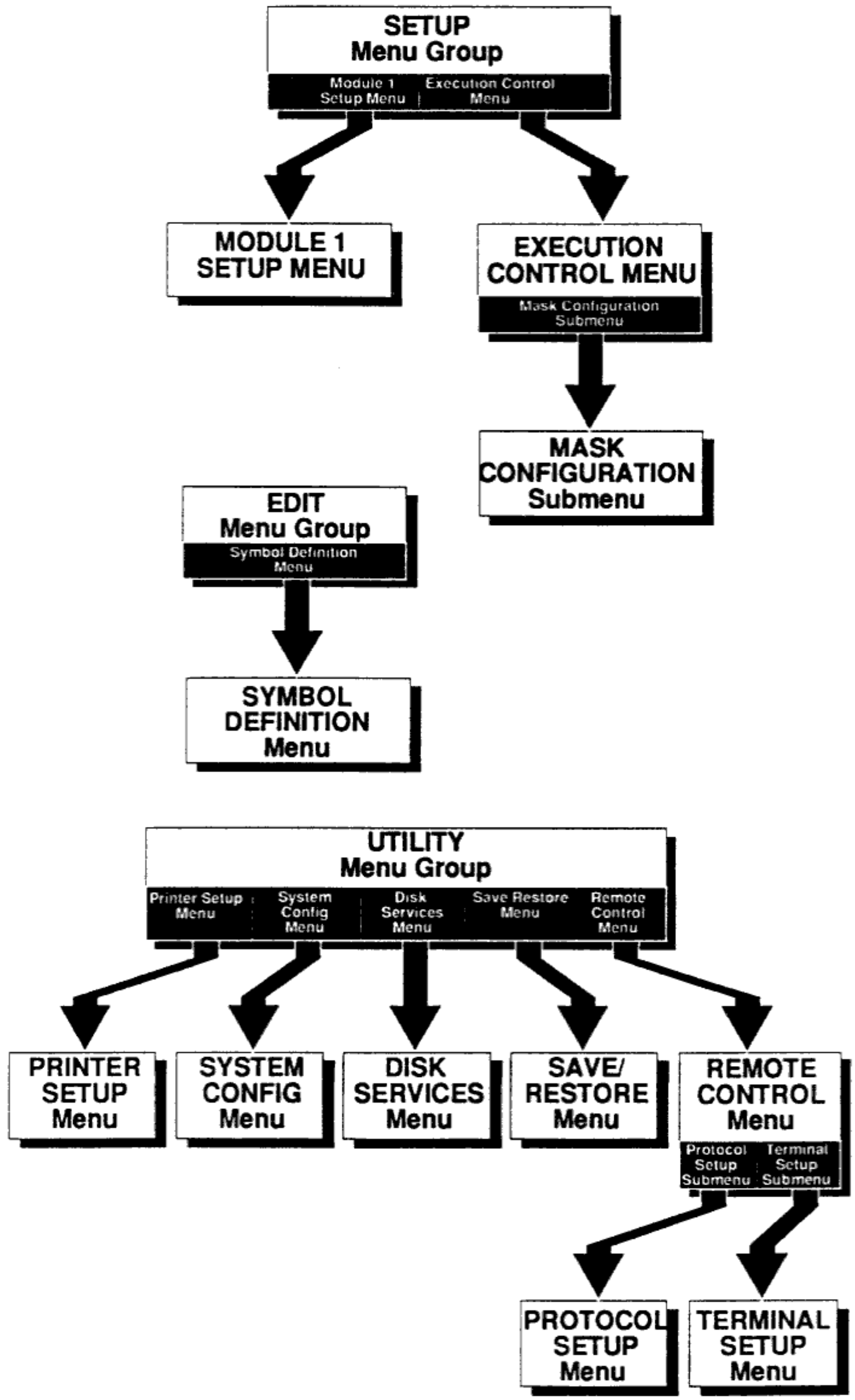


Figure 2-2. PRISM menu hierarchy. This figure only shows the menus always present in a PRISM system. Additional menus may be provided by optional application software.

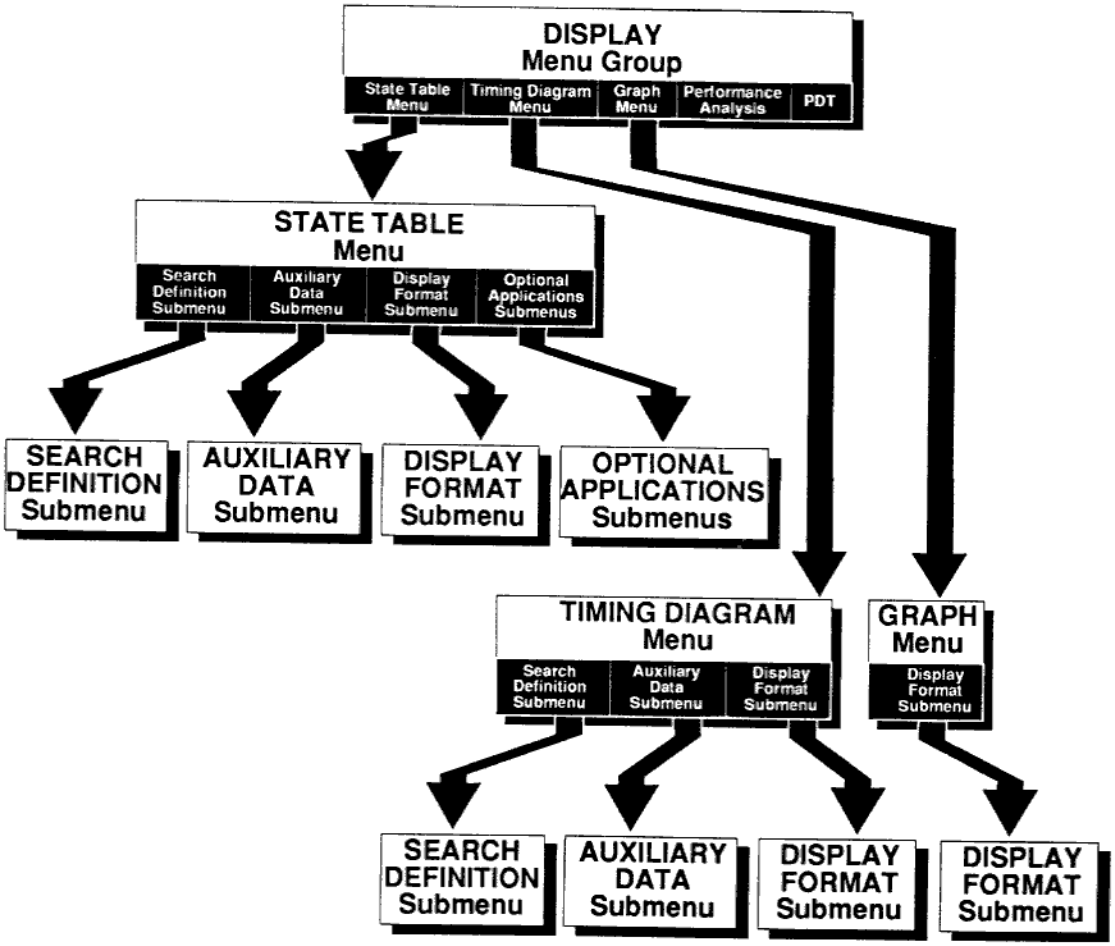


Figure 2-2. PRISM menu hierarchy (cont). This figure only shows the menus always present in a PRISM system. Additional menus may be provided by optional application software.

Accessing Menus and Submenus

The first step in getting a menu on the screen is to identify which menu group it belongs to (see Figure 2-2). Then, press the appropriate MENU key.

Press a MENU key to select a menu group. Then, either type in the menu name or use the SELECT keys to scroll to the desired menu.

Cursor. A marker that specifies a particular location on the display screen.

Data Cursor. A line in a Display menu that marks a specific data location.

Field Cursor. A blinking rectangle on the display screen that marks the field you are currently interacting with.

When you press a MENU key, the menu displayed is the last menu accessed in that group unless it's the first time the group has been accessed since power-up. The name of the menu group and the menu are shown in the upper left corner of the display screen. To change to a different menu within the same group, position the field cursor on the menu name and use the SELECT keys to scroll to the desired menu. (Or, you can type in the first few characters of the menu you want.) To access a menu in a different menu group, you have to press the appropriate MENU key.

Access submenus through function keys. Exit submenus by pressing F8.

Submenus are called by pressing function keys. Labels at the bottom of the screen identify the submenu called by each function key. Each submenu can be called only from one specific menu, although submenus accessed through different menus may have the same name. When a submenu is called, it replaces the lower portion of the menu. Changes cannot be made to the menu until the submenu is exited. To exit a submenu, press F8.

NOTE

Through the System Configuration menu, you can open a Menu Map submenu that shows you all the menus available in your system. This submenu is discussed in more detail under Menu Map later in this section.

Splitting the Display Window

Window. The portion of a menu that appears on the screen at one time.

Pane. The PRISM has a split-screen feature that allows two windows to be displayed at one time. Each of these windows is referred to as a pane.

Split the display by pressing F8 in a Setup or Display menu. Press F8 again for a single pane display.

When displaying menus from the Setup and Display menu groups, you can split the display window horizontally into two panes by pressing F8. This allows you to view any combination of two data or acquisition setup menus at the same time. With the split display you can do the following:

- look at the same data in both State and Timing formats at the same time
- look at both an acquisition memory and a reference memory at the same time
- look at two widely separated portions of the same data display
- simultaneously view a data acquisition and the menu setup used to acquire it

Press F8 again to return to a single pane display.

Press Shift-F8 to switch active panes.

At any one time, one pane is active and the other is inactive. Changes can only be made to the active pane, and the function key labels at the bottom of the screen are always those associated with the active pane. To separate function key labels from the bottom pane when the top pane is active, a dashed line appears above the labels. The blinking cursor always occupies the active pane.

Fields

A field is any part of a menu that you can modify. If you have a color monitor, fields are displayed as white characters on a blue background. If you have a flat-panel display, fields are shown in reverse video (dark characters on a light background).

To aid you in setting parameters, most PRISM fields have online help notes associated with them. These notes briefly explain the function of and the available choices for the field the cursor is on (see *Online Notes* later in this section).

There are two basic types of fields: select fields and fill-in fields.

Select Fields

Use pop-up menus and the SELECT keys to change the values in select fields.

A select field contains a limited number of predefined choices. There are several ways to make a selection in a select field:

- Position the field cursor in the field and press Return to open a pop-up select menu. Then use the SELECT knob or keys to highlight a new selection. Press Return again to close the pop-up menu and effect the new selection. Pop-up select menus are available for most select fields.
- Position the field cursor in the field and cycle through selections for the field with the SELECT keys until the selection you want occupies the field.
- Call up the help note to display the entire list of choices and scroll to the item you want to select. (Note: Selections preceded by an asterisk in the help note are not currently available.)
- Position the field cursor in the field and type in a character string that matches one of the available selections.

NOTE

It usually isn't necessary to type in an entire character string. As soon as the PRISM recognizes the selection (which might be after one, two or three characters), it stops printing typed characters and displays the selection in the field.

Pressing the CURSOR keys while the cursor is in a select field moves it to a different field.

Fill-in Fields

Use the keyboard to type in fill-in field values.

A fill-in field has no list of choices. Instead, you move the cursor to the field and enter your selection by typing in a string of characters. You may use the QWERTY keyboard, the hex keypad, the SELECT knob or the SELECT keys to enter characters. The first keystroke makes the field go blank and allows you to overwrite any existing characters. Pressing the left and right CURSOR keys moves the cursor within a fill-in field without changing the value of the characters it passes over.

Some fill-in fields (such as memory location number fields) accept only numeric input, while others (such as the fields used to name files) accept any alphanumeric character. If the field is the numeric type, using the SELECT knob (or SELECT keys) increments or decrements the entire field, regardless of where in the field the cursor is positioned. If the field is the alphanumeric type, only the character under the cursor will change when the knob is turned.

Use the Rub Out key to clear the entire field. Use the Back Space key to delete a single character in the field. Or, use the right and left arrow CURSOR keys to position the cursor in the field without making any modifications.

KEYBOARD DESCRIPTION

As shown in Figure 2-3, the PRISM 3002 keyboard is divided into eight functional areas. These areas and their associated keys are discussed in the following paragraphs.

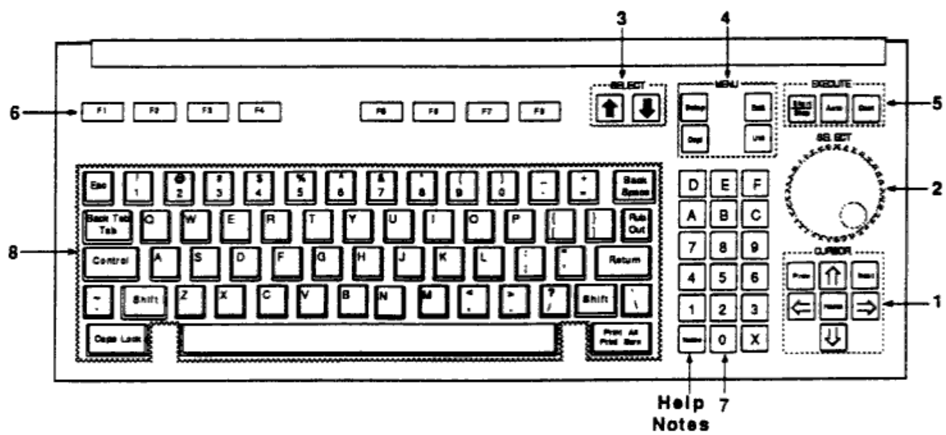
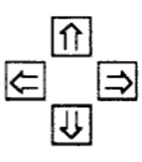


Figure 2-3. PRISM 3002 keyboard.

1 CURSOR Keys



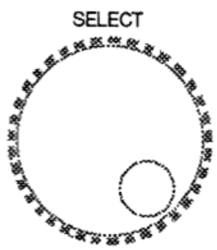
These four keys move the blinking cursor within and between menu fields. Before you can make any changes in a field, the cursor must be positioned in it.

The Prev key moves the field cursor one menu field to the left. If the cursor is positioned in the first field on a line, the cursor is moved to the last field on the previous line. If the cursor is on the first field at the top of the menu, the cursor is moved to last field at the bottom of the menu.

The Next key advances the field cursor one menu field to the right. If the cursor is positioned in the last field on a line, the cursor is moved to the first field on the following line. If the cursor is on the last field at the bottom of the menu, the cursor is moved to the first field at the top of the menu.

The Home key places the field cursor in the first field at the top left of the display.

2 SELECT Knob



The SELECT knob scrolls data in Display menus. In pop-up select menus, it highlights menu selections. When used directly in a menu select field, the SELECT knob cycles through the possible selections for the field that the cursor is on. When you are using the knob to make selections in menu fields, turning the knob clockwise performs the same function as pressing the SELECT ↓ key and turning the knob counterclockwise is the same as pressing the SELECT ↑ key.

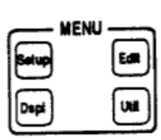
NOTE

You can also change a field selection by typing in the selection you want. As soon as you've entered enough characters to uniquely identify the selection, the field changes.

3 SELECT Keys

Pressing the SELECT keys cycles through the selections for a pop-up select menu (if open), or the field that the cursor is on. To make a menu selection directly from a field, you place the cursor on the field and press one of these keys. Turning the SELECT knob performs the same function (except in Display menus).

4 MENU Keys



The MENU keys give you access to groups of related menus. The current menu group is displayed in the upper left corner of the screen; the second line in every menu shows the name of the menu and the group to which it belongs. (The first line in each menu is reserved for error and prompt messages and is usually blank.) For more information on the PRISM menu structure, refer to the menu overview later in this section.

NOTE

When you press a MENU key, one of the menus in that group is displayed on the screen. To access a different menu in that group, position the cursor in the menu select field in the upper left corner of the menu and turn the SELECT knob or press the SELECT keys until the name of the desired menu appears in the field. (You could also use a pop-up select menu to make another menu selection.) To access a menu in a different menu group, you must press the appropriate MENU key.

There are four menu groups:

[Setup] The Setup menus are used together to set up the trigger conditions and to determine what data is stored in acquisition memory, and thus available for display. The Setup menu group consists of the Execution Control menu (used to control auto-run and continuous acquisition modes) and one or more menus for each installed acquisition module.

[Edit] The Symbol Definition menu is the only Edit menu. It allows you to assign a convenient mnemonic to a channel group value.

[Dspl] The Display menus let you look at the acquired data in a variety of formats.

[Util] The Utility menus are used to manage memory, specify what is loaded into RAM, and control input/output operations. The menus comprising this group are Disk Services, Save/Restore, System Configuration, Remote Control, and Printer Setup.

5 EXECUTE Keys

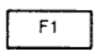
The three EXECUTE keys initiate and terminate data acquisitions.

[Start/Stop] The Start/Stop key starts a single data acquisition. When the trigger event specified in the Setup menus is found, the PRISM fills acquisition memory, then stops and displays acquired data. While the system is running, the screen shows the current status of the acquisition. If Start/Stop is pressed during the acquisition, the PRISM stops immediately (regardless of the trigger search status) and displays acquired data.

The Auto key starts an auto-run mode data acquisition. The PRISM makes an acquisition and compares the acquired data to reference memory data. Based on the result of the comparison and on selections made in the Execution Control menu, the system will either make another acquisition; store the acquired data and make another acquisition; or stop and display the last acquisition. Pressing Start/Stop stops the acquisition.

The Cont key (Continuous Mode) starts a continuous data acquisition. The PRISM continually acquires and displays data. If the trigger event (specified in the Setup menus) has not been found within the time limit set in the Execution Control menu, the system stops the current data acquisition, displays the current data, and starts another acquisition. Pressing Start/Stop will stop the acquisition.

6 FUNCTION Keys F1 Through F8

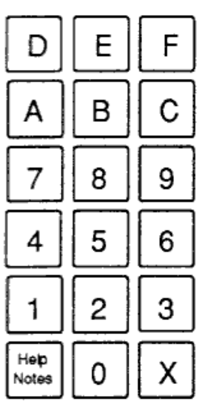


The functions of keys F1 through F8 change depending on the menu displayed. A row of labels at the bottom of each menu tells you which keys are available and gives their function. Not all function keys are active in every menu.

NOTE

A bar over the function key label indicates that it calls up a submenu. Labels that are open at the top indicate that the key performs a function within the (currently active) menu.

7 Hexadecimal Keypad



For convenience in entering numeric data, a hexadecimal keypad is provided. If a field requires a radix other than hexadecimal, some keys may be invalid.

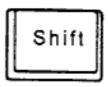
An X entered in a field indicates that the value of a channel or character is ignored. Also, X is used to confirm operations that could result in data being lost. Pressing X while the field cursor is in a data cursor location field in a Display menu moves the data cursor to the location in memory where the trigger event is stored. Sometimes pressing X aborts an operation that is in progress.

Pressing the HELP NOTES key brings up online help notes that give you information about selections available in menu fields. For more information about notes, refer to *Online Notes* later in this section.

8 QWERTY Keyboard

The QWERTY section of the PRISM 3002 keyboard is like the familiar typewriter keyboard, with a few notable exceptions. Certain keys perform specialized functions that are not available on a typewriter. Use the QWERTY keys to enter any character, including numbers and symbols. Character keys repeat when held down.

A few of the keys function only when the PRISM 3002 is acting as a terminal connected to a host computer.



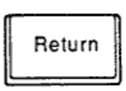
When the Shift key is held down, the character keys produce uppercase letters or the upper character shown on the key. This is useful when you are using your PRISM mainframe as a terminal.

NOTE

PRISM file names are not case-sensitive; all lower case letters are converted to upper case letters.

The Print Scrn key causes the image currently displayed on the screen to be output through a port or stored in a disk file. This key's operation is controlled through selections made in the Printer Setup menu (Utility menu group).

The Print All key (Shift-Print Scrn) outputs the State Display to a printer or to a disk file. This key's operation is controlled through selections made in the Printer Setup menu (Utility menu group) and the Print All submenu (State Table menu in the Display menu group).



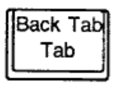
The Return key opens pop-up select menus. After you make a selection within the pop-up menu, pressing Return again closes the pop-up menu and effects the selection. Refer to *Pop-Up Select Menus* for more information.

When the PRISM 3002 is being used as a terminal connected to a host computer, Return moves the insertion point to the beginning of the next line.

The Rub Out key causes the field the cursor is on to go blank and repositions the cursor.

The Back Space key deletes the character to the left of the cursor and moves the cursor back one character in fill-in fields. If the cursor is on a select field, Back Space moves the cursor to the previous field.

The ESC key only functions when the PRISM 3002 is being used as a terminal. It performs whatever function is defined for it by the host computer.



The Tab key moves the cursor to the next field in the menu (like the Next key). Shift-Tab moves the cursor to the previous field in the menu (like the Prev key). When the PRISM mainframe is being used as a terminal, TAB moves the insertion point to the next tab stop.

POP-UP SELECT MENUS

Most select fields have a pop-up feature that lists all the selections for that field. To open the pop-up menu, press Return while in a select field. The pop-up menu opens with the current selection highlighted. To change selections, use the SELECT knob or keys to highlight a new selection, then press Return. You can also use these CURSOR keys to change selections: ⇑, ⇓, `Prev`, `Next`, and `Home`. Figure 2-4 shows an example pop-up menu.

If there are selections that are not shown, the pop-up menu includes a row of arrows to show that there are more choices.

Press Return to open the pop-up menu, then highlight a new field selection. Press Return again to effect the new selection.

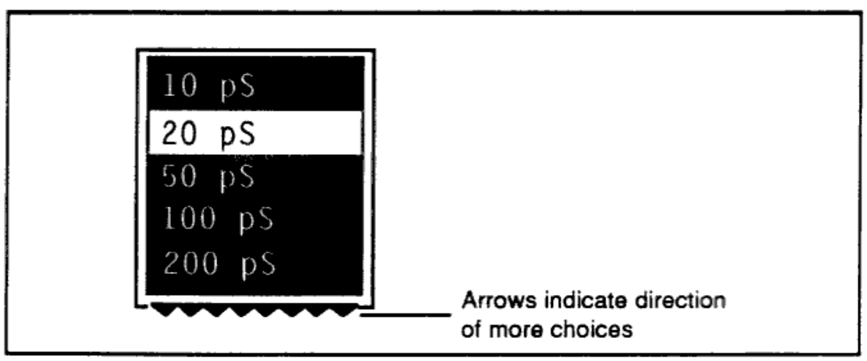


Figure 2-4. A pop-up menu. Pop-up menus are especially useful for making Time/Div selections.

To close a pop-up menu without changing the previous selection, press any key **other than** Return, Print Scrn, the Select keys, or Cursor keys ⇑, ⇓, `Prev`, `Next`, and `Home`.

If you press Return in a field that does not have a pop-up menu (such as a fill-in field) the PRISM beeps and waits for a new key entry.

Pressing Print Scrn while you have a pop-up menu open allows you to capture the pop-up menu setting.

ONLINE HELP

The PRISM provides you with four types of online help:

1. To help you in moving through the menus in the system, there is an online menu map that shows you what menus are available by what menu group they are in.
2. To aid you in making field selections, each field has a help note associated with it that explains the function of the field.
3. To give you information during the performance of various operations, the top line of the display screen is reserved for messages.
4. To assist you in using command-driven application software packages, specific command help is usually provided with the application.

The operation of the first three of these is detailed in the following discussions. The operation of the fourth type varies with the application software you are using and is discussed in the user's manual for the specific application.

Menu Map

The System Configuration menu (the first menu shown after power up) gives you access to a submenu containing a menu map of the system. This submenu lists each menu currently available in the system and shows you which menu group each must be accessed through. An example of the Menu Map submenu is shown in Figure 2-5.

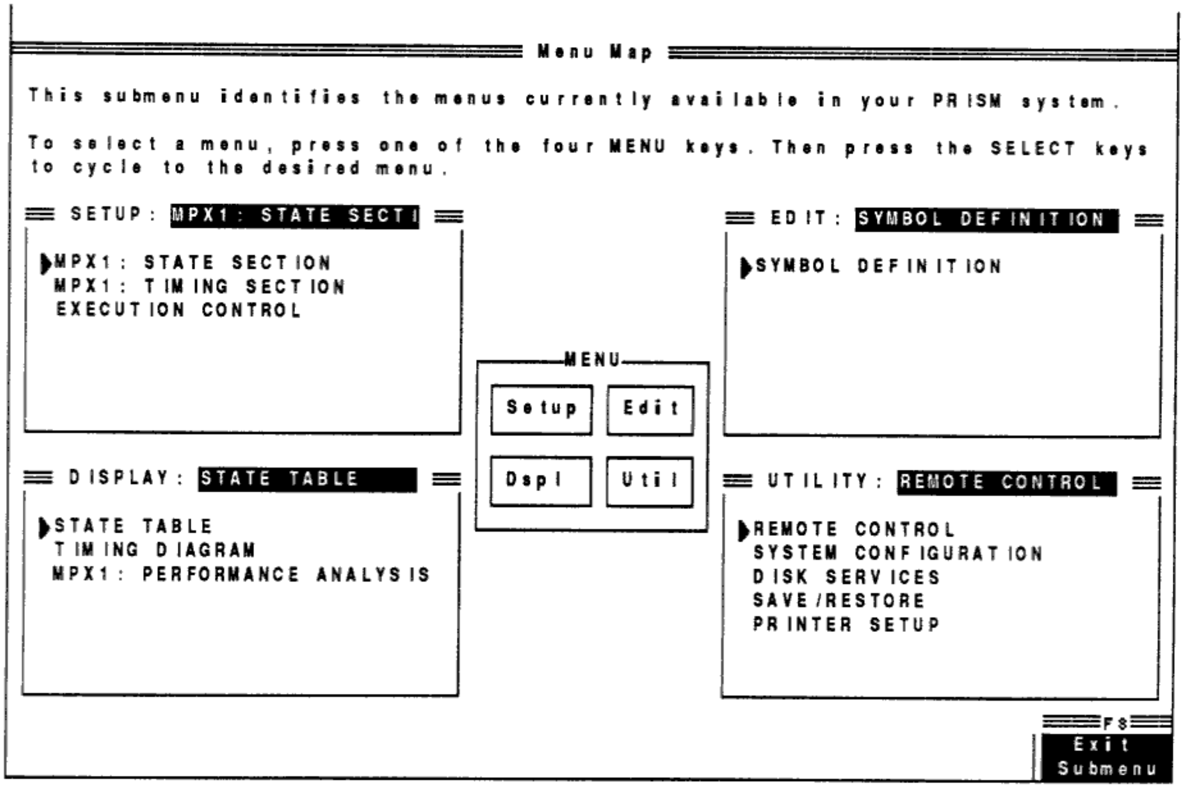


Figure 2-5. Menu Map submenu. Gives overview of all the menus. Use it for easy access to help notes about different menus. When you are ready to change menu groups, press one of the MENU keys on your keyboard.

To access the Menu Map submenu, enter the Utility menu group by pressing Util. Open the System Configuration menu by pressing Home, then typing in SY. Press F5: Menu Map to open the Menu Map submenu.

Help Notes

If you aren't sure of a field's function, position the cursor in the field and press HELP NOTES. A notes box (see Figure 2-6) containing a list of the selections overlays the lower portion of the menu. The notes box also contains a brief explanation of the field's function. The item currently selected appears in reverse video if you have a flat-panel display or as white characters on a blue background if you have a color monitor.

Turning the knob or pressing a SELECT key changes which item is selected. Selecting an item in the notes box selects it in the menu as well. As you change the current selection, the text in the notes box changes to explain the new selection.

NOTE

Selections preceded by an asterisk (*) in the notes box are not available. Usually this occurs as the result of a conflicting selection made elsewhere in the system or of an incompatible hardware configuration.

If the list of possible selections is too long to fit in the notes box, arrows indicate whether there are unseen selections above or below the part of the list displayed. Use the knob or SELECT keys to scroll the selection list up or down. The notes box remains on the screen until you press HELP NOTES again.

The field cursor can be moved around the menu while the notes box is active. The notes box always contains information about the field that the cursor is positioned in. When you move the cursor to a different field, the help note text changes to match the new field. Moving the cursor down to fields covered by the notes box causes the menu to scroll upward until the field containing the cursor is visible.

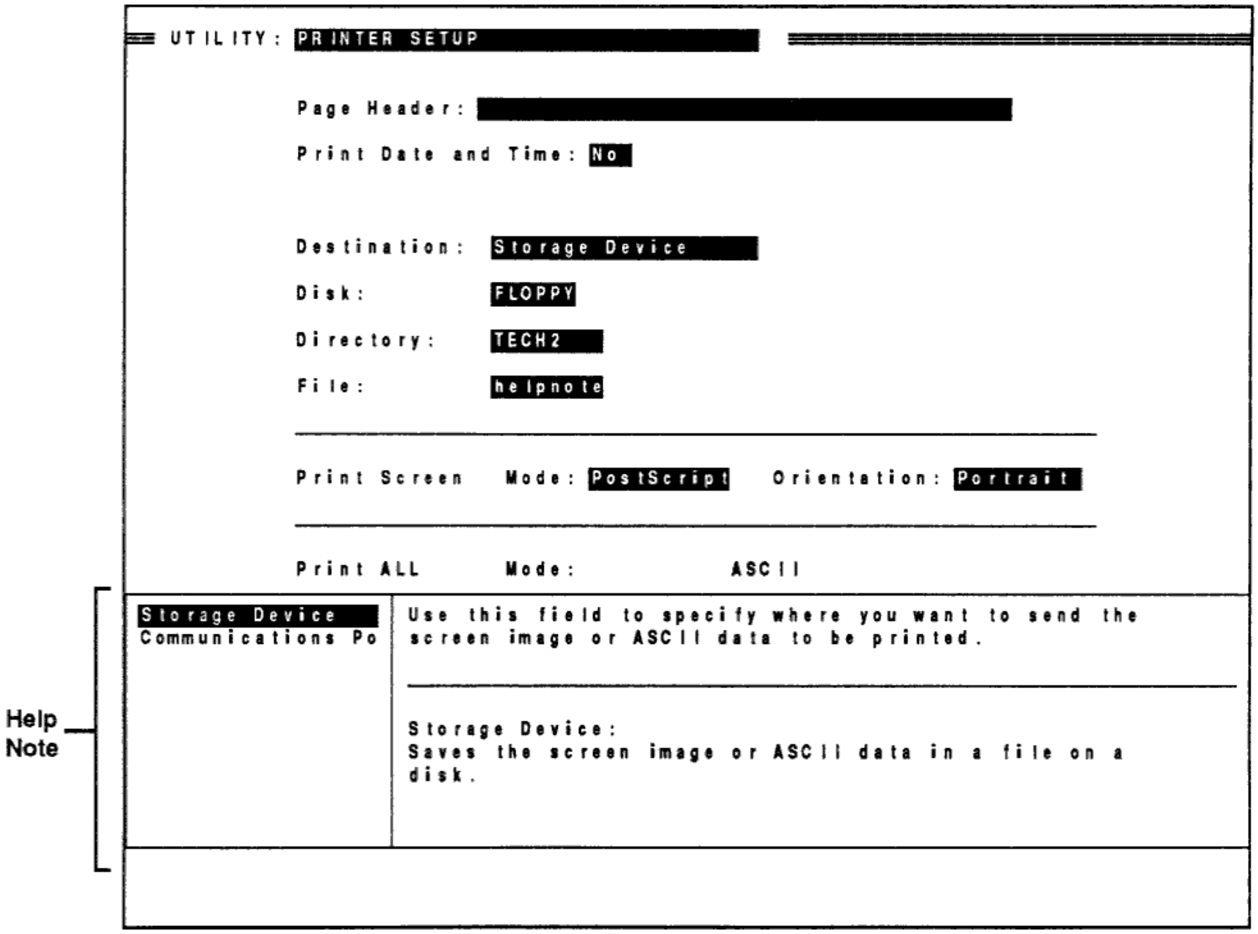


Figure 2-6. Help Notes. The box in the lower portion of the menu contains notes to help you make field selections.

Messages

The PRISM has a comprehensive set of error, prompt, and information messages that let you know if you are entering the wrong type of information in a field, that warn you if the operation you have selected will destroy stored information, and that give you the status of in-progress operations.

Messages appear on the top line of the display screen. In-progress messages end with three dots, indicating that additional messages will follow.

Section 3: ACQUIRING DATA

Acquisition is the process by which a logic analyzer captures data from a system under test. You may choose to store all the data that is acquired or to qualify the data so that only some of it is stored.

Instructions for acquiring data are contained in application module user's manuals.

In the PRISM system, data acquisition is controlled through the menus in the Setup menu group. The Setup menu group consists of menus for each installed acquisition module and the Execution Control menu (used to control Auto-Run and Continuous acquisition modes). This section deals primarily with the Execution Control menu. For detailed instructions on setting up your PRISM for an acquisition, refer to the user's manuals for the modules installed in your mainframe.

HOW TO ACQUIRE DATA

This procedure is intended to give you an overview of the steps involved in acquiring data. The details of setting up the PRISM to acquire data are discussed in the application module user's manuals. While the details vary with the application module installed, acquiring data generally requires that you do the following:

1. Connect an appropriate leadset to your system under test. Then, connect the leadset to the probe (discussed in the application module user's manual).

CAUTION

To avoid potential damage to circuit components, always make all the connections before powering up your PRISM mainframe or turning on your system under test.

2. Connect the probe to the installed application module through connectors on the right side of the mainframe (discussed in the application module user's manual).
3. Power up the mainframe (discussed in Section 2 and Appendix A of this manual).

4. Set up the application module by making selections in its Setup menus (discussed in the application module user's manual).

   a. Group channels together in a way that makes sense for what you're trying to find out about your system under test.
   b. Define clocking parameters so that you sample data at the right times.
   c. Set up the trigger test. For example, define the event you want the trigger test to recognize, choose an action to be performed when the trigger event occurs, set modules up to signal each other, and so on.
   d. Select the memory location where you want to store the trigger event. This controls the amount of data you can see before and after the trigger.

5. Set up the Execution Control menu, if you are making a Continuous or Auto-Run acquisition (discussed later in this section).
6. Set up the format in which you want to display data (discussed in Section 4 of this manual).
7. Start the data acquisition by pressing Start, Cont, or Auto, depending on the mode you want to use to acquire data. The Acquisition Status menu keeps you informed of the progress of the trigger search. The Acquisition Status menu is shown in Figure 3-1.
8. When data acquisition is complete, the data is displayed in the format you set up. You can make some changes to the display to make viewing the data easier (see Section 4 of this manual), or you can use optional application software to view data.

The rest of this section discusses acquisition modes and how to use the Execution Control menu.

CONTROLLING THE ACQUISITION MODE

The PRISM provides you with three different modes for making acquisitions: Single, Auto-Run, and Continuous. When making an acquisition in Single mode, the PRISM acquires data until the trigger event is found; then fills acquisition memory, stops, and displays acquired data. In Auto-Run mode, the PRISM makes repeated acquisitions based on the result of a comparison between acquisition and reference memory. Continuous mode allows you to continuously acquire and display data.

The acquisition mode used to capture data is determined by which Execute key you press (see *Keyboard Description* in Section 2). The three Execute keys start and stop all the modules simultaneously. However, the Setup menu for each module provides a method for turning the module off. If a module is turned off, trigger recognition, data display, and all post-processing functions operate as though the module does not exist.

For correct completion of your acquisition, turn off unused modules.

Before making an acquisition, be sure that all modules that are not connected to an active system are turned off. An operating module that doesn't have any data coming in will not fill memory, thus preventing the system from automatically stopping the acquisition.

The trigger events searched for during acquisition, and the actions taken as a result, are defined in the Setup menus for each module. Additional parameters controlling Auto-Run and Continuous acquisition modes are defined in the Execution Control menu.

The following discussion assumes that you have already defined the trigger event in the Setup menus for your modules. If you have not done so, be sure to go back and do so before starting an acquisition.

Making Single Acquisitions

Press Start / Stop to make a single acquisition. Press the key again to halt the acquisition.

When a single acquisition is started, the PRISM acquires data until the trigger event specified in the Setup menus is found. When the event is found, the PRISM fills acquisition memory, then stops and displays acquired data. If the Start/Stop key is pressed during the acquisition, the PRISM stops immediately, regardless of the trigger search status, and displays acquired data.

While the acquisition is in progress, the screen displays the Acquisition Status menu. This menu is shown in Figure 3-1.

Pressing Stop always halts an acquisition.

Following the instructions in the user's manual for your acquisition module, make sure that the probes and leadsets are firmly connected and that the trigger event has been specified in the module's setup menu. Then, press the Start/Stop key to begin a single data acquisition.

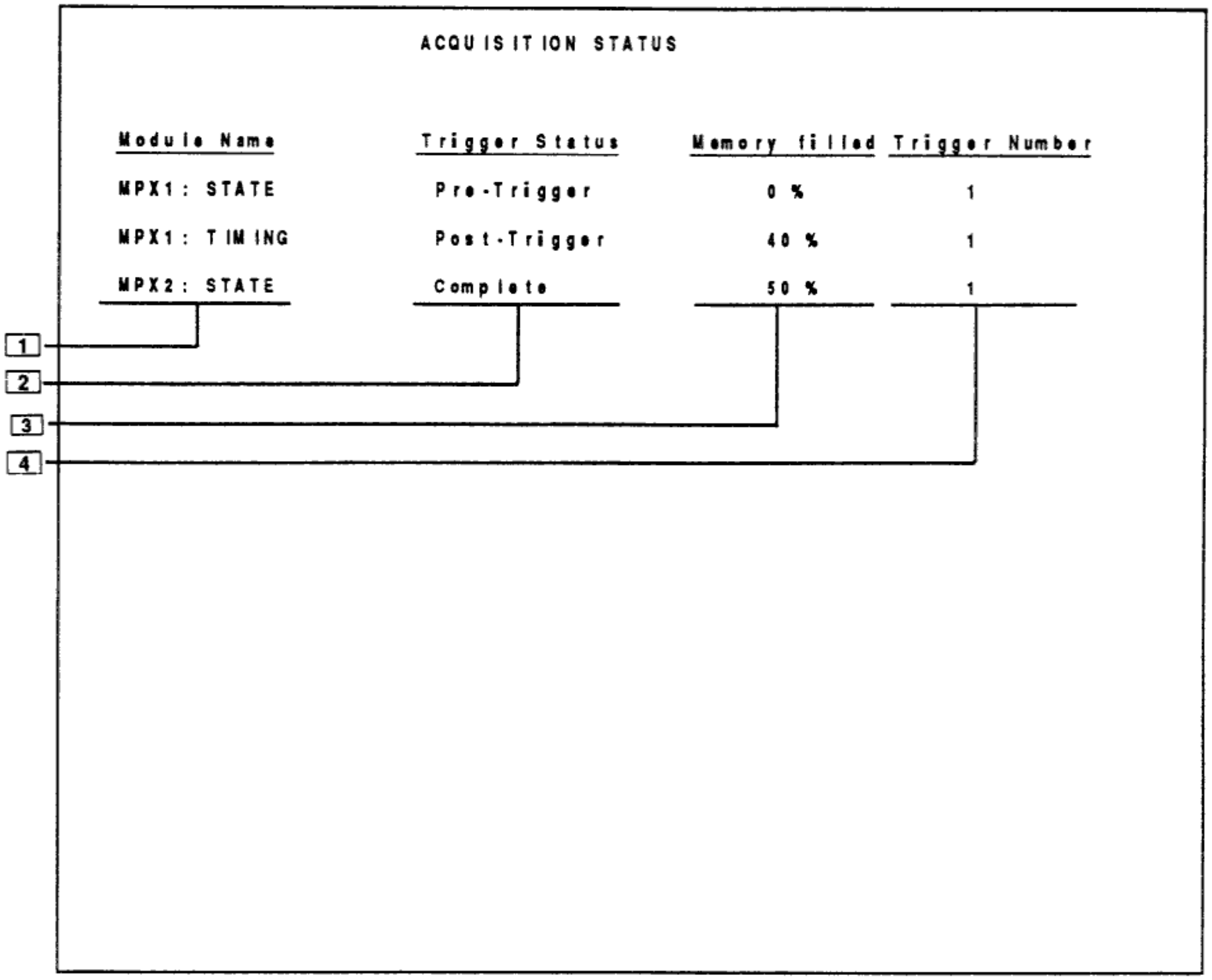


Figure 3-1. Acquisition Status screen.

1. **Module Name**. Identifies the module the acquisition information pertains to.

2. **Trigger Status**. Tells whether the module is looking for the trigger event (Pre-Trigger), has already triggered and is filling memory (Post-Trigger), or has triggered and finished filling memory (Complete).

3. **Memory Filled**. Shows what percentage of memory is currently filled.

4. **Trigger Number**. Shows the number of times the trigger specification has been executed. This number will only be greater than one when multiple triggers have been specified in the module's setup menu.

Making Auto-Run Acquisitions

Acqmem. Acquisition Memory. RAM containing the most recent data acquisition. Each acquisition module has its own Acqmem.

Refmem. Reference Memory. RAM containing previously acquired data. You create the Refmem for each module by copying the Acqmem into it or by restoring it from a file stored on disk.

When operating in Auto-Run mode, the PRISM searches for the trigger event defined in each module's setup menu. When the trigger event is found, the PRISM fills acquisition memory and compares acquisition memory to reference memory. Based on the result of this memory comparison, the system performs an action.

In the Execution Control menu (shown in Figure 3-2), you select two actions: one for the logic analyzer to perform when the memories are equal, and another action for when memories are unequal. There are four possible actions: continue by making another acquisition, display the acquired data and continue by making another acquisition, store the acquired data and continue by making another acquisition, or stop and display the last acquisition. Pressing Start/Stop will stop the acquisition at any time. While the PRISM is running in Auto-Run mode, the screen continually displays the data being acquired.

Press Auto to start an Auto-Run acquisition.

To make an acquisition in Auto-Run mode, do the following:

1. Following the instructions in the user's guide for your acquisition module, make sure that the probes and leadsets are firmly connected and that the trigger event has been specified in the module's Setup menu.
2. Access the Execution Control menu by pressing the Setup key, then selecting Execution Control in the menu select field located in the upper left of the display screen. The Execution Control menu (shown in Figure 3-2) is divided by a double line. The upper section controls Auto-Run mode and the lower controls Continuous mode. When the logic analyzer is operating in Auto-Run mode, the lower section of the menu is ignored.

3. Using Figure 3-2 as a guide, fill in the fields in the Auto-Run Mode portion of the menu:
   a. Select the actions to be performed when memories are equal and unequal. Also select whether or not a tone will sound.
   b. Select the block of acquisition memory that you want to compare to reference memory. There are three ways to do this. You can place the data cursors on the first and last locations in a Display menu, then select Between Cursors to compare memory locations between (and including) the cursor positions. You can select Fixed and enter values for the first and last locations as comparison limits. Or, you can select Entire Memory to compare all memories to each other.
   c. Select the delay period between acquisitions. Data is continually displayed as it is acquired. With a fast acquisition rate, data may not stay on the screen long enough for you to evaluate it. By specifying a few seconds delay, you will have enough time to inspect the data and decide whether to manually stop the acquisition or to let it continue.
4. Open the Mask Configuration submenu by pressing F7: Mask Config. This submenu (shown in Figure 3-3) lets you exclude data acquired by some channels from the memory comparison.
5. Select which channels you want to include in the acquisition-to-reference memory comparison.

   Each channel group is assigned a mask containing one bit per channel; this is shown in Figure 3-3. Every channel assigned a binary value of 1 will be included in the comparison. Channels assigned a value of 0 or X will be excluded.

   Mask digits must be entered in the group's input radix (defined in the module's setup menu). For example, the value 8 entered for a four-channel group with input radix HEX causes the most significant channel to be compared and the three least significant channels to be ignored.
6. Press F8: Exit Submenu to return to the Execution Control menu.
7. Press the Auto key to start the acquisition.

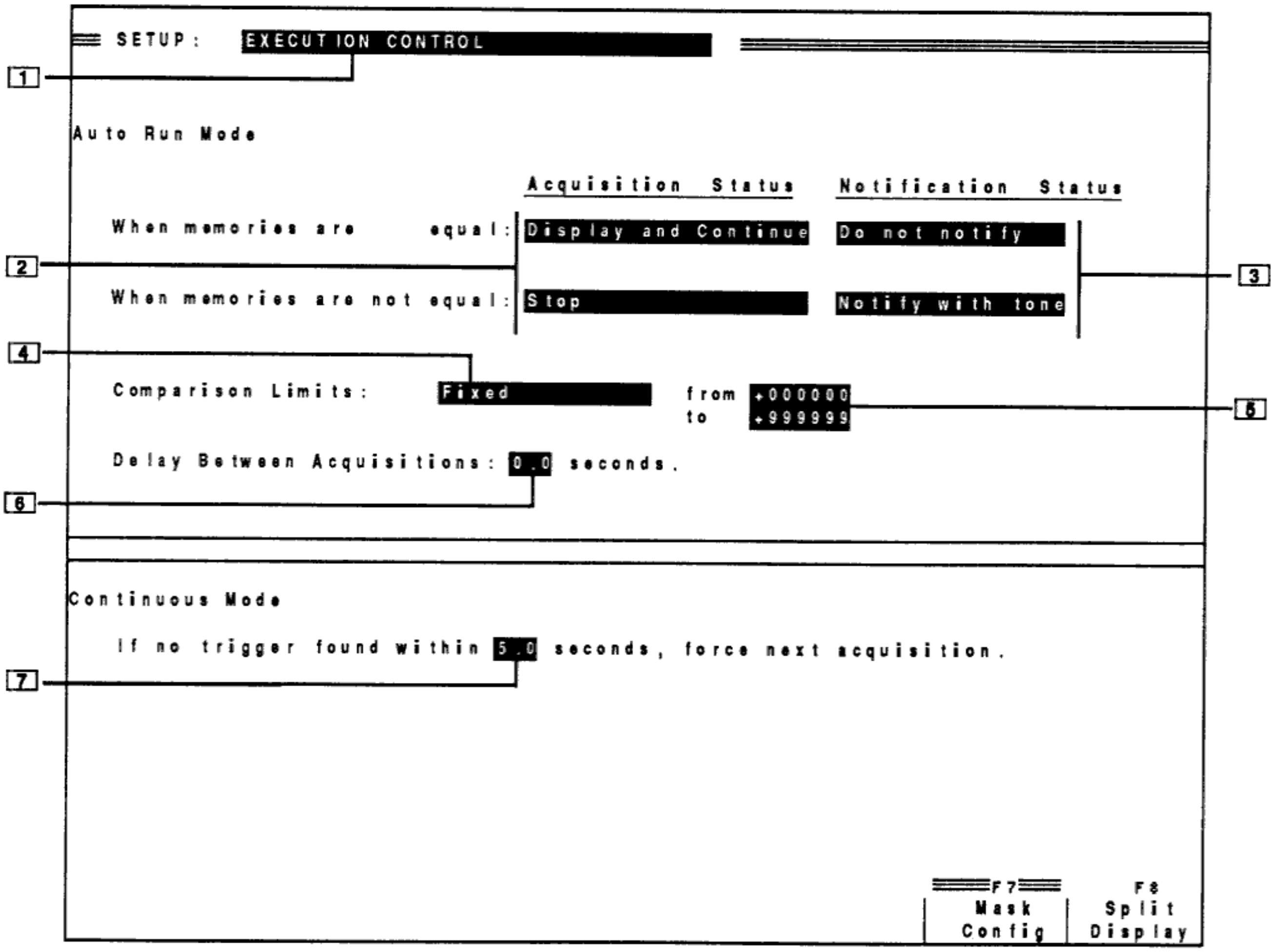


Figure 3-2. Execution Control menu.

[1] **Menu Select**. Determines the displayed menu. Change menus by scrolling through the selections in the field. All the menus in the Setup menu group are available.

[2] **Action**. Specifies the action executed when acquisition memory and reference memory are equal or unequal. Selections are: Continue, Store and Continue, Display and Continue, and Stop. If you select Store and Continue, each data acquisition is stored in a file on the disk currently selected as the source disk in the Disk Services menu. The files have names that indicate which acquisition module acquired the data and which acquisition it was. For example, MPX10002 would be the second acquisition acquired by the module MPX1, MPX20006 would be the sixth acquisition acquired by the module MPX2, and so on.

[3] **Tone**. Determines whether or not a tone sounds when acquisition and reference memories are equal or unequal. Selections are Notify with tone and Do not notify.

[4] **Comparison Limits**. Determines that amount of acquisition memory that is compared to reference memory. Selections are Fixed, Between Cursors, and Entire Memory. If Fixed is selected, only acquisition memory locations between (and including) the locations shown are compared. If Between Cursors is selected, the memory locations between (and including) the current positions of data cursors 1 and 2 are compared. If Entire Memory is selected, all memories are compared, not just the four timestamp sets currently being displayed. See Section 4 for a discussion of displaying timestamp sets.

[5] **Range**. Specifies the range of acquisition memory locations to be compared when Fixed is selected in the Comparison Limits field.

[6] **Delay**. Determines the minimum time between acquisitions.

[7] **Continuous**. Used only when acquisition is started with the CONT key. Specifies the maximum time per acquisition in Continuous mode.

Function Keys

F7: **Mask Config**. Opens the Mask Configuration submenu. Use this submenu to define a memory comparison mask.

F8: **Split Display**. Splits the display window vertically into two panes so you can view two menus or submenus at one time.

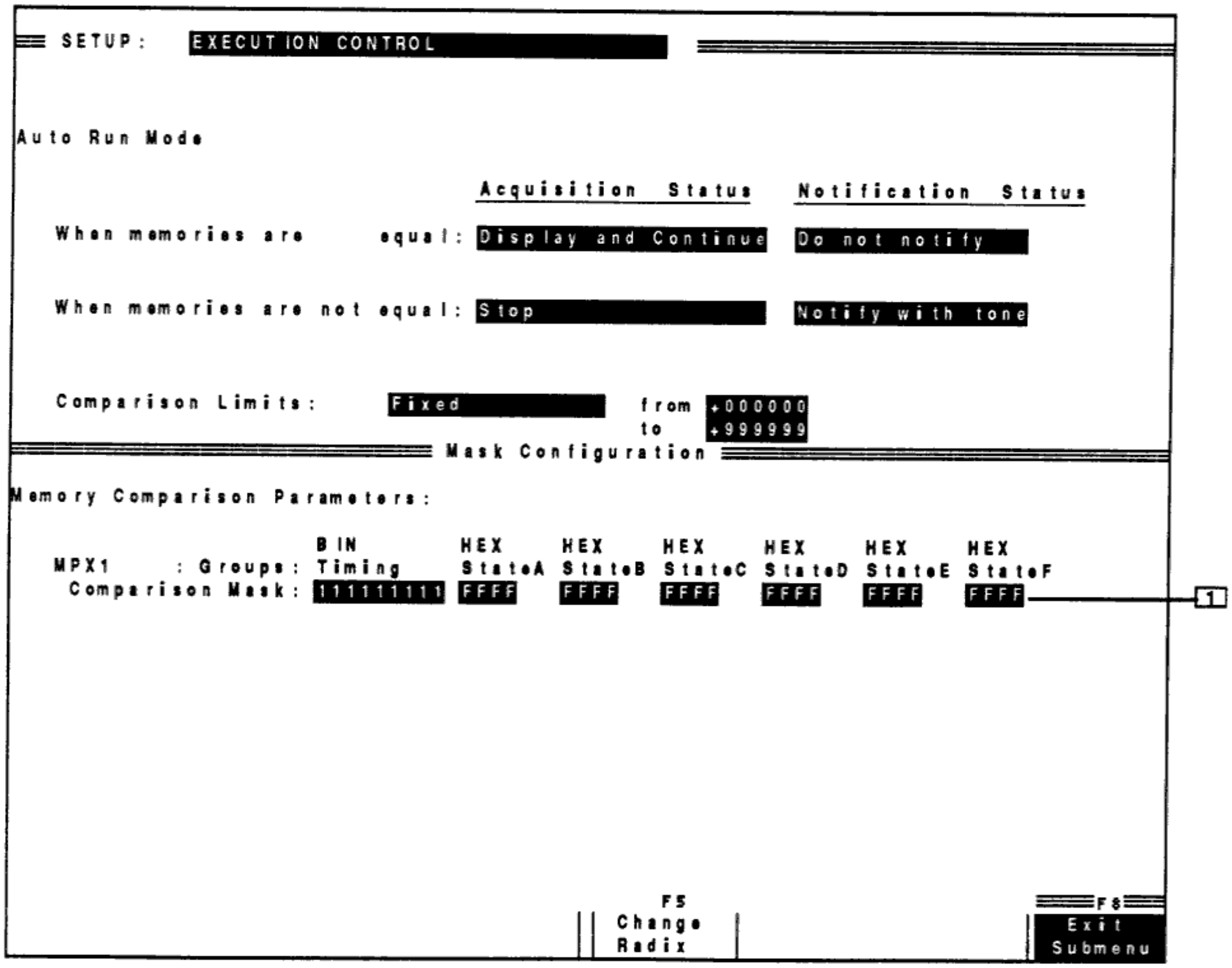


Figure 3-3. Mask Configuration submenu.

[1] **Comparison Mask.** Determines which data input channels are included in the Acqmem to Refmem comparison. Enter mask digits in the input radix for each group. Choose each digit so that binary 1's are in positions equivalent to those channels you want to include in the comparison, and binary 0's are in positions of channels you want to exclude. X is the same as 0 (channel not compared). Default is 1 (all channels compared).

Function Keys

F5: Change Radix. Changes the input radix for the channel group field the cursor is on.

F8: Exit Submenu. Closes the Mask Configuration submenu and returns the display to the Execution Control menu.

Once you've pressed Auto, the PRISM continues acquiring and displaying data until you press Stop or the result of a memory comparison matches the Stop condition you selected in the Execution Control menu.

During an acquisition, you may not make any changes to Display or Setup settings. The only keyboard input that the PRISM accepts is the Start/Stop key.

Making Acquisitions in Continuous Mode

Press Cont to start an acquisition in Continuous mode.

While operating in Continuous mode, the PRISM continuously acquires and displays data. If the trigger event specified in the module's Setup menu has not been found within a set amount of time, the acquisition is halted, the current data is displayed, and a new acquisition is started. Pressing the Start/Stop key will stop the acquisition.

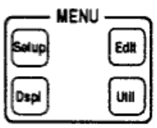
During an acquisition, you may not make any changes to Display or Setup settings. The only keyboard input that the PRISM accepts is the Start/Stop key.

To make an acquisition in Continuous mode, do the following:

1. Following the instructions in the user's guide for your acquisition module, make sure that the probes and leadsets are firmly connected and that the trigger event has been specified in the module's Setup menu.
2. Access the Execution Control menu by pressing the SETUP key, then select Execution Control in the menu select field located in the upper left of the display screen. The Execution Control menu (shown in Figure 3-2) is divided by a double line. The upper section controls Auto-Run mode and the lower controls Continuous mode. When the logic analyzer is operating in Continuous mode, the upper section of the menu is ignored.
3. Select the maximum length of time the system will wait for the trigger event before halting and starting a new acquisition.
4. Press the Cont key to start the acquisition.

Section 4: DISPLAYING DATA

The PRISM provides three menus for viewing logic analyzer data: the State Table menu, the Timing Diagram menu, and the Graph menu. The State Table menu (see Figures 4-1 and 4-7) lists data in a state table; the Timing Diagram menu (see Figure 4-9) displays data values as digital waveforms. The Graph menu (see Figure 4-13) displays a plot of digital data.



These menus are selected by pressing the Dspl key to enter the Display menu group, then selecting STATE TABLE, TIMING DIAGRAM, or GRAPH in the menu select field in the upper left corner of the display screen. After an acquisition, the PRISM displays data in the form that was last selected.

NOTE

Additional display menus are often provided by application software.

Data is stored either in acquisition memory (Acqmem) or in reference memory (Refmem). Acqmem always contains data from the last acquisition. If you want to save an Acqmem, you can copy it into Refmem or to a file on disk. *Acquisition Memory and Reference Memory* are discussed in detail later in this section.

This section is divided into four parts:

1. Common data display features such as data scrolling, cursor control, and searching, which are available in both the State Table and Timing Diagram menus.
2. Features specific to the State Table menu such as selecting the group and type of time data to display.
3. Features specific to the Timing Diagram menu, such as controlling vertical and horizontal expansion of timing traces.
4. All Graph menu features.

COMMON DATA DISPLAY FEATURES

Common data display features are the fields and operations available in both the State Table and Timing Diagram menus.

Data Scrolling and Cursor Control

Data scrolling is controlled by two data cursors: Cursor 1 and Cursor 2. In the State Table menu, the data cursors appear as horizontal lines running across a row of data. In the Timing Diagram menu, the data cursors appear as broken vertical lines across the timing traces.

To scroll data, spin the SELECT knob.

The location of each data cursor is shown in the upper right corner of the display menu (see Figure 4-1). In the State Table menu, the data cursor position is the number of acquisition cycles or memory locations that the data cursor is offset from the acquisition trigger. In the Timing Diagram menu, the data cursor position is the time from the acquisition trigger to the memory location where the data cursor is positioned. Memory locations preceding the trigger are assigned negative values; locations after the trigger are positive.

To jump to the system trigger location, move the cursor to either the Cursor 1 or Cursor 2 field and press X.

There are two ways to move data cursors. You can scroll them through data using the knob. Or, you can jump to a specific memory location. To move a data cursor to a specific memory location, do the following:

1. Place the blinking field cursor in the field showing the location of the cursor you want to move. The fields are labeled Cursor 1 and Cursor 2.
2. Type in the memory location number or change the data cursor position either by pressing the SELECT keys or by typing in the desired location. Press X or T (for Trigger) to move the data cursor to the system trigger location. Press C or M (for Module) to move the data cursor to the module trigger location.

NOTE

If you are using the knob to scroll through memory, the cursor will wrap around the end of the data in either direction.

Press F2 to change which data cursor is active.

At any time, one of the data cursors is active and the other is inactive: A small arrow is in the upper right of the menu. To change which cursor is active, press F2: Change Cursors.

The location of the active data cursor determines which data is displayed. The active cursor is always on the screen, so only data surrounding it can be viewed. If you want to display a different portion of memory, move the active data cursor to the desired area.

Cursor ▲ shows the time between events.

The **Cursor ▲** field shows the time difference between the data cursor positions. This allows you to measure the time elapsed between two data events.

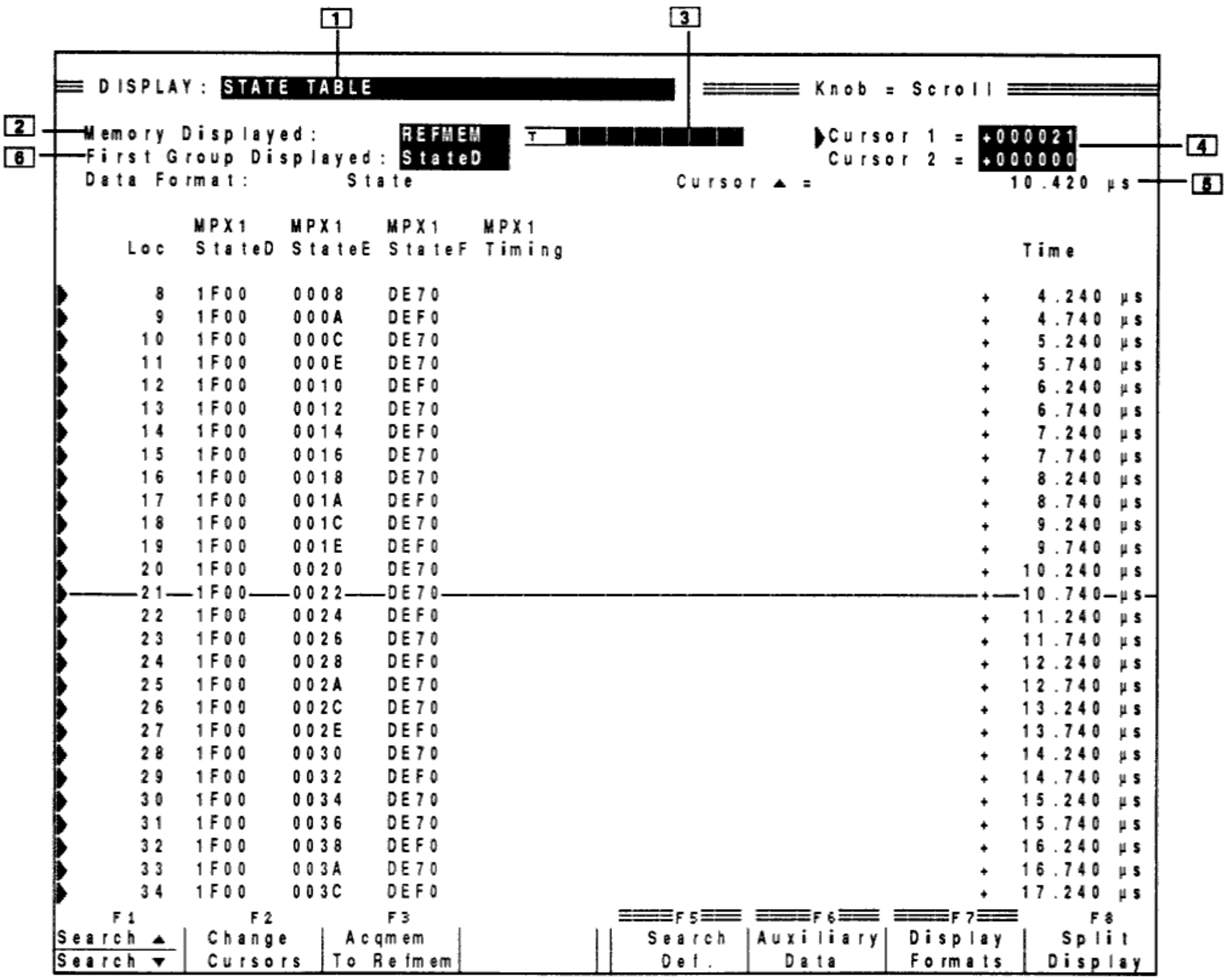


Figure 4-1. Common display fields. This State Table menu shows the fields common to both State Table and Timing Diagram menus.

1 **Menu Select**. Determines which menu is displayed.

2 **Memory Displayed**. Determines whether acquisition memory (Acqmem) or reference memory (Refmem) is displayed. Note: This is a select field only when a Refmem for the module is loaded.

3 **Domain Indicator**. Shows the portion of memory that is on the screen. The T indicates the trigger location.

4 **Data Cursor Location**. Shows the memory locations that Cursors 1 and 2 are on. The arrow points to the active cursor.

5 **Cursor ▲**. Gives the time between the events that Cursors 1 and 2 are on.

6 **First Group Displayed**. Lets you select which channel group is displayed first in the State Table menu. In the Timing Diagram menu, this field is First Trace Displayed, and it lets you select which timing trace is displayed first.

Function Keys

F1: **Search**. Searches for the events defined in the Search Definition submenu. Pressing F1 searches forward from the active data cursor position toward the end of memory. Pressing Shift-F1 searches backward from the active cursor position toward the beginning of memory.

F2: **Change Cursors**. Changes which data cursor is active.

F3: **Acqmem To Refmem**. Overwrites reference memory with the current contents of acquisition memory.

F5: **Search Def**. Opens the Search Definition submenu. Use this submenu to specify a search type. Selections are Patterns, Ranges, or Mem Diffs (memory differences).

F6: **Auxiliary Data**. Opens the Auxiliary Data submenu, which shows the current counter/timer values.

F7: **Display Formats**. Opens the Display Format submenu. Use this submenu to control how data is displayed.

F8: **Split Display**. Splits the display window horizontally into two panes. This allows you to view two menus simultaneously.

Locating the Trigger

The system trigger location in the State Table menu is marked by **TRIG** in the **Loc** (memory location) column. In the Timing Diagram menu, the system trigger is marked by a solid vertical line across the timing traces. You can jump to the trigger location by placing the field cursor on the Cursor 1 or Cursor 2 field and pressing X or T (for Trigger).

The module trigger is the point at which an individual module triggered. The module trigger is not marked on the display. To jump to the module trigger, press C or M (for Module) from the Cursor 1 or Cursor 2 field. If you have more than one module, then pressing C or M again jumps to the next module trigger.

The PRISM displays a message telling you which module trigger is shown.

If you pressed Start/Stop before the trigger occurred, the most recently acquired location in acquisition memory is the "stop trigger." This location is labeled STOP in the State Table menu. In the State Table, the memory locations are numbered relative to the trigger location, which is always location 0. This means that all other memory locations are negative in relation to a stop trigger.

Displaying Data in Two Panes

Press F8 to split the display window or return it to single pane.

While the PRISM is in the Display menu group, you can use F8: Split Display to split the screen into two panes. (For more information, see *Splitting the Display Window* in Section 2.) This allows you to view two sets of data at the same time. You can fill one pane with the State Table menu and the other with the Timing Diagram menu. Or, you can put the same menu in both panes to look at more than one area of memory at once. Menus in the Setup menu group can also be displayed in panes.

Press Shift-F8 to switch active panes.

Although you can view two panes of data simultaneously, you can only interact with one of them at a time. The active pane is the one containing the blinking field cursor. To switch to the other pane, press Shift-F8. The function key labels at the bottom of the screen are associated with the active pane. When the top pane is active, the function key labels are separated from the bottom pane by a dotted line.

If both panes contain either State Table or Timing Diagram menus, you can link the data cursors together. Cursor linking is controlled by the **Cursors are** field shown in Figure 4-2. (Note: This field is always shown at the top of the active pane, so its location changes when you switch which pane is active.) When Unlinked is selected, the data cursors in one pane move independently of the data cursors in the other pane. When the data cursors in two panes are linked together, they maintain the same distance from each other so that as one cursor is scrolled through memory, the cursor linked to it in the other pane also scrolls. The distance maintained is the length of time between the data samples the data cursors were set on when Linked was selected.

Data cursors wrap around both ends of memory; that is, if you scroll a cursor off the end of a memory, it jumps back to the beginning of the memory. However, when data cursors are linked between panes, both linked cursors may not jump back to the beginning of memory when you scroll one of them off the end of memory. This is because the linked cursors maintain the same time distance from each other, which translates into physical screen distance in a data display.

When you unsplit the display window so that it returns to a single pane, the menu in the top pane is the one that stays open. And, the data cursors remain in the same locations they occupied in the top pane.

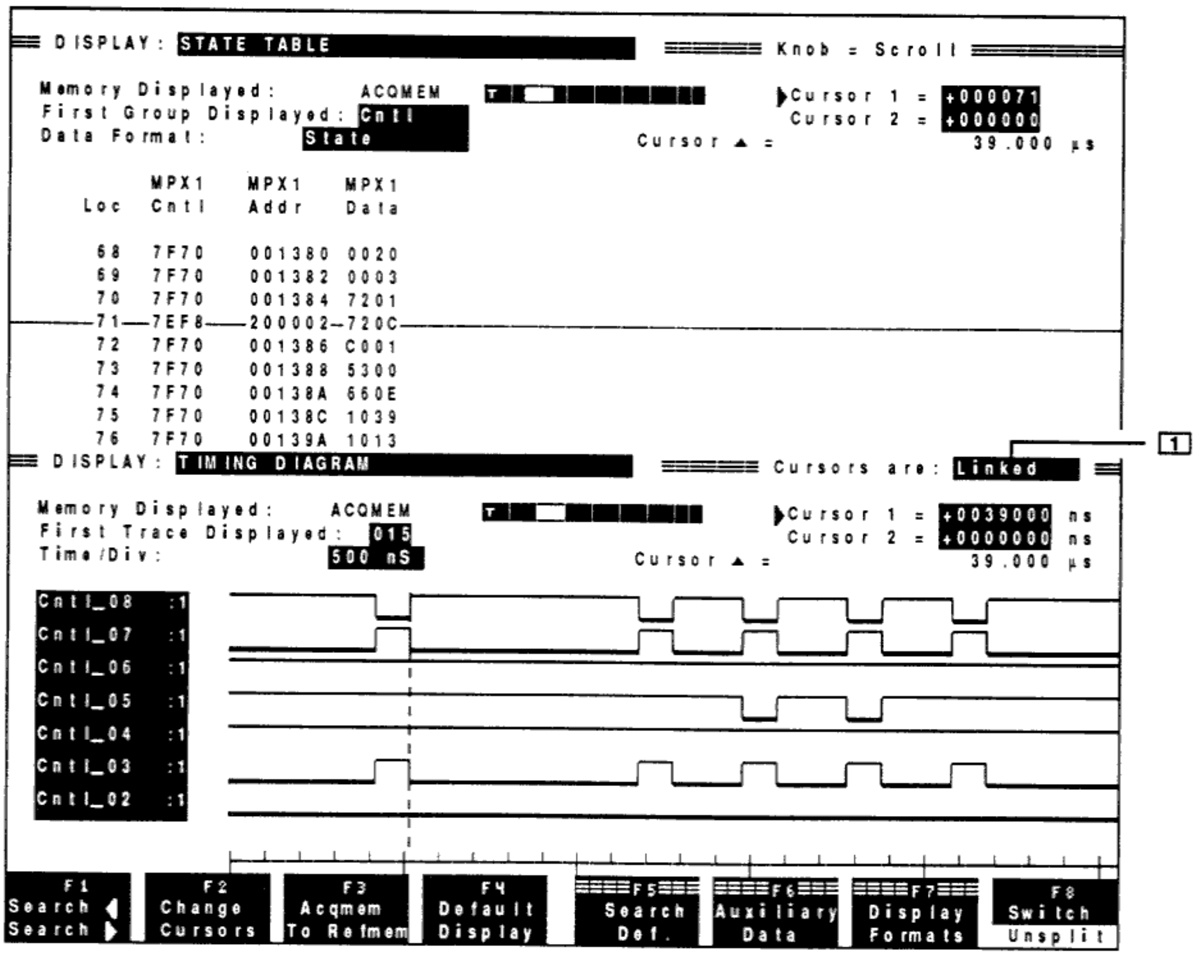


Figure 4-2. Split screen display. This example shows the State Table menu in the upper pane and the Timing Diagram menu in the lower pane.

[1] **Cursors are.** Lets you select whether the cursors in each pane of a split display are Linked or Unlinked. Linked data cursors move together. Unlinked cursors move independently.

Function Key

F8: Switch/Unsplit. Pressing F8 closes the lower pane and returns the display window to a single pane. Pressing Shift-F8 switches which pane is active (only one pane is active at a time).

Memory Domain Indicators

In most cases, the data on the screen will represent only a fraction of the total memory. A memory domain indicator located near the top of the display menus shows you the area of memory currently displayed. Figure 4-3 shows the Memory Domain Indicator field. The solid bar in reverse video represents the total memory depth. The window inside the bar identifies the relative position in memory of the area currently on the screen. The position of this bar will change as you scroll data across the screen. The system trigger position is marked with a T.

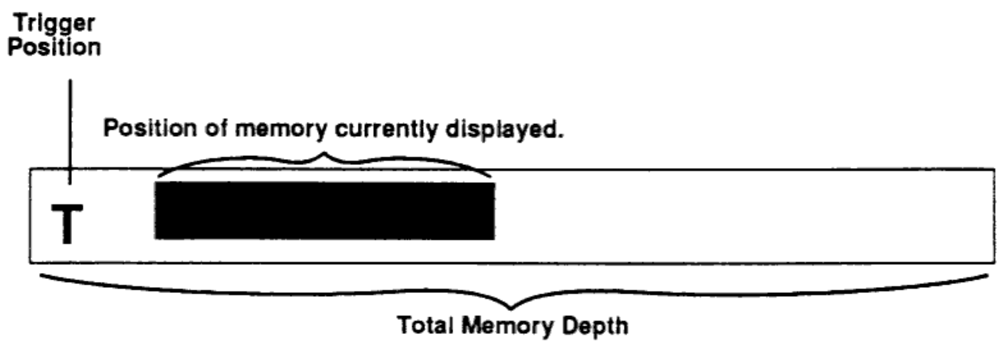


Figure 4-3. **Memory Domain indicator.** Identifies the area of memory the screen currently displays.

Acquisition and Reference Memory

Data in the PRISM is stored in either acquisition memory (Acqmem) or reference memory (Refmem). Acqmem always contains the most recent data acquisition. It works like a first-in first-out buffer, storing every qualified data sample until the memory is full. After that, each new data sample overwrites the oldest sample. This continues until acquisition stops. At power-up, acquisition memory is empty.

Refmem is empty until you copy data into it; at power-up, no Refmem exists. The primary use for Refmem is to give you reference data against which you can compare newly acquired data. For example, you might want to store data from a known good circuit in Refmem, then compare it to data from a malfunctioning circuit. Refmem cannot be edited.

NOTE

The PRISM can compare Acqmem to Refmem if you are making an acquisition in Auto-Run mode. Refer to Section 3 for more information.

You can save both Acqmem and Refmem to a file disk for use at a later time. See *Saving Acquisition and Reference Memories* in Section 6 for instructions.

Displaying Acqmem or Refmem

The Memory Displayed field lets you display either Acqmem or Refmem.

Both acquisition and reference memories can be displayed in either the State Table and Timing Diagram menus. The Memory Displayed field in the upper left portion of the menu allows you to choose whether to display Acqmem or Refmem (see Figure 4-1). The positions of the data cursors do not change when you change which memory is displayed or when you make a new acquisition.

If the width and/or source of a Refmem conflicts with that of the current acquisition setup, the Refmem cannot be displayed accurately. Only reference memory groups containing the same names and same number of channels as the acquisition grouping can be displayed properly. For grouping instructions, refer to the user's manual for your application module.

Moving Acqmem to Refmem

Press F3 to copy Acqmem to Refmem.

If you want to use the contents of acquisition memory for reference, you can copy it into Refmem. Be sure to copy the current Refmem onto disk if you want to save it (see *Saving Acquisition and Reference Memories* in Section 6).

NOTE

If you save an Acqmem to a file on disk, it becomes a Refmem. Acqmem can only be filled with data from probe input channels. This means that only a Refmem can be restored from a disk file.

To copy acquisition memory to reference memory, press F3: Acqmem to Refmem. Then, press X to confirm the operation.

NOTE

When you press X, reference memory is overwritten with a copy of acquisition memory; the previous contents of Refmem cannot be retrieved.

Searching For Memory Differences

The PRISM can search for locations where acquisition and reference memories do not match each other. In the State Table menu, an arrow in the left column marks locations where a difference was found. The specific difference is highlighted. Figure 4-4 shows an example. In the Timing Diagram menu, there is no mark to indicate where differences occurred; however, the search operation transports the active data cursor to the nearest differing location.

```
    14    7F70   000C4E  48F9  MOVEM.L D0-7,A0123456,00C3FF84   S
    15    7F70   000C50  7FFF    ( READ EXTENSION )             S
    16    7F70   000C52  00C3    ( READ EXTENSION )             S
    17    7F70   000C54  FF84    ( READ EXTENSION )             S
    18    7F70   000C56  4BF9  LEA       00C3FC00,A5            S
>   19    7ED0   C3FF84  0000    ( WRITE )                      S
>   20    7ED0   C3FF86  0000    ( WRITE )                      S
    21    7ED0   C3FF88  0000    ( WRITE )                      S
>   22    7ED0   C3FF8A  0007    ( WRITE )                      S
    23    7ED0   C3FF8C  FFFF    ( WRITE )                      S
    24    7ED0   C3FF8E  FFFF    ( WRITE )                      S
    25    7ED0   C3FF90  0000    ( WRITE )                      S
>   26    7ED0   C3FF92  0007    ( WRITE )                      S
```

Figure 4-4. Searching for memory differences. The highlighted data in this State Display shows where acquisition memory and reference memory differ.

To search for memory differences:

1. While in either the State or the Timing Diagram menu, press F5: Search Def. This opens the Search Definition submenu shown in Figure 4-5.
2. Select Mem Diffs in the Search field.
3. Press F8: Exit Submenu to close the Search Definition submenu.
4. Press either F1: Search Up or Shift-F1: Search Down to begin searching. The search always begins at the active data cursor position. If you press F1, the active cursor moves to the next youngest location where the memories are different. If you press Shift-F1, the active cursor moves backward to the next oldest location where the memories differ.

The search operation wraps around the ends of memory in either direction. If no memory differences are found, a message telling you that the search failed appears at the top of the display.

Searching for a Data Pattern

The PRISM allows you to search for a specified pattern of consecutive memory locations. All display-enabled groups from active modules are examined. If you want to apply the search to only one module, use Don't Care characters (X) in the search fields for the other modules in your system.

If you want to find the trigger location, you don't need to use searching. Place the field cursor on either the Cursor 1 or the Cursor 2 field and press X or T to transport the data cursor to the system trigger location. Press C or M to transport the cursor to the module trigger location.

In the State Table menu, an arrow in the left column marks locations where a pattern match was found. In the Timing Diagram menu, there is no mark to indicate where pattern matches occurred; however, the search operation transports the active data cursor to the nearest matching location.

To search for a pattern:

1. While in either the State or the Timing Diagram menu, press F5: Search Def to open the Search Definition submenu. Figure 4-5 shows an example.
2. Select Patterns in the Search field.
3. Enter the data pattern you want to search for in the word recognizer fields under the appropriate channel groups. There are two ways to enter the search value. You can press F1: Load From Cursor to enter the value from the active data cursor location in memory. Or, you can type in the value you want to search for.

   For each channel group, you must enter the search value in the assigned input radix for the channel group. To change the channel group's input radix, press F5: Change Radix.

NOTE

If you choose the RANGE radix for your search, the PRISM searches for the range symbol's lower bound value only, not the entire range assigned to that symbol. In search operations, the RANGE radix is used primarily for finding the entry point to a particular code module.

If you are displaying a channel group's data in a radix that is different from the one you selected in the Search Definition submenu, the value you search for won't be in the same radix in both the State Table and in the Search Definition submenu.

For example, suppose you are displaying data in binary and you want to search for a pattern of all highs in a channel group containing four channels. If you select hexadecimal as the input radix, F is the value you would enter in the Search Definition submenu. However, 1111_{bin} is the data value that the data cursor would move to in the State Table menu.

4. Press F8: Exit Submenu to close the Search Definition submenu.
5. Press either F1: Search ▼ or Shift-F1: Search ▲ to begin searching. The search always begins at the active data cursor position. If F1 is pressed, the active cursor moves to the next location where the search value is found. If Shift-F1, the active cursor moves backwards to the next oldest location containing the search value.

The search operation wraps around the ends of memory in either direction. If the search value is not found, the PRISM displays a message telling you that the search failed.

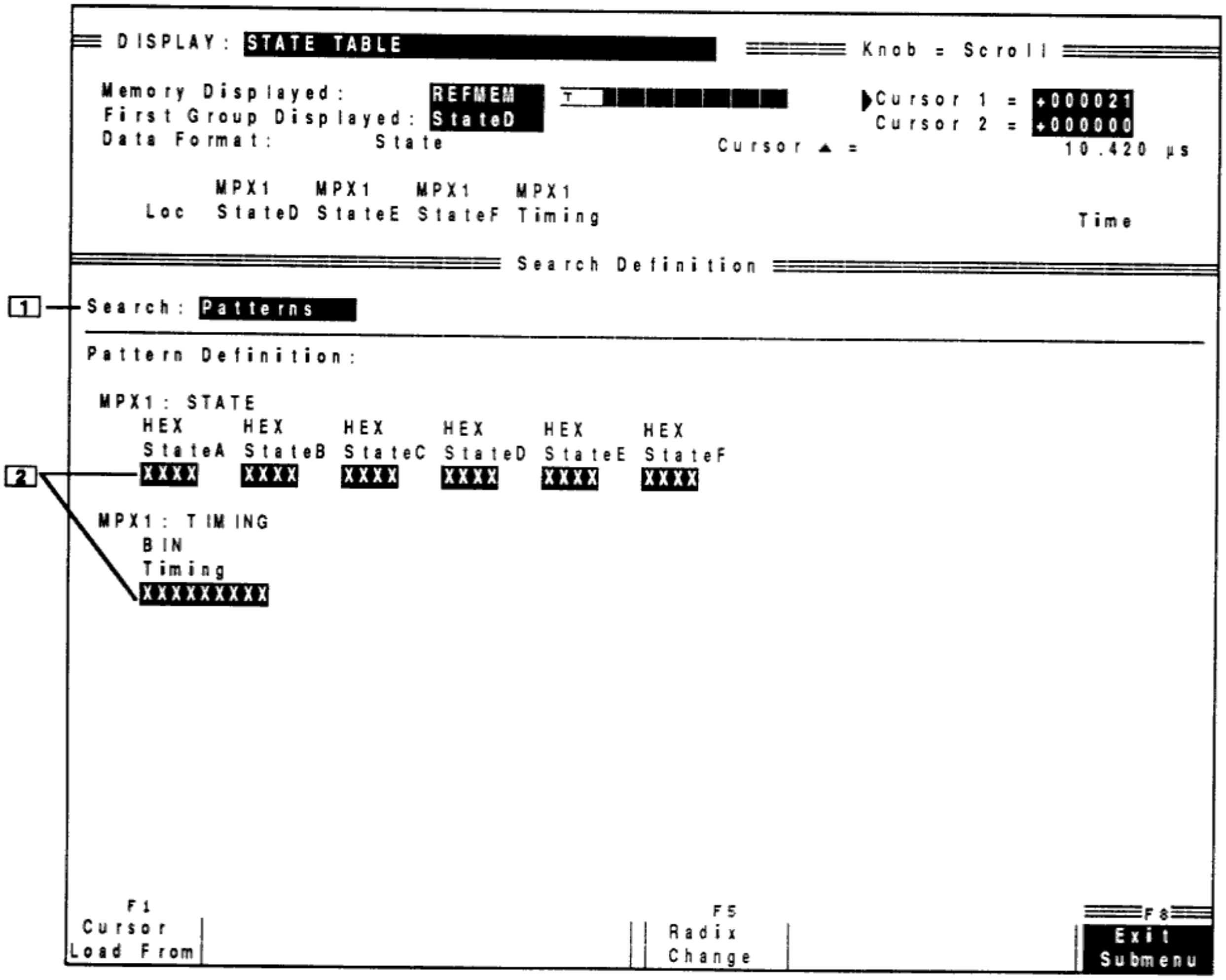


Figure 4-5. Search Definition submenu.

[1] **Search**. Determines whether the search operation looks for a specific data pattern or for locations where acquisition and reference memories differ from each other. The selections are Patterns, Mem Diffs, and Off (no searching). Select Patterns for both pattern symbol and range symbol (lower bound value only) searches.

[2] **Search Value Definitions**. Specifies the data to be searched for. There is a field for each channel group defined in the Setup menus for the installed application modules. You must use the same radix as is selected for the group in the Setup menu group (the display radix may be different).

Function Keys

F1: Load From Cursor. Loads the value from the active data cursor position into the search value definition fields.

F5: Change Radix. Changes the input radix for the field the cursor is on. Selections are BIN, OCT, HEX, PATTERN, and RANGE.

NOTE

If you choose the RANGE radix for your search, the PRISM searches for the range symbol's lower bound value only, not the entire range assigned to that symbol. In search operations, the RANGE radix is used primarily for finding the entry point to a particular code module.

F8: Exit Submenu. Closes the submenu.

How the Search Operation Works

To determine memory differences, the PRISM compares acqmem and refmem samples by both module and memory location. Samples are compared by module type (for example, comparing $MPX1_{ACQ}$ to $MPX1_{REF}$, and $HSM1_{ACQ}$ to $HSM1_{REF}$), rather than by comparing samples globally (MPX1-and-$HSM1_{ACQ}$ to MPX1-and-$HSM1_{REF}$). The comparisons are made on a location-to-location basis, relative to the module trigger. Note that although the samples are displayed in chronological order, by timestamp, they are not compared by timestamp.

The arrow in the left column of the State Display indicates a difference in the binary information stored for that sample. The highlighted area shows exactly where the binary difference occurs, and also indicates the disassembly text difference. When you press F1: Search, the PRISM finds the next binary difference, as indicated by the arrow (the actual memory difference, not the disassembly difference).

A note to consider if your State Display includes disassembly text: if either your acqmem or refmem has more—or earlier—data than the other, memory differences shown in the first few disassembled instructions may be marked incorrectly.

If the acqmem and the refmem don't start at the same place, the first few instructions may not be disassembled the same way in the two memories. This is due to at least one of the memories not having enough data to disassemble the instructions correctly. If this is the case, it may be several samples after the first overlap between the two memories before they can be correctly correlated for comparison. As a result, the first few samples may be falsely marked as different, or the same location may be given a different location number in the two memories. (The difference in the location numbers is due to the way the disassembler interprets the start of memory.) You can often examine the difference by viewing the display in different data formats. The recommended order is Software, Hardware, State. (Because the case described is not a direct binary difference between the two memories, the F1: Search operation will not indicate these samples as a memory difference.)

Data Correlation

Data correlation refers to the ability of a logic analyzer to preserve the time relationship between events; that is, to keep track of when each data sample occurred in relation to the other samples. This is particularly important when you are simultaneously displaying data that was acquired by different acquisition modules or by probes with different sample rates. The PRISM correlates data by storing a timestamp along with the data on each acquisition cycle. This enables the PRISM to correctly time-align data samples for display.

Timestamp. A timestamp is a clock value stored along with data on each acquisition cycle. Timestamps record how long after the start of acquisition each sample occurred.

Timestamp Set. All data acquired with the same timestamp reference during an acquisition is referred to as a timestamp set.

As long as you are viewing data from the same acquisition, you do not have to worry about data correlation. The PRISM keeps track of when each sample occurred. However, if you are simultaneously displaying data from different acquisitions (say, you loaded data from a previous acquisition that you had stored on disk as a Refmem), the time relationships can be meaningful only if the acquisition setup was the same when both sets of data were acquired.

Viewing Counter/Timer Data

Press F6 to view counter/timer values.

The Auxiliary Data submenu, shown in Figure 4-6, allows you to view the values of all counters and timers at the time the acquisition was made.

To open this submenu, press F6: Auxiliary Data while in either the State Table or the Timing Diagram menu. When you are finished, press F8: Exit Submenu to return to the display menu.

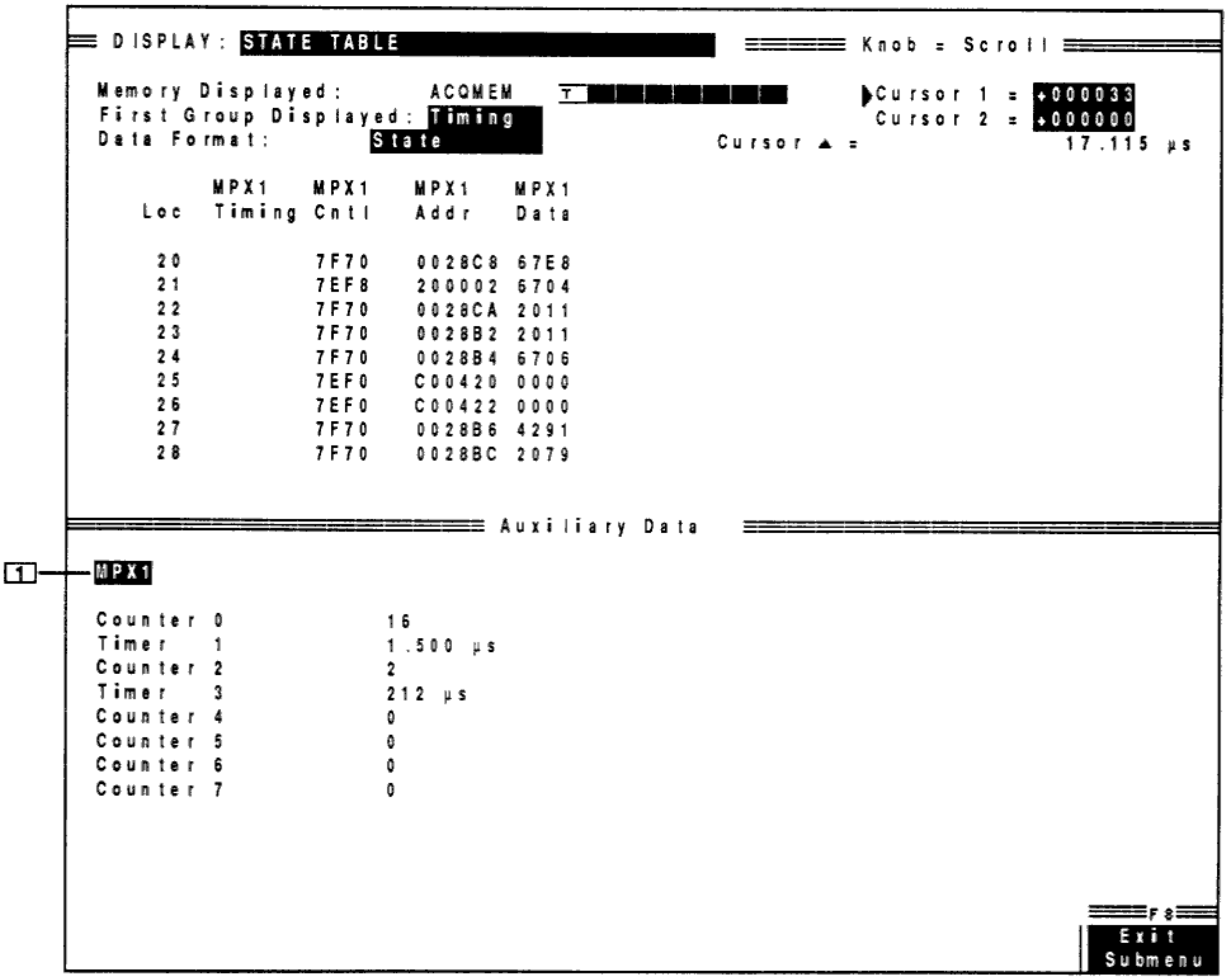


Figure 4-6. Auxiliary Data submenu. Shows the values stored in the counters and timers for the selected application module.

1 **Module**. Lets you select which application module to show the counter and timer values from.

Function Key

F8: Exit Submenu. Closes the Auxiliary Data submenu.

Blank Areas in the Data Display

Blank areas in the State Table menu can be caused by one or more of the following conditions:

- The timestamp sets have different memory depths. If one timestamp set has a deeper memory than the other, there will be blank areas in the smaller groups near the end of the display menu.

- The active data cursor is positioned outside the bounds of stored data. Any movement of the SELECT knob will move the active cursor to the nearest location containing valid data.
- Two timestamp sets are correlated. There can be intervals where there is activity in one timestamp set, but none in the other. The areas where no activity occurred will be blank.

Blank areas in the Timing Diagram menu can be caused by the first two conditions described above, plus channel groups that have no data for the locations displayed.

STATE TABLE FEATURES

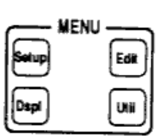
The State Table menu (see Figure 4-7) lists the data sample values in tabular form for each channel group. Each row in the table consists of data sampled on one acquisition cycle. The first column gives the memory location of the sample event relative to the trigger. Events preceding the trigger are assigned negative locations; events following the trigger have positive locations. The remaining columns show the actual data acquired from each channel group.

Channel group names in the State Table menu are truncated if the radix doesn't contain enough characters to show the whole group name. Only groups you select for display in the Display Format submenu are shown. An arrow in the far right column indicates if more groups are enabled than can be shown on the screen at one time.

You may also choose to display the timestamp value associated with each acquisition cycle. The timestamp can be either relative (from Trigger) or absolute (from Previous).

From Trigger. A relative timestamp. Shows the time elapsed between the acquisition trigger and the data sample event.

From Previous. An absolute timestamp. Shows the duration of the data sample event.



To display the State Table, press the Dspl key, then select STATE TABLE in the Menu Select field at the top of the display. The following figure shows the State Table.

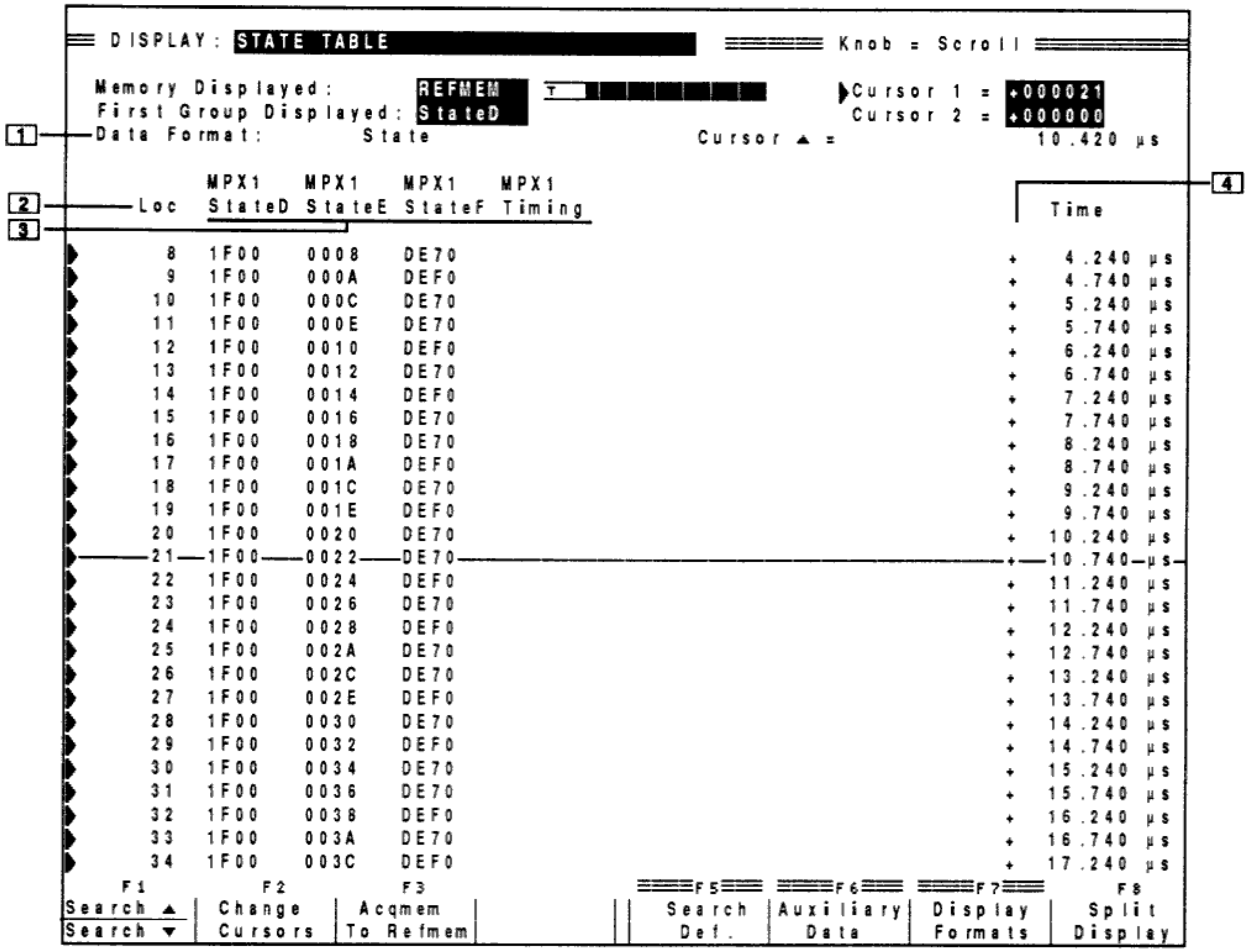


Figure 4-7. State Table menu.

[1] **Data Format.** Lets you select the format of data displayed in the State Table menu. If no application software is loaded, the only selection is **State** (all data displayed in a state table).

[2] **Loc**. Gives the memory location number. It shows the location of the data sample relative to the trigger. Events following the trigger have positive locations; events preceding the trigger have negative locations.

[3] **Channel Groups**. Each column contains the data acquired from a channel group. The first line is the channel group name. All channel groups enabled for display in the Display Format submenu are available. Channel groups are defined in setup menus prior to acquisition.

[4] **Time.** Depending on which timestamp is selected in the Display Format submenu, the timestamp associated with each data sample may be either relative or absolute.

Selecting the State Table Display Format

Use the Display Format submenu to change the radix in which data is displayed.

Selections made in the Display Format submenu determine which groups are shown, the display radix and polarity, and the type of time data listed. Figure 4-8 shows the Display Format submenu and describes the selections available.

To open the Display Format submenu, press F7: Display Formats.

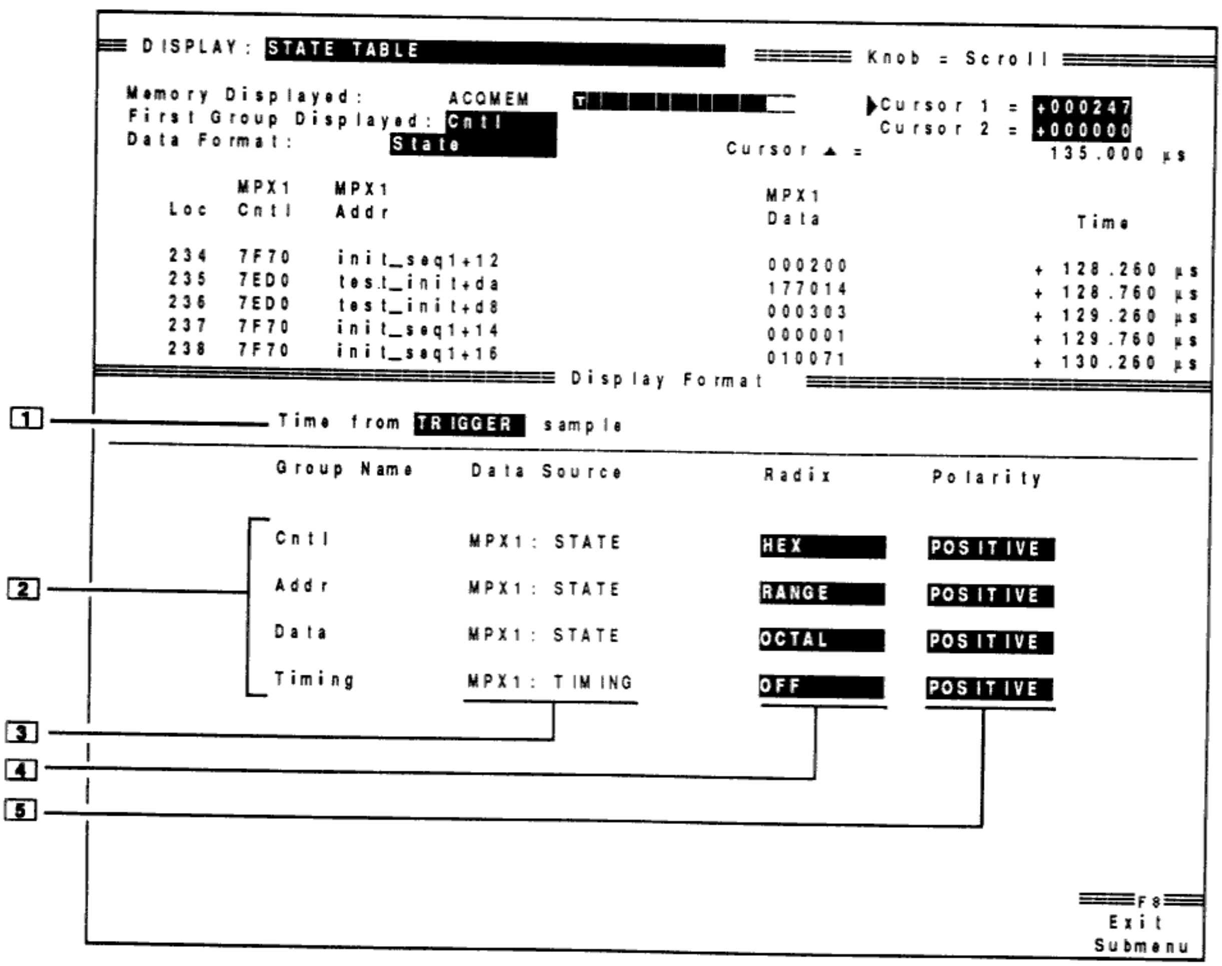


Figure 4-8. State Table Display Format submenu. Controls how data appears in the State Table menu.

[1] **Timestamp**. Determines the type of time data displayed for each location in the State Table menu. TRIGGER displays the time elapsed from the acquisition trigger to when the sample occurred. NEXT displays the time to the next sample. OFF turns off the time display.

[2] **Group Name**. Identifies the channel group. Channel groups are defined in a submenu associated with the acquisition module's setup menu.

[3] **Data Source.** Identifies the group's timestamp set by identifying which module (or module section) acquired the data.

[4] **Radix**. Determines the group's display radix. Selections are BINARY, DECIMAL, HEX(adecimal), OCTAL, ASCII, EBCDIC, PATTERN, RANGE, and OFF. PATTERN or RANGE displays a symbol name defined in the Symbol Definition menu in place of the channel group value. If OFF is selected, the channel group is not displayed.

[5] **Polarity**. Channel group polarity determines the logic used to display acquired signals. Selections are Positive and Negative. If positive is selected for a channel group, then a signal above the threshold voltage would be "true" with a binary value of 1. The same signal with negative polarity selected would be "false" with a value of 0. Note: If the system under test uses active-low logic, you must select negative polarity if the entries in the State Table menu are to be in any radix other than binary.

Function Key

F8: Exit Submenu. Closes the submenu.

Selecting Which Groups to Display

In the State Table menu, channel groups are always displayed in sequential order. You can select which groups are displayed by selecting a radix for them in the Display Format submenu. You can control the order of the groups on the screen by specifying which group is shown in the first column.

Only channel groups (with a display radix selected) in the Display Format submenu are shown.

To select the group in the first column:

1. Position the blinking field cursor in the **First Group Displayed** field.
2. Press the SELECT keys until the desired group is shown, use a pop-up select menu, or type in the name of the group. The first column now shows the data from the channel group you selected as the first group.

Data Display Truncation

Sometimes a channel group has more channels than will fit on the screen in the current display radix. For these cases, the data is truncated at the right edge of the screen and the truncation symbol (▶) is displayed as the right-most character.

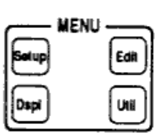
To see the truncated data, you can either change the first group displayed or you can change the display radix of one or more groups in the Display Format submenu. You can take a group out of the display by changing its display radix to OFF.

TIMING DIAGRAM FEATURES

The Timing Diagram menu, shown in Figure 4-9, displays the data values for each channel as a digital (two-state) waveform. Use the SELECT knob to horizontally scroll the traces.

NOTE

It can be hard to tell whether a timing trace is high or low, especially if there are no transitions showing on the screen. For this reason, the PRISM uses different line widths for different logic levels. A thick trace indicates logic level low; a thin trace indicates logic level high.



To display the Timing Diagram, press the Dspl key, then select TIMING DIAGRAM in the Menu Select field at the top of the display. The following figure shows the Timing Diagram.

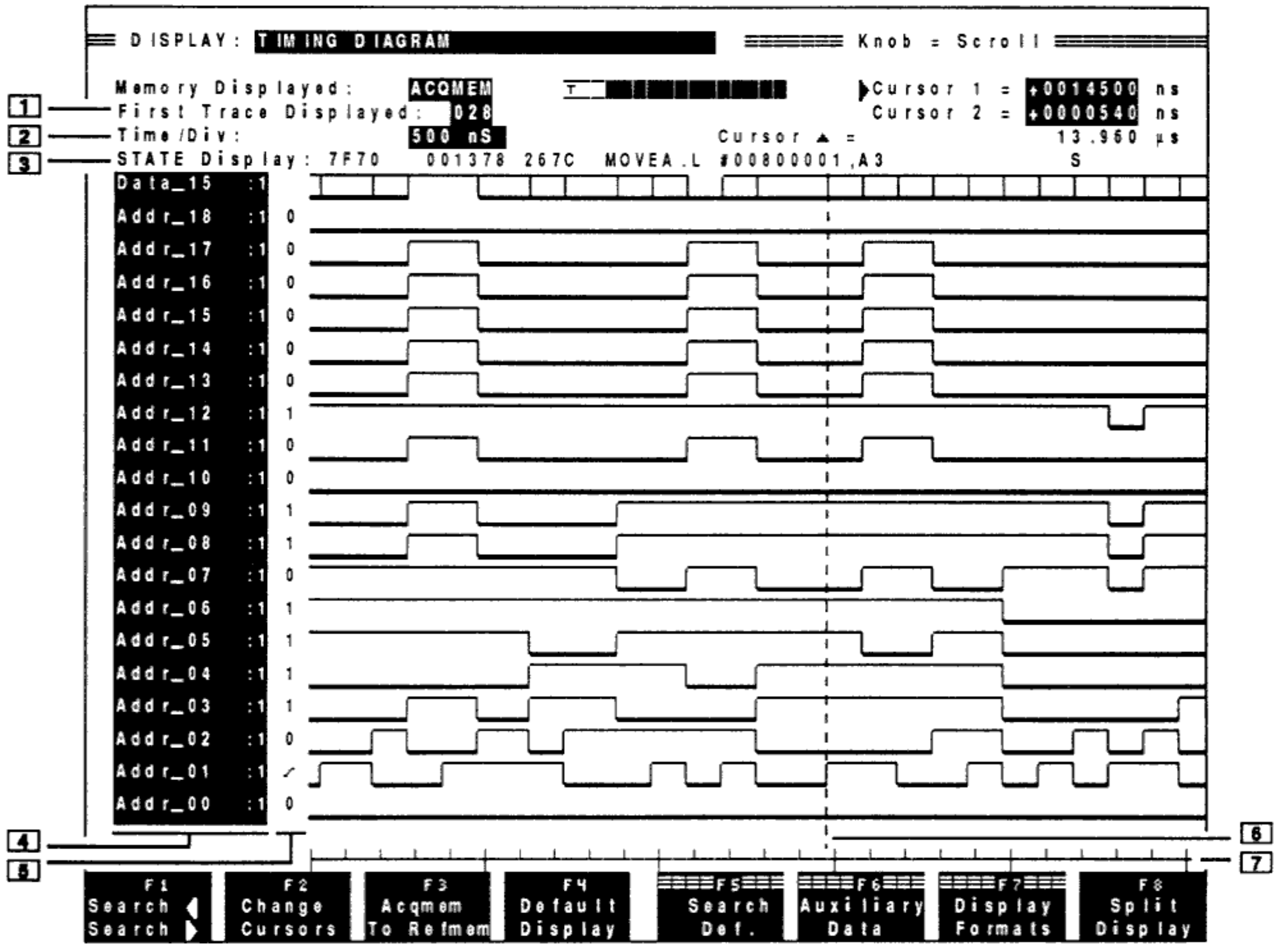


Figure 4-9. Timing Diagram menu.

[1] **First Trace.** Lets you select which trace is shown at the top of the timing diagram.

[2] **Time/Division**. Controls the horizontal expansion of the timing traces by specifying the time each division on the graticule represents.

[3] **STATE Display.** Displays the state at the active cursor location. This field is enabled in the Display Format submenu.

[4] **Trace Label**. The default name for each trace specifies its channel group, channel number, and module. Trace labels take the following form: Group name_channel number:module number. For example, the trace label Addr_09:1 represents address line 09 of the MPX1 module.

You can also rename the traces. Refer to *Selecting the Timing Diagram Display Format.*

[5] **Vertical Display**. Shows the logic level of each trace at the active cursor location. This field is enabled in the Display Format submenu.

This field reflects the **displayed** logic level of the traces. Changing the trace polarity in the Display Format submenu affects the values shown.

[6] **Data Cursor 1.**

[7] **Graticule**. Provides a time reference for viewing data. The time represented by graticule divisions is selected in the Time/Div field.

Function Key

F4: Default Display. Returns the Timing Diagram to its default status, with all traces turned On and displayed in their original order.

Selecting the Timing Diagram Display Format

Selections made in the Display Format submenu control the data shown in the Timing Diagram menu. Only groups that have TRACE selected in this submenu appear in the Timing Diagram menu.

You can also use the Display Format submenu to change the names of the traces displayed in the Timing Diagram.

Figures 4-10 and 4-11 show the Display Format submenu and describe the selections available.

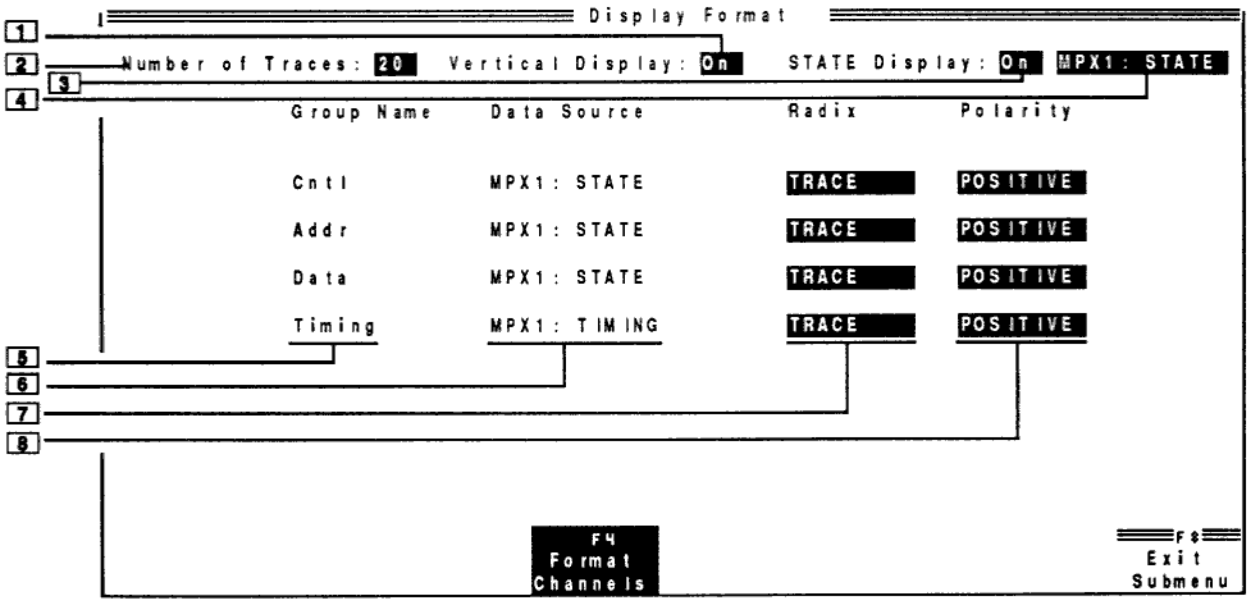


Figure 4-10. Timing Diagram Display Format submenu: Group Display. Controls data appearing in the Timing Diagram menu.

1 **Vertical Display**. Enables the Vertical Display field in the Timing Diagram, which shows the logic level of each trace at the active cursor location. The selections are ON and OFF.

2 **Number of Traces**. Determines the number of traces (10 or 20) shown on the screen at one time. Twenty traces is the default; if you select 10 traces the height of the traces will double.

3 **STATE Display**. Enables the STATE Display field in the Timing Diagram, which shows the state at the active cursor location. The selections are ON and OFF.

4 **STATE Display Module**. If the STATE Display is set to ON, this field allows you to select the source module for the STATE Display field in the Timing Diagram.

5 **Group Name**. The channel groups. Includes all the channel groups defined for the active application modules in the system.

6 **Data Source**. Identifies the group's module.

7 **Radix**. Determines whether a channel group is displayed. The selections are TRACE and OFF.

[8] **Polarity**. Determines the logic used to display acquired signals. Selections are Positive and Negative. If positive is selected for a channel group, then a signal above the threshold voltage would be high. The same signal with negative polarity selected would be low. Note: If the system under test uses active-low logic, you must select negative polarity for the traces in the Timing Diagram menu to be meaningful.

Function Keys

F4: Format Channels. Selects Channel Display mode. Channel Display mode allows you to change trace labels.

F8: Exit Submenu. Closes the submenu.

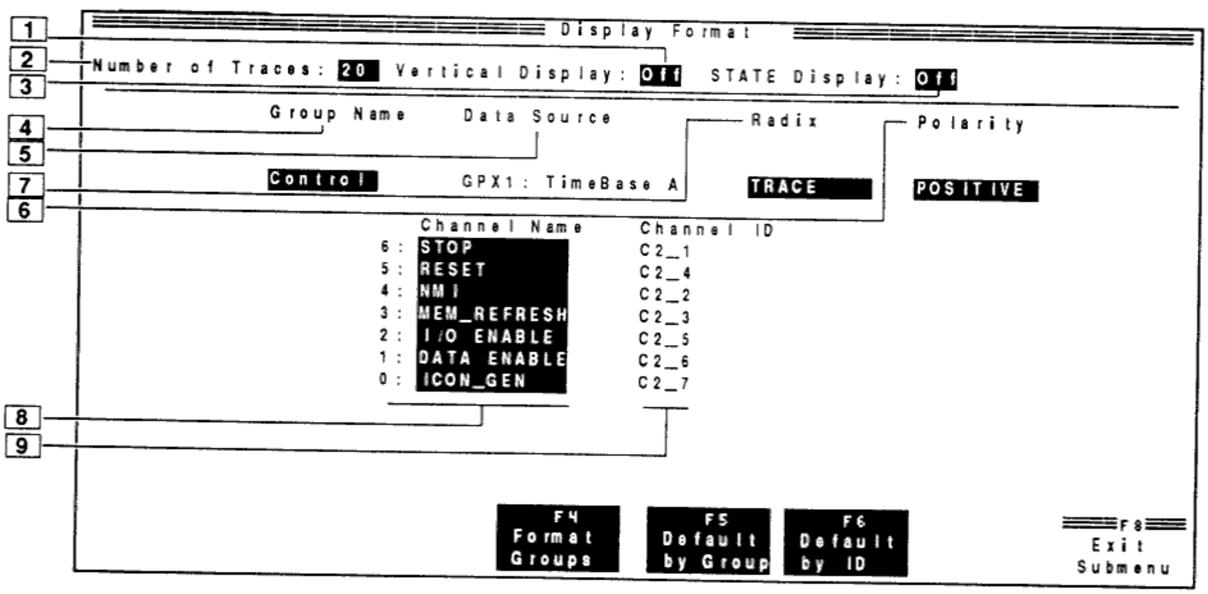


Figure 4-11. Timing Diagram Display Format submenu: Channel Display. Controls trace names in the Timing Diagram menu.

[1] **Vertical Display**. Enables the Vertical Display field in the Timing Diagram, which shows the logic level of each trace at the active cursor location. The selections are ON and OFF.

[2] **Number of Traces**. Determines the number of traces (10 or 20) shown on the screen at one time. Twenty traces is the default; if you select 10 traces the height of the traces will double.

[3] **STATE Display**. Enables the STATE Display field in the Timing Diagram, which shows the state at the active cursor location. The selections are ON and OFF. If this field is set to ON, a STATE Display Module field appears, allowing you to select the source module for the STATE Display field.

[4] **Group Name**. Selects the channel group to be acted on.

[5] **Data Source**. Indicates the application module for the channels shown.

[6] **Polarity**. Determines the logic used to display the entire channel group. Selections are Positive and Negative. If positive is selected for a channel group, then a signal above the threshold voltage would be high. The same signal with negative polarity selected would be low. Note: If the system under test uses active-low logic, you must select negative polarity for the traces in the Timing Diagram menu to be meaningful.

[7] **Radix**. Determines whether the channel group is displayed. The selections are TRACE and OFF.

[8] **Channel Name**. Controls the name of the trace shown in the Timing Diagram. The default name indicates the trace's channel group, channel number, and module. To change the name, enter a new name in this field. Names can be up to 11 characters long. You may use the full ASCII character set, including space and tab characters.

[9] **Channel ID**. Shows the physical channel label for each trace. The channel label indicates the probe and physical line number.

Function Keys

F4: Format Groups. Selects Group Display mode. The Group Display mode shows Display Format information by group rather than by channel.

F5: Default by Group. Changes the names of all traces in the group to a default based on the group name. This is the power-up default for trace labels, where each trace is specified by its channel group, channel number, and module. Trace labels take the form Group name_channel number:module number. For example, the trace label Timing_05:1 represents timing line 05 of the MPX1 module.

F6: Default by ID. Changes the names of all traces in the group to be the same as the channel ID labels. Channel ID labels are identified by probe and line number.

F8: Exit Submenu. Closes the submenu.

Bus Forms

You can display a composite trace, called a bus form, consisting of all traces within a given channel group. To do so, place the field cursor on a trace label field and open a pop-up menu. From the pop-up menu, choose the group name for the bus form you want to display. The default bus form labels consist of just the group name. For example the bus form for the data channel group is labeled "Data." Figure 4-12 shows a bus form for the data channel group.

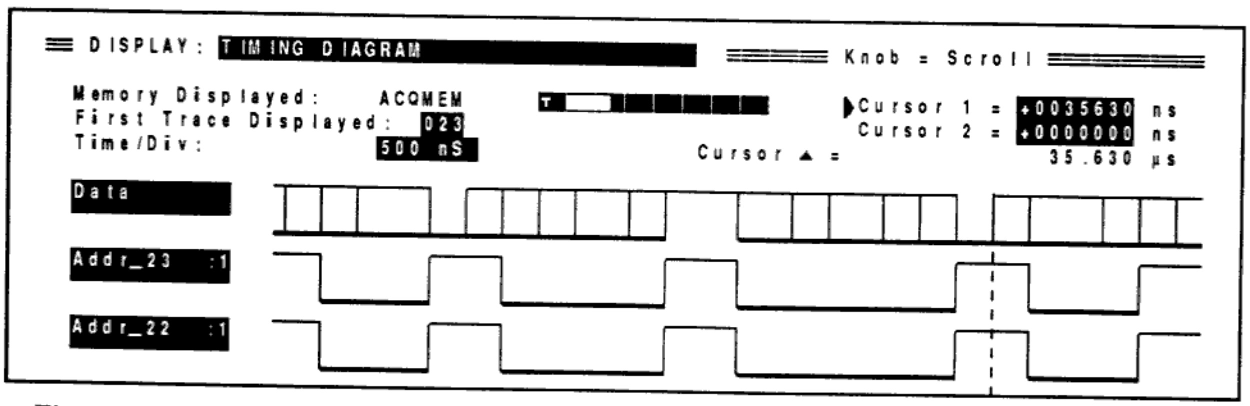


Figure 4-12. Timing diagram showing a bus form. The bus form labeled "Data" is a composite of all traces in the data channel group.

Selecting Which Traces are Displayed

There are two ways to select which traces are on the screen at a given time. You may either vertically scroll the data until the trace you are interested in is on the screen. Or, you can choose to display a trace in a particular position on the screen by using it to replace an existing trace.

NOTE

For a channel group to be shown in the timing diagram, that channel group must have TRACE selected in the Display Format submenu.

To vertically scroll timing traces:

1. Place the field cursor on the First Trace Displayed field.

2. Vertically scroll the traces by pressing the SELECT keys. Or, type in the position number of the desired trace.

To replace one trace with another:

1. Place the field cursor on the trace label you want to replace (see Figure 4-9).
2. Press Return to open a pop-up select menu. You can then highlight a trace label and effect the selection by pressing Return again. Or, instead of using the pop-up menu, type the desired trace label over the existing one.

Turning Traces On and Off

To display a particular trace, open a pop-up menu in the Trace Label field and select the trace.

To turn off the display of a timing trace, type OFF for the channel group name.

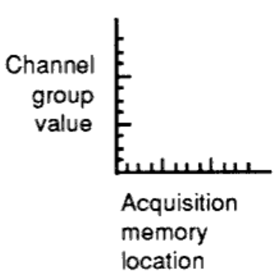
To turn on a timing trace that is turned off, place the field cursor on the trace label and press Return to open a pop-up select menu. Within the pop-up menu, select the trace, then press Return to effect the selection.

To return the timing display to its default status (all traces on), press F4: Default Display. The PRISM turns on all traces and displays them in their default order. If you renamed any of the traces, the new name remains.

GRAPH FEATURES

Just as an oscilloscope graphically displays analog circuit activity, the Graph menu displays digital circuit activity.

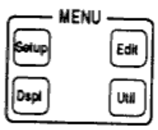
The Graph menu is another way to view your acquired data. This menu is a diagnostic tool that can be invaluable in probing digital circuitry. For example, by acquiring information from the data bus of an A/D circuit, you can display an analog-like waveform. The Graph menu functions very much like an oscilloscope does in analog circuitry, providing easily-recognizable waveforms ("plots")—a dynamic picture of what is going on in your digital circuit. Without this kind of tool it is extremely difficult to examine and compare digitized signals to their analog counterparts. Figures 4-13 and 4-14 show digitized television signals, as displayed by the Graph menu.



The Graph menu works by plotting channel group values against their acquisition memory location (data points versus "time"). You can display any type of channel group: address, data, or control. Typically, the Graph menu is used to look at either data value sequences, as described above, or memory address activity, so that you can see what areas of memory are being used and how heavily.

The Graph menu displays up to three channel group plots at one time. You can control whether each channel group plot is shown on its own separate axis (Separate display mode), or whether the plots are all shown on a single axis (Overlay display mode). Figures 4-13 and 4-14 illustrate these two modes. In addition, you can choose to display the waveforms as a series of dots, a series of straight lines, or as a continuous smooth line.

By moving a data cursor, you can scroll through the plot. As you do so, information fields show the exact data values and locations of the sample points at the two cursors.



To display the Graph menu, press the Dspl key, then select GRAPH in the Menu Select field at the top of the display. Figures 4-13 and 4-14 show the Graph menu and fields.

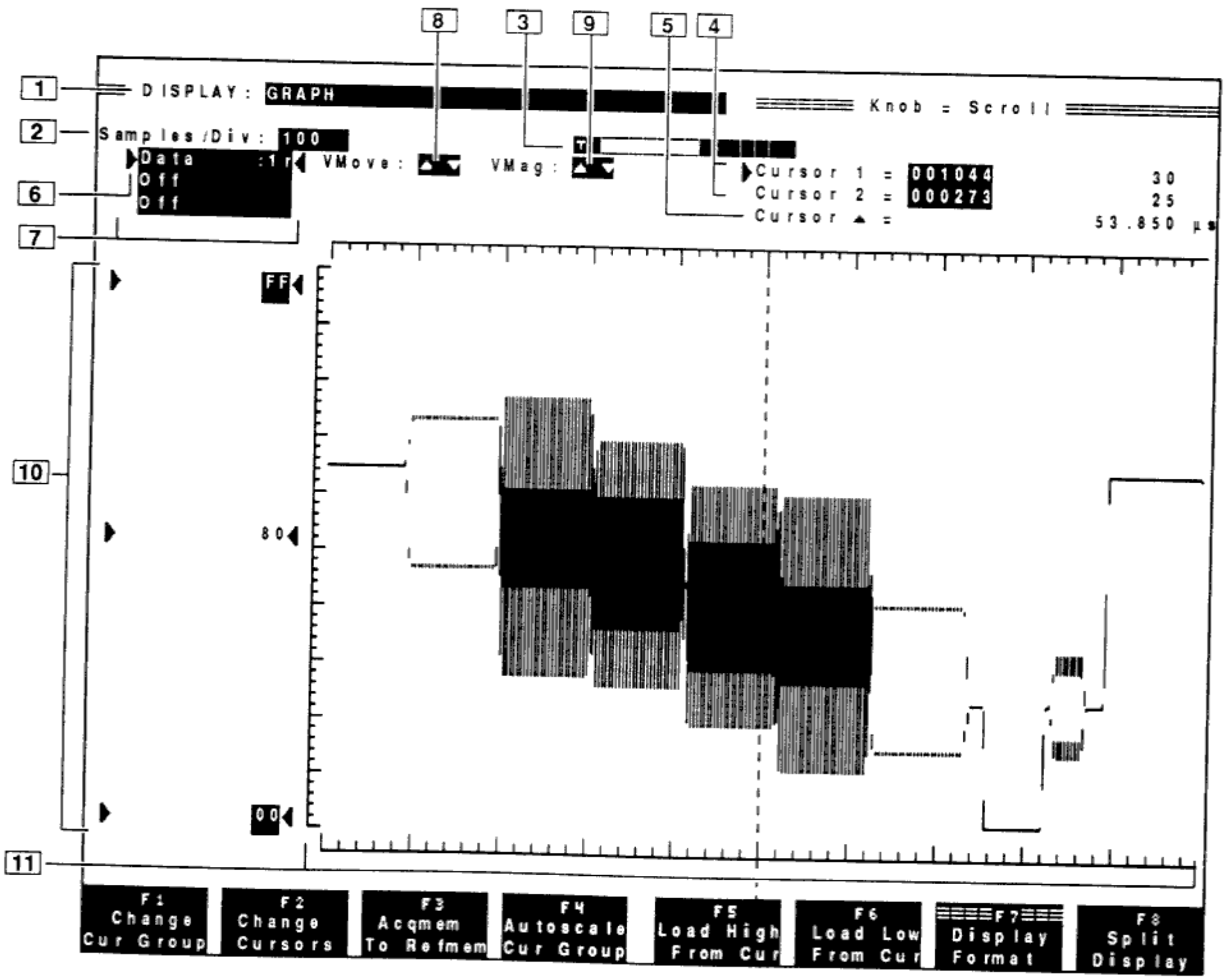


Figure 4-13. Graph menu in Overlay display mode.

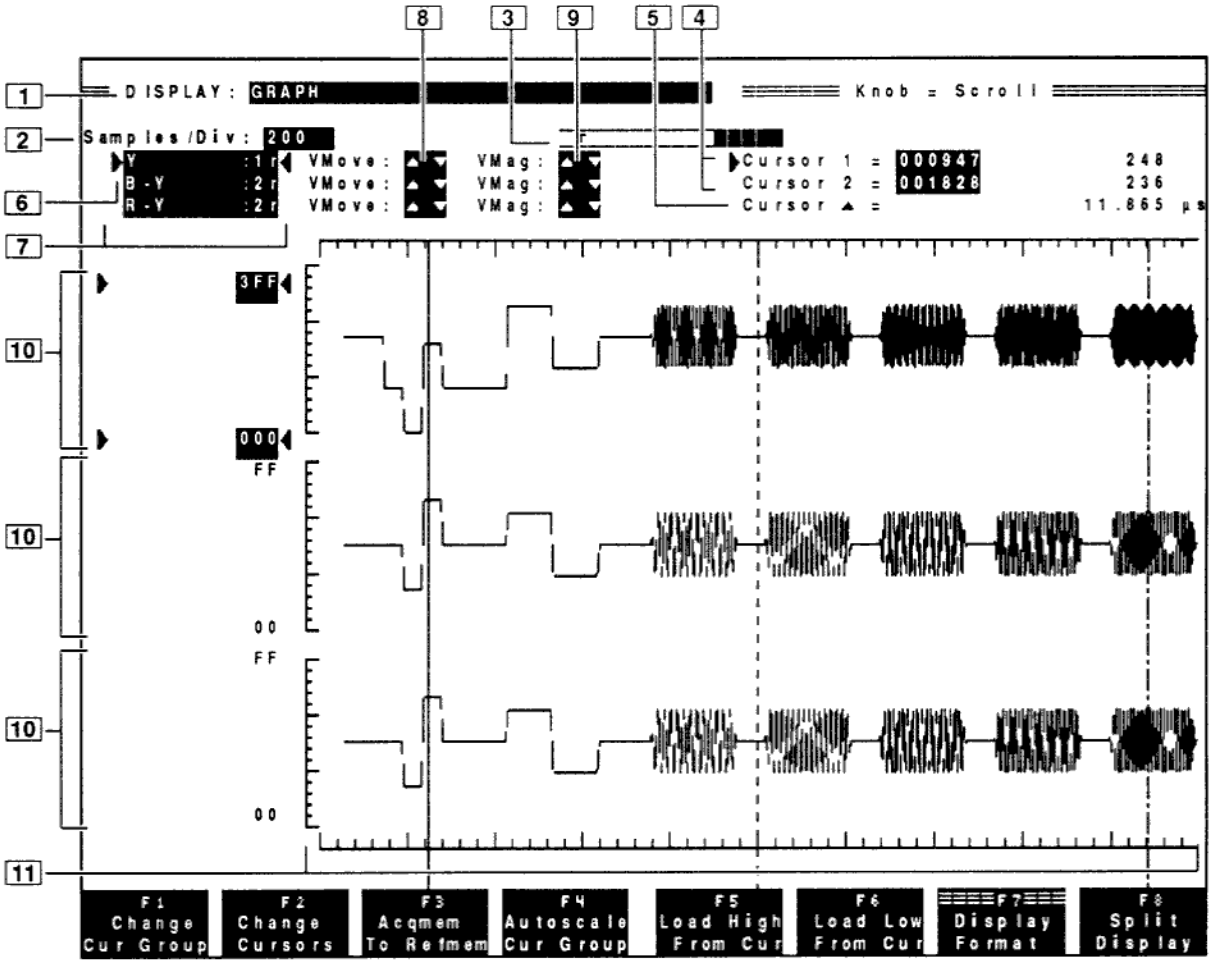


Figure 4-14. Graph menu in Separate display mode.

[1] **Menu Select.** Determines which menu to display. Selections are GRAPH, STATE TABLE, and TIMING DIAGRAM (or options PA, WAVEFORM, and PDT).

[2] **Samples/Div.** Selects the number of samples that are displayed per horizontal division. Predefined values are 1, 2, 5, 10, 25, 50, 100, 200, 500, 1000, 2000, and 5000. This field defaults to a value that allows display of the entire record plus any offset. Predefined values above the calculated default are eliminated from the field and cannot be selected.

[3] **Domain Indicator.** Shows what portion of the record is being displayed. The T indicates the location of the active channel group acquisition module trigger.

[4] **Data Cursor Location and Value.** Shows cursor location within the record and the data value at that sample point. An arrow points to the active cursor.

[5] **Cursor ▲.** Gives the time between Cursor 1 and Cursor 2 events.

[6] **Active Group.** The arrows indicate the active channel group. The function keys and data cursors are associated only with the active group.

[7] **Group Name.** Specifies the selected channel group for display. Define a channel group with the appropriate Channel/Grouping or Clocking/Grouping submenu associated with the acquisition module's setup menu.

[8] **VMove.** Increases or decreases the range boundaries by one (with each press of a SELECT key) until a data range limit is reached or until the difference between the two boundaries is 10.

[9] **VMag.** Doubles data current range boundaries or halves the current data range boundaries unless the action would set the boundaries beyond default values or within 10 of each other.

[10] **Data Range Boundaries.** Displays the range of the channel group values being plotted.

[11] **Horizontal Axis.** Shows the location of the sample points in acquisition memory.

Function Keys

F1: Change Cur Group. Makes another channel group active.

F2: Change Cursors. Toggles between the active data cursors.

F3: Acqmem To Refmem. Overwrites reference memory with the current contents of acquisition memory.

F4: Autoscale Cur Group. Resets the the data range limits to default boundaries that display an entire record on the screen.

F5: Load High From Cur. Sets the upper data range boundary to the value of the channel group data at the active cursor. Data points above this boundary are clipped and not shown.

F6: Load Low From Cur. Sets the lower data range boundary to the value of the channel group data at the active cursor. Data points below this boundary are clipped and not shown.

F7: Display Format. Opens the Display Format submenu.

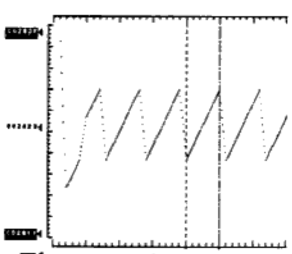
F8: Split Display. Splits the display window horizontally into two panes. Also forces the Display Mode to Separate (for the split display only) but does not change the Display Mode field.

Graph Menu Uses

Typical applications for the Graph menu include: process instrumentation, medical instrumentation, analytical instrumentation, audio, and voice natural language processing.

Here are some examples of how you can use the Graph menu:

- Display data bus outputs of a DSP (digital signal processor) while varying its filter algorithm or frequency stimulus.
- Plot address values to see how a firmware routine executes. Graph patterns can show you where the code is executing sequentially, looping on if-statements, calling other routines, and so on.
- Display memory read/write patterns when dealing with vector tables, interrupt tables, memory mapping, handshaking, or data transfer protocols.



The repeating pattern of address values shows that this firmware routine is looping as it should.

Plot Description

A plot of channel group values gives you a picture of the data. There are four components to a plot: the data points, the data set being plotted, and the two reference axes. The following paragraphs describe the plot components.

Channel Group Values

Data points represent channel values.

Channel group values become data points on the plot. The data points can be displayed as a series of dots, a series of straight lines, or a smooth line. You can zoom, clip, or scroll through the data points. Zoom the data points by changing the Samples/Div field. Clip the data points by changing one of the data range boundaries. Scroll the data points by moving the active cursor.

Record Width

A record width is the number of samples acquired (the data set being plotted).

Data Range

For an 8-bit bus, the default upper boundary is $2^8 -1$, resulting in a data range of 0–255.

The vertical axis displays the range of the data points and defaults to a range that displays the entire record. The default lower boundary is the least value data point. The default upper boundary for unsigned data is calculated and is equal to $2^n -1$, where n is the number of channels in the group. The default upper boundary for signed data is the two's complement of the unsigned value ($2^{(n-1)}-1$). The default lower boundary for unsigned data is 0 and $-(2^{n-1})$ for signed data. No data points exist above the upper boundary.

You can clip the data points by raising the lower boundary or lowering the upper boundary. Three function keys, F4: Autoscale Cur Group, F5: Load High From Cur, or F6: Load Low From Cur, allow you to quickly change the data range boundaries.

Each display mode displays the data ranges differently. In Overlay display mode, the range boundaries of the channel groups are stacked with the boundaries of the active group highlighted. Arrows also point to the active range boundaries. In Separate display mode (see Figure 4-14), each data range is shown next to the appropriate plot grid. As with Overlay display mode, the active range boundaries are highlighted and arrows point to the active range boundaries.

NOTE

The minimum difference between the lower boundary and the upper boundary is 10.

Sample Points

The horizontal axis represents acquisition memory location.

The horizontal axis represents the location of the sample points in acquisition memory. It is scaled by the Samples/Div field. Samples/Div defaults to a value that displays the data points in one record width plus the Display Offset, if any. As with data ranges, no data points exist above the calculated Samples/Div setting. Changing the Samples/Div field to a value less than the default zooms (expands) the data display.

Discontinuities can exist at display points near an axis.

If you are plotting in either Linear Format or Interp Format (described later under *Display Format*) and change a data range boundary so that a data point is not displayable, the point is automatically moved to one pixel above the displayable area (500 pixels horizontally and 256 pixels vertically) and the display is recalculated. Because the point was moved and is not at its real position, there can be anomalies near the moved point. Enter a different data range boundary to eliminate the discontinuity.

Display Modes

Two display modes (Overlay and Separate) select the number of coordinate systems to use when displaying the three channel groups. In Overlay mode (see Figure 4-13) all three channel group plots are displayed on a single coordinate system. In Separate mode (see Figure 4-14) each channel group plot is displayed on an individual coordinate system. You select the display format in the Display Format submenu. Press F7: Display Format to activate the Display Format submenu, then select the Display Mode.

Display Formats

The display format applies to all channel groups.

Each channel group plot is displayed according to the Group Format selections you make in the Display Format submenu. The available formats are: Dot, Linear, and Interp. The selected Group Format applies to all channel groups. You cannot use different formats for each channel group.

Dot Format

Use dot format for maximum accuracy.

In dot format, single dots drawn on the screen represent data points (dots). This group format is useful when you want to view the exact data points.

Linear Format

Use linear format to find isolated sample points.

In Linear format, straight lines connect the data points (dots). Connecting the dots creates a visual pattern that is more recognizable than a dot pattern. This group format also helps you find isolated sample points.

Interp Format

Use Interp format to display data as a continuous line.

The Interp (interpolate) format connects the data points (dots) with a sin (x)/x interpolation. The result is a continuous smooth line made up of the data points and calculated values. The smooth line provides easier pattern recognition than either Dot or Linear group formats.

Selecting the Graph Display Format

Selections made in the Display Format submenu alter the display parameters and the group plot parameters. Figure 4-15 shows the Display Format submenu.

Press F7 to change the format of your display.

To open the Display Format submenu, press F7: Display Format.

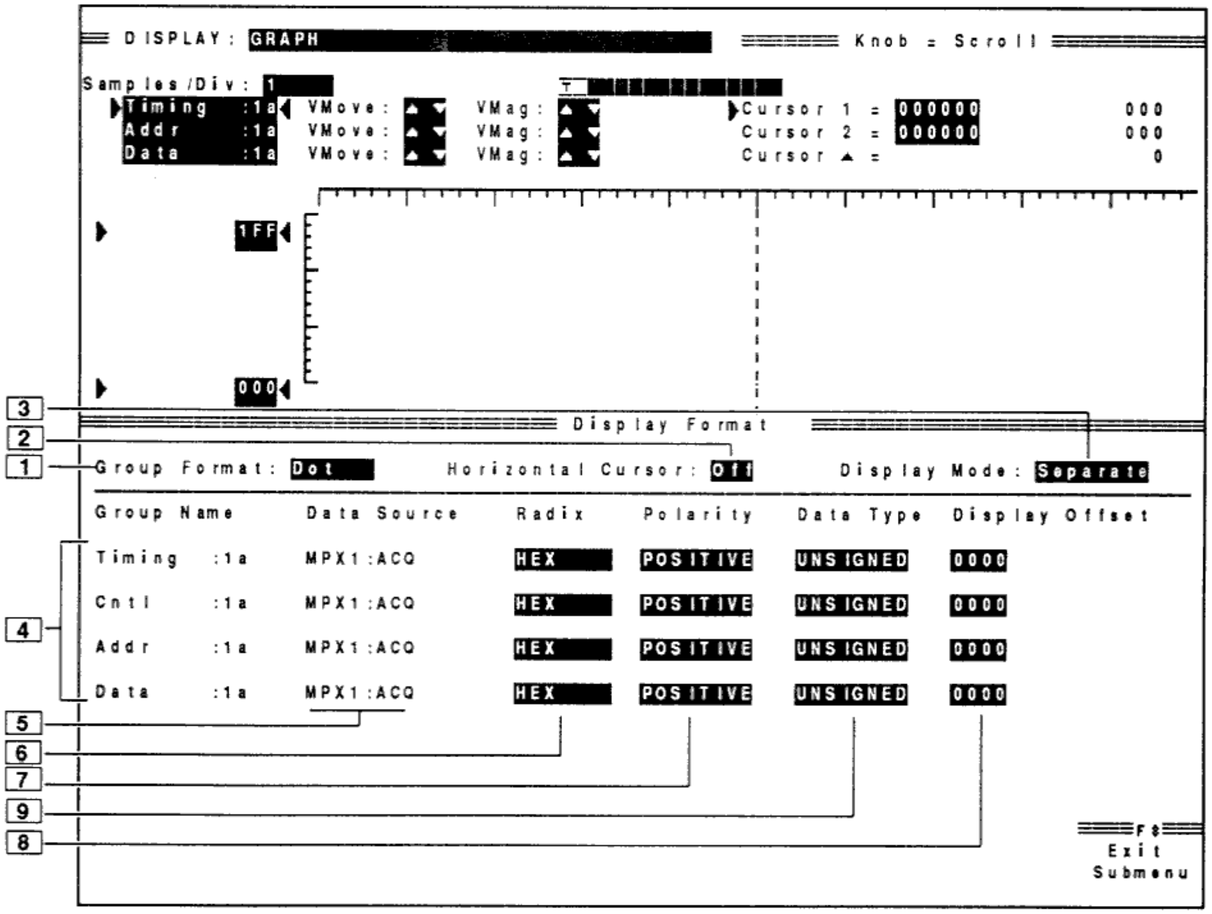


Figure 4-15. The Graph Display Format submenu controls how data appears in the Graph menu.

1. **Group Format.** Selects the way channel group values are plotted. The three choices are: Dot, Linear, and Interp.

2. **Horizontal Cursor.** Turns the horizontal cursor on or off.

3. **Display Mode.** Determines how the channel group data is displayed: Overlay or Separate.

4. **Group Name.** Identifies the channel group name, the source acquisition module number, and memory source. Define channel groups with the appropriate Channel/Grouping or Clocking/Group submenu associated with the acquisition module's setup menu.

5. **Data Source.** Identifies the channel group's source module (or module section) and memory source: ACQ (acqmem) or REF (refmem).

6. **Radix.** Determines the channel group's display number base. Selections are: DECIMAL, HEX, and OCTAL.

[7] **Polarity.** Determines the logic polarity to use when displaying the acquired data. Selections are POSITIVE and NEGATIVE. Selecting POSITIVE displays the data points as acquired. Selecting NEGATIVE displays the data points after a one's complement operation is performed.

[8] **Display Offset.** Specifies the number of sample points to move (offset) the channel group's display along the horizontal axis.

[9] **Data Type.** Determines whether or not the acquired data is displayed UNSIGNED or SIGNED. Selecting UNSIGNED displays the acquired data as an unsigned value. Selecting SIGNED displays data boundaries, cursor locations, and data points as two's complement signed values with the MSB serving as the sign bit.

Function Key

F8: Exit Submenu. Closes the submenu.

Offsetting a Data Plot

You can offset a channel group plot by a specified number of sample points (acquisition memory locations). The Display Offset field specifies the amount of offset. The offset is immediately visible, even for inactive channel groups. Use this feature to compare the same data from different sources.

Data Compression and Expansion

Because the data acquisition size may be large and the number of displayable pixels (500 horizontally and 256 vertically) is limited, data points are shown compressed, expanded, or one-to-one, depending on the Samples/Div field setting. If the Samples/Div field is greater than 50, the data display is compressed. If the Samples/Div field is less than 50, the data display is expanded and when exactly 50 the data display is one-to-one.

NOTE

When data points are displayed expanded and either Linear or Interp plot format is selected, display points between actual data points are interpolated.

When the data display is compressed and there are two or more data values at the same sample point, a vertical line is drawn between the lowest value data point and the highest value data point. These vertical lines or risers can occur in all three group formats.

Data Scrolling and Cursor Control

Two cursors control data scrolling: Cursor 1 and Cursor 2. Cursor 1 is a vertical line of dashes. Cursor 2 is a vertical line of dots and dashes. Both extend across the plot display and can be positioned at sample points. The data point value and its acquisition memory location are shown in the upper right corner of the Graph menu (see Figure 4-13).

NOTE

The time of the current cursor is communicated between all display menus.

To jump to the module trigger, move the cursor to either the Cursor 1 or Cursor 2 field and press M or C.

Press X or T to jump to the system trigger.

There are two ways to move data cursors. You can scroll them through data using the knob. Or, you can jump to a specific memory location or to the module trigger. To move a data cursor to a specific memory location, do the following:

NOTE

The cursors always move to a valid data point.

1. Place the field (blinking) cursor in the Cursor 1 or Cursor 2 field.
2. Type in the memory location number or press the SELECT keys to increase or decrease the memory location (each press moves the memory location by one). Or, press C or M (for Module) to move the data cursor to the module trigger location.

NOTE

If you are using the knob to scroll through memory, the cursor will wrap around the end of the data in either direction.

Press F2 to change the active data cursor.

The active cursor is the cursor that can be moved with the knob. Only one data cursor can be active. A small arrow next to the Cursor 1 or Cursor 2 field label indicates which data cursor is active. To change which cursor is active, press F2: Change Cursors.

Cursor ▲ shows the time between events.

The Cursor ▲ field shows the time difference between the Cursor 1 and Cursor 2 positions. This field allows you to measure the time elapsed between two data points.

Changing the Active Group

Press F1 to change the active group.

Only one channel group plot can be active at a time. To make another channel group active press F1: Change Cur Group. The active plot changes to the next channel group. The selection wraps around when the last channel group is reached.

Moving Acqmem to Refmem

Press F3 to copy Acqmem to Refmem.

If you want to use the contents of acquisition memory for reference, you can copy it into Refmem. Be sure to copy the current Refmem onto disk if you want to save it (see *Saving Acquisition and Reference Memories* in Section 6).

NOTE

If you save an Acqmem to a file on disk, it becomes a Refmem. Acqmem can only be filled with data from probe input channels. This means that only a Refmem can be restored from a disk file.

To copy acquisition memory to reference memory, press F3: Acqmem to Refmem. You are then prompted to press X to confirm the operation.

NOTE

When you press X, reference memory is overwritten with a copy of acquisition memory; the previous contents of Refmem cannot be retrieved.

Changing Data Range Boundaries

To change either the upper or lower data range boundary, move to the appropriate field and type in your choice. You can also use the F4: Autoscale Cur Group, F5: Load High From Cur, and F6: Load Low From Cur function keys to quickly change data range boundaries. The minimum difference between the lower data range boundary and the upper data range boundary is limited to a decimal 10.

Press F4: Autoscale Cur Group to set the data range boundaries to the highest and lowest channel group value in the current memory.

Press F5: Load High From Cur to set the high range boundary to the current channel group value at the cursor.

Press F6: Load Low From Cur to set the low range boundary to the current channel group value at the cursor.

Displaying Data in Two Panes

Press F8 to split the display window or return it to single pane.

You can use F8: Split Display to split the screen horizontally into two panes. (For more information, see *Splitting the Display Window* in Section 2.) This allows you to view two sets of data at the same time. Splitting the screen automatically changes the Display Mode to Separate for the split screen display only. The Display Mode field is not changed.

If the pane contains either State Table or Timing Diagram menus, you can link the data cursors together. Cursor linking is controlled by the **Cursors are** field shown in Figure 4-2. When Unlinked is selected, the data cursors in one pane move independently of the data cursors in the other pane. When the data cursors in two panes are linked together, they maintain the same distance from each other so that as one cursor is scrolled through memory, the cursor linked to it in the other pane also scrolls. The distance maintained is the length of time between the data samples the data cursors were set on when Linked was selected.

Data cursors wrap around both ends of memory; that is, if you scroll a cursor off the end of a memory, it jumps back to the beginning of the memory. However, when data cursors are linked between panes, both linked cursors may not jump back to the beginning of memory when you scroll one of them off the end of memory. This is because the linked cursors maintain the same time distance from each other, which translates into physical screen distance in a data display.

When you unsplit the display window so that it returns to a single pane, the menu in the top pane is the one that stays open. And, the data cursors remain in the same locations they occupied in the top pane.

Section 5: USING SYMBOLS

There is only one menu in the Edit menu group: the Symbol Definition menu. This menu allows you to define character strings—symbols—that will be used in place of channel group values whenever you select Pattern or Range as the radix in the Setup and Display menus.

WHEN TO USE SYMBOLS

You can use pattern or range symbols to simplify setting up triggers.

Use pattern or range symbols in word recognizer fields.

Symbols are used to simplify tasks, such as setting up triggers or identifying specific values within a display. When you set up a trigger specification or view data, it's cumbersome to remember which numeric channel group values correspond to particular machine instructions or code modules. The PRISM makes this task more manageable by allowing you to assign symbolic names or mnemonics to group values. For example, you might assign the symbol WRITE to the control bus event that causes the system under test to write to a memory location. Then, if you wanted to trigger when a write cycle occurs, you could enter WRITE in the trigger setup in place of the actual data value. You could also choose to have WRITE appear in the State Display for quick identification of the instruction.

Often, the application software will define symbols for you. For example, when you load mnemonic disassembly software, a table of symbols is also loaded (typically, to the control group). These symbols represent data values that correspond to bus cycle types. In addition, some software applications, such as LALINK (or 85SYMCV), produce range symbol files which you can load. (Typically, these files are loaded to the address group.) If your configuration includes a symbol table, you can view or edit the symbols in the Symbol Definition menu.

CREATING A SYMBOL TABLE

The Symbol Definition menu allows you to create a table mapping data values to mnemonic character strings or symbols. The Symbol Definition menu controls both pattern symbols and range symbols.

Pattern symbol. A pattern symbol is a string of numeric characters (don't-cares may also be used) that represents a single data value.

Range symbol. A range symbol is a string of ASCII characters that represents a data value range. The range is defined by lower and upper bound values.

Pattern symbols allow you to replace single data values with appropriate mnemonics. For example, if the value 1011_{hex} on the control bus of the system under test causes a write to a peripheral device, you could map that value to the character string I/OWrite. Then, if you select PATTERN as the display radix, I/OWrite will appear in the State Display menu in place of 1011_{hex}. Likewise, if you wanted to trigger when the write cycle occurred, you could use the string I/OWrite in the setup menu.

Range symbols allow you to replace ranges of data values with symbols created by your application software or with symbols you create yourself. For example, if the code for your I/O Read routine is located at physical addresses 1300 through 13FF, you could map that address range to the range symbol IO READ. Then, if you select RANGE as the display radix, IO READ will appear in the State Display menu in place of any address in the range of 1300 through 13FF. Similarly, if you wanted to trigger on any access to the I/O Read code, you could use the range symbol IO READ in the setup menu.

NOTE

When used in a word recognizer field, a range symbol is interpreted as a single value—the symbol's lower bound value—rather than as a range of values. An exception occurs when a range value is explicitly specified in a word recognizer field (for example, the MPX ≤ = ≤compare condition).

DEFINING PATTERN SYMBOLS

To use pattern symbols, you must first define them in the pattern symbol table, shown in Figure 5-1.

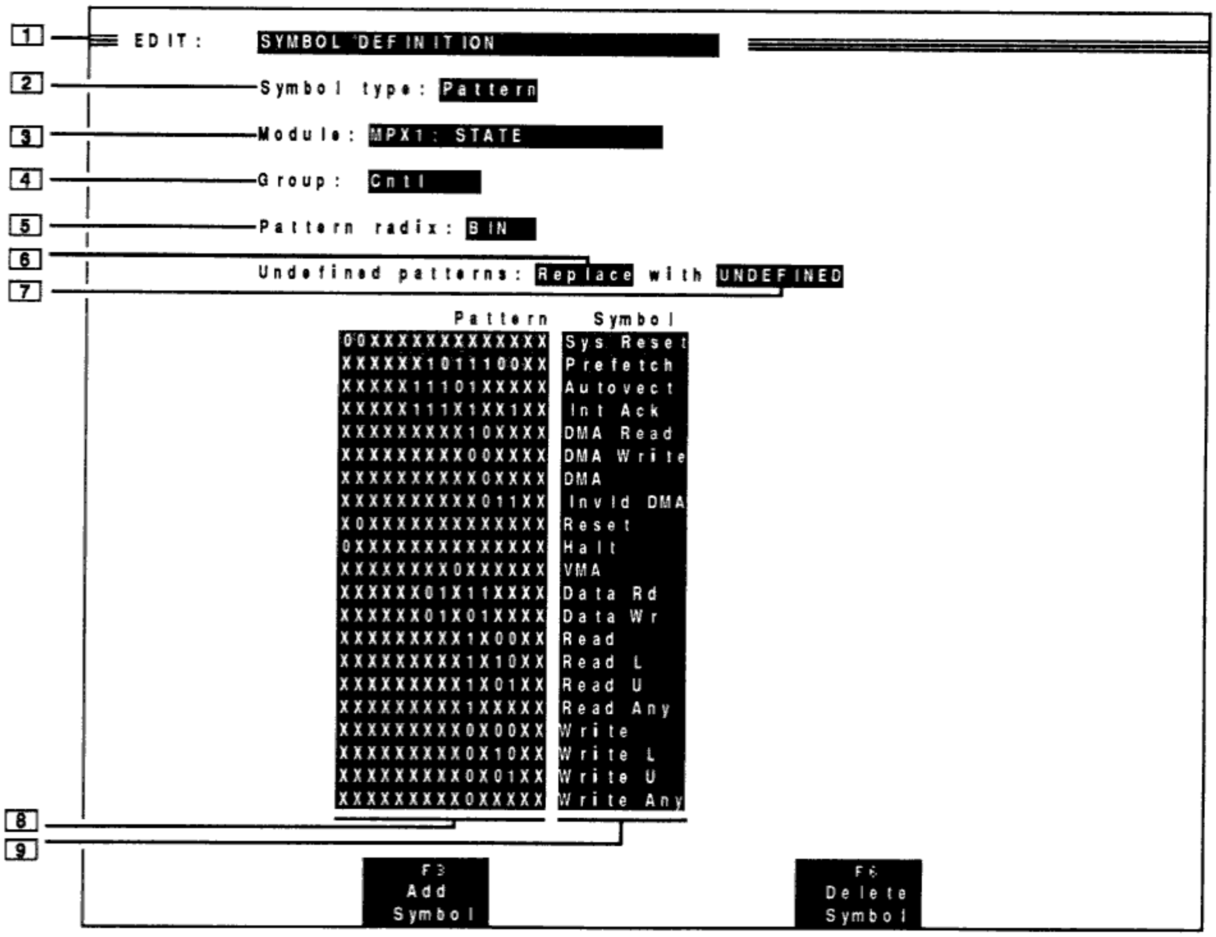


Figure 5-1. Symbol Definition menu, showing pattern symbols.

1 **Menu Select**. Lets you select which menu is displayed.

2 **Symbol Type**. Determines the type of symbol the symbol table is to define. Selections are Pattern and Range.

3 **Module**. Determines the module for which the symbol table is defined. Only channel groups associated with this module are available in the channel group field.

4 **Group**. Determines the channel group for which symbols are being defined.

5 **Pattern Radix**. Determines the radix for channel group values in this menu. Selections are BIN, HEX, and OCT for binary, hexadecimal, and octal.

[6] **Undefined Patterns.** Determines whether undefined channel group values are displayed or replaced with a character string. Selections are Display and Replace.

[7] **Undefined Value Symbol**. The character string entered in this field replaces undefined channel group values in display menus.

[8] **Pattern**. The channel group value for which a symbol is being defined.

[9] **Symbol**. Lets you type in a character string to use in place of a channel group value in the pattern field.

Function Keys

F3: **Add Symbol**. Adds a new symbol entry line at the end of the table.

F6: **Delete Symbol**. Deletes the symbol entry on which the cursor is placed.

Adding Pattern Symbols to a Table

To assign pattern symbols to channel group values, do the following:

1. Access the Symbol Definition menu by pressing Edit. This menu is shown in Figure 5-1.
2. Select the module and channel group for which you want to define symbols.
3. Select the radix you want to use for entering channel group values. This radix will be used only for symbols; it will not affect any previously defined input or output radixes.
4. Select whether you want to display channel group values for which no symbol has been defined, or whether to replace them with a character string. If you select Replace, type in the replacement string.
5. Press F3: Add Symbol to add a symbol to the table. When you press F3, blank fields for the pattern and symbol pair appear in the table.
6. In the new pattern field, enter the channel group value for which you want to define a symbol. Then, type in a symbol name next to the pattern.
7. Repeat steps 5 and 6 until you have entered all the symbols you want to use.

When you define a symbol, be careful about how you use the Don't Care character (X). This character can be used to ignore the value of some channels, but it can also give you more than one possible symbol for a given channel group value. For example, suppose you had the following symbols in your table:

```
0XXX  Symbol_1
X0XX  Symbol_2
00XX  Symbol_3
```

Notice that a data value of 0011 could be represented by any of these three symbols. In this case, PRISM will always display 0011 as Symbol_1 because it is the first appropriate symbol in the table. Data values are always compared to symbol table values starting at the top of the table and moving down.

NOTE

When a data value can be represented by two or more symbols defined in a symbol table, the PRISM always uses the first appropriate symbol in the table.

Deleting Pattern Symbols from a Table

To delete a pattern symbol, go to the Symbol Definition menu and place the cursor on the symbol you want to delete. Then press F6: Delete Symbol. The PRISM deletes the symbol from the symbol table and from other places it may have been used, such as in trigger setup selections.

Editing Pattern Symbols

To change a pattern symbol's name or value, move the cursor to the field that you want to change, and overtype. When you change the attributes of a symbol in the symbol table, those same attributes are changed in other places where the symbol is used.

Saving and Restoring Pattern Symbols

You can restore a pattern symbol table that you saved in a file on disk. Pattern symbol tables are also saved when you perform a Save Instrument Setup operation. For instructions, refer to the following topics in Section 6: *Saving Symbols, Restoring Symbols, Saving Acquisition Setups*, and *Restoring the Acquisition Setup.*

DEFINING RANGE SYMBOLS

To use range symbols, you must first define them in the range symbol table, shown in Figure 5-2.

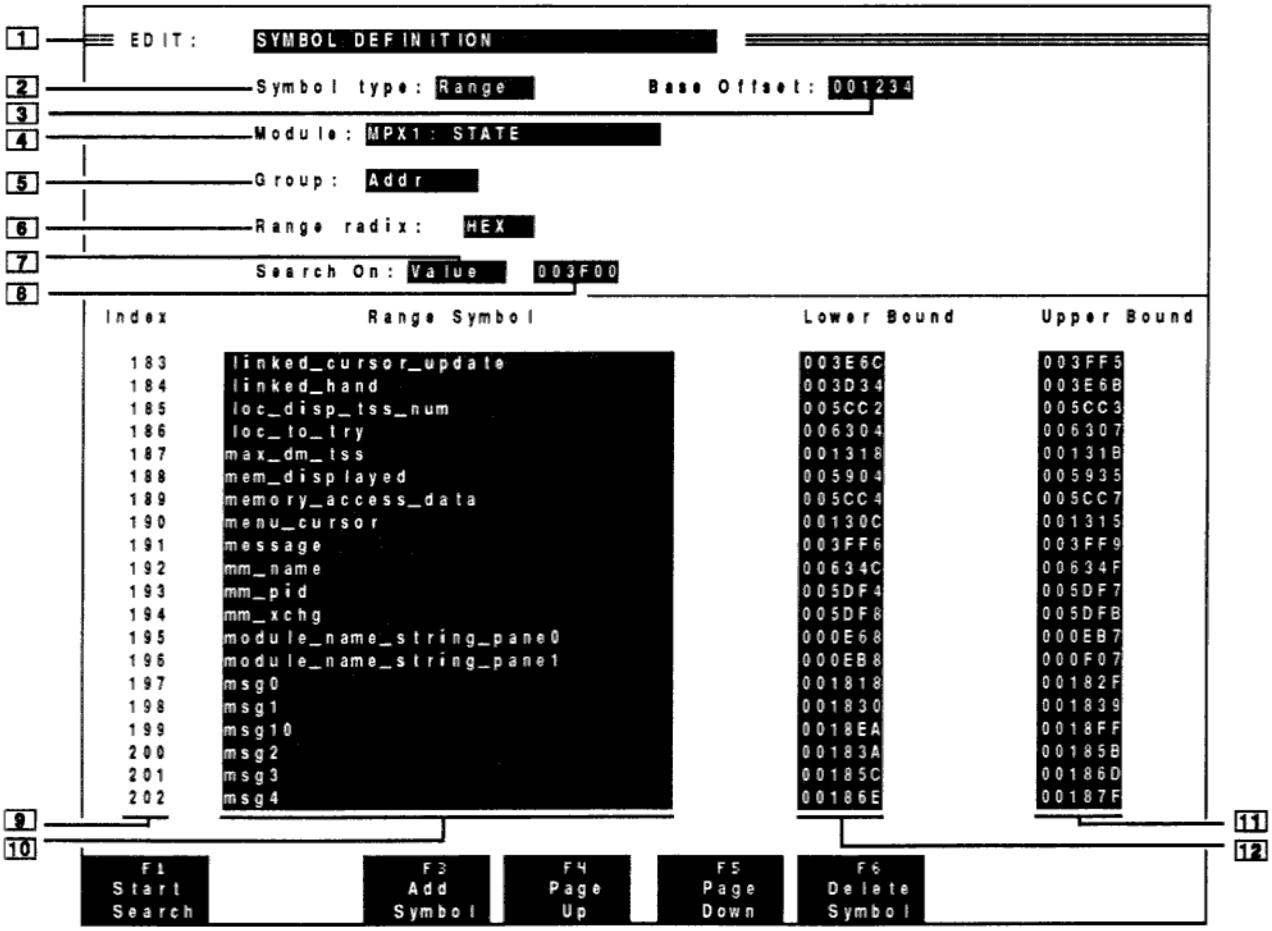


Figure 5-2. Symbol Definition menu, showing range symbols.

1 **Menu Select**. Lets you select which menu is displayed.

2 **Symbol Type**. Determines the type of symbol the symbol table is to define. Selections are Pattern and Range.

3 **Base Offset**. A value representing the code's actual load module address. The upper and lower bounds represent relative address values. The combination of the base offset value plus the lower bound for each symbol represents the absolute address of that symbol. The base offset radix is set by the range radix.

[4] **Module**. Determines the module for which the symbol table is defined. Only channel groups associated with this module are available in the channel group field.

[5] **Group**. Determines the channel group for which symbols are defined.

[6] **Range Radix**. Determines the radix for values expressed within this menu. Selections are HEX and OCT for hexadecimal and octal. This radix is used only for range symbols, and affects values shown in the Symbol Definition menu. (This radix is also reflected in the range symbol + offset value shown in the State Display.) The range symbol radix does not affect other previously defined input or output radixes.

[7] **Search On.** Determines the method used to locate a particular range symbol listed in this menu. Selections are Symbol, Value, and Index. The Symbol selection searches for the symbol by its name. The Value selection searches for the symbol whose range includes a specified value. The Index selection searches for a symbol by its index number.

[8] **Search On String**. This field specifies the particular symbol to search for. For Symbol, the search operation looks for the symbol name exactly as entered. (This means that you must enter the entire symbol name, not a shortened form.) For Value, the search operation looks for a symbol whose range includes that value. (The Value radix is set by the Range Radix field.) For Index, the search operation looks for the symbol represented by that index number.

[9] **Index**. The index numbers assigned to the range symbols. The PRISM assigns a unique index number to each symbol. The index numbers are always consecutive, with the first range symbol assigned index number 0. When symbols are added or deleted, the table's range symbols are reindexed.

[10] **Range Symbol**. The range symbol names, in alphabetical order. To change the name of a symbol, move the cursor to the symbol name and type a new name. The name may be up to 32 characters long, and can consist of any ASCII characters except the semicolon (;).

[11] **Upper Bound**. The upper bound of the range represented by the symbol. To change this value, move the cursor to this field and type a new value. The radix for this field is set by the Range Radix field.

[12] **Lower Bound**. The lower bound of the range represented by the symbol. To change this value, move the cursor to this field and type a new value. The radix for this field is set by the Range Radix field.

Function Keys

F1: **Start Search**. Searches the Range Symbol field for the symbol specified in the Search On fields.

F3: **Add Symbol**. Adds a new symbol entry line at the end of the table.

F4: **Page Up**. Scrolls up a page in the Range Symbol field.

F5: **Page Down**. Scrolls down a page in the Range Symbol field.

F6: **Delete Symbol**. Deletes the symbol entry on which the cursor is placed.

Loading a Range Symbol File

Use the Convert & Restore Ranges operation in the Save / Restore menu to load a range symbol file.

To load range symbols from a file produced by application software such as LA Connect, use the Convert & Restore Ranges operation in the Save/Restore menu (in the Utility menu group). For more information, refer to *Loading Range Symbols From a File* in Section 6 of this manual.

You can restore a range symbol table that you saved in a file on disk. For instructions, refer to the following topics in Section 6: *Saving Symbols, Restoring Symbols, Saving Acquisition Setups,* and *Restoring the Acquisition Setup.*

Range Symbol Definition Rules

Use these rules when you manually define range symbols.

To use range symbols effectively, you should follow these rules when defining them:

1. Define the symbol with the lower bound less than or equal to the upper bound, that is, *lower bound* ≤ *symbol* ≤ *upper bound.*
2. Do not allow any of the symbol ranges to overlap. Ideally, you should assign ranges to contiguous memory locations. For example:

symbol	lower bound	upper bound
x	1254	126B
y	126C	126C
z	126D	1277

When you load a symbol file, you'll probably have to delete some module names that were defined as symbols.

When you load a symbol file produced by a software application such as LA Connect, the symbol ranges are already assigned correctly. However, in addition to the normal symbols, the symbol files may also include module names, defined as symbols. For example, the symbol file could include a symbol $mod_code, with the bounds 0 through 7FFF. "Symbols" like this are not useful and should be deleted (thereby satisfying range symbol definition rule number 2).

To provide you maximum flexibility in assigning your symbols, the PRISM does not enforce the range symbol definition rules. (There are occasions where non-standard usage of range symbols is helpful.) However, failure to follow the definition rules can cause difficulties in assigning the appropriate symbol to a value in the Display menu and in searching for symbol values in the Edit menu.

NOTE

Avoid creating symbols that span ranges larger than 2^{24}. In some cases, doing so can result in a "range symbol + offset" value that is not displayed correctly. If the offset value is more than 24 bits, the least significant character of the offset value may be dropped from the displays.

Adding Range Symbols to a Table

To manually add range symbols to the range symbol table, do the following:

1. Access the Symbol Definition menu by pressing Edit.
2. Select the module and channel group for which you want to define symbols.
3. Select the radix you want to use for entering channel group values. This radix will be used only for range symbols, and affects values shown in the Symbol Definition menu. (This radix is also reflected in the range symbol + offset value shown in the State Display.) The range symbol radix does not affect other previously defined input or output radixes.
4. Press F3 to add a symbol to the table. When you press F3, new fields for the range symbol and bound values appear at the end of the table.
5. In the new fields, enter the range symbol name and the lower and upper bound values.

6. Repeat steps 4 and 5 until you have added all the symbols you want to use. The new symbols will be placed into the table in alphabetical order the next time the display is updated (for example, when a search operation occurs).

Deleting Range Symbols from a Table

To delete a range symbol, go to the Symbol Definition menu and place the cursor on the symbol you want to delete. Then press F6: Delete Symbol. The PRISM deletes the symbol from the symbol table, reindexes the table, and deletes the symbol from other places it may have been used, such as in trigger setup selections.

Searching the Range Symbol Table

To search for a symbol in the range symbol table, do the following:

1. In the Symbol Definition menu, display the symbol table you want to search.
2. Move to the Search On field and select a search method. You can search for a symbol by its name, value, or index number:
   a. To search for a symbol by its name, select Symbol in the Search On field. Then move to the next field and enter the name of the symbol. (You must enter the entire symbol name; the PRISM searches for an exact match only.)
   b. To search for a symbol by its value, select Value in the Search On field. Then move to the next field and enter a value that falls within the lower and upper bounds of the symbol. The radix for this value is determined by the Range Radix field.
   c. To search for a symbol by its index number, select Index in the Search On field. Then move to the next field and enter the symbol's index number. Note that the index number is not fixed. It reflects the position of a symbol within the table and can change if symbols are added to or deleted from the table.
3. Press F1 to execute the search.

Editing Range Symbols

To change a range symbol's name or value, move the cursor to the field that you want to change, and overtype. When you change the attributes of a symbol in the symbol table, those same attributes are changed in other places where the symbol is used. The range symbol table is arranged alphabetically, so changing a symbol's name can change its position within the table.

Because the range symbol table can be very large, consisting of up to 1500 symbols, the menu provides several methods to move the cursor within the table:

- **Cursor Keys.** You can use the cursor keys as usual to move within the Range Symbol fields. Note that the ⇑ and ⇓ cursor keys scroll within the Range Symbol field. If, instead of scrolling, you want to move from the Range Symbol field to other fields, it is easiest to use the `Prev`, `Next`, and `Home` cursor keys.
- **Page Up and Page Down Function Keys.** Use these keys to scroll the symbols displayed in the Range Symbol field up or down one page.
- **Search Operations.** You can search for individual symbols in the table, as described in *Searching the Range Symbol Table,* earlier in this section.

In addition, pressing F3: Add Symbol moves the cursor to the end of the symbol table, where it adds the new symbol. Use F3: Add Symbol as a quick method of moving to the end of the table; just press F3, then F6: Delete Symbol. (This method doesn't work if the symbol table is full.)

To jump quickly from the range symbol field to the upper fields, press F4: Page Up to take you to the top of the current range symbol page, then press the `Prev` cursor key, to jump to the Search On field.

Another method that takes you from the range symbol field to the upper fields quickly is pressing the `Home` cursor key. This takes the cursor to the menu select field at the top of the display.

Section 6: USING UTILITIES

This section explains the functions performed by the system-level menus in the Utility menu group. These menus allow you to control data storage and transmission and to set parameters for communication with other devices. The following menus are discussed:

1. The **Disk Services** menu provides you with a list of all the directories and files on any installed disk (floppy disk or hard disk) and allows you to perform most common disk management operations.
2. The **Save/Restore** menu gives you control over what is stored in dynamic RAM and provides you with a list of the files and directories on any installed disk that are available for a given operation.

   Before you can use the contents of a file, the file must be loaded. Usually, the files that you need to operate PRISM get automatically loaded at power-up. However, there may be times when you will have to manually load files.

   Files that are not loaded are unavailable for use by other menus in the system. For example, application software must be loaded before you can use it; files containing previously saved data must be loaded before you can display the data; and previously stored system setups must be loaded before you can use them to acquire data.
3. The **Printer Setup** menu allows you to set parameters for communication with output devices such as printers.
4. The **Remote Control** menu allows you to set parameters for using the mainframe as a component in an integrated system. You can transmit data directly to and from another device. Or, you can use the mainframe as a terminal connected to a host computer.
5. The **System Configuration** menu shows you which modules are installed, which disk drives are available, the protocols each port is configured for, and the software versions that are running.

DISK SERVICES

The Disk Services menu (see Figure 6-1) gives you control over the content and organization of any installed disk. This Disk Services section begins with a general discussion of the file system and an overview of the Disk Services menu followed by instructions on how to perform various disk operations.

In this section, the term disk refers to either the hard disk, or the floppy disk currently inserted in the floppy disk drive. You can perform most disk operations on either the hard or floppy disk. If an operation is specific to either the floppy or hard disk, this will be specifically stated.

Some Facts About the File System

PRISM files are stored on disk in MS-DOS format. This allows you to share files (and floppy disks) between your mainframe and personal computers running the MS-DOS operating system. While you can manipulate PRISM files with your personal computer, it is important to realize that MS-DOS is not the operating system used by PRISM. The following paragraphs discuss the differences between the PRISM file system conventions and those of MS-DOS file system.

NOTE

When you insert a new unformatted floppy in the disk drive, you must format it before you can perform any other disk operation on it. Your mainframe cannot read from or write to a floppy unless it has been initialized with the MS-DOS format. This format lets you store 720 kilobytes of information on each floppy disk.

One of the major differences between the PRISM file system and MS-DOS implementations is that directories cannot be nested. In other words, PRISM does not allow you to put a directory inside a directory. If you use your personal computer to nest directories on a disk, you cannot access the subdirectories with PRISM.

NOTE

When looking at disk contents with PRISM utilities, you cannot see the files in the ROOT directory. However, you can see them if you list disk contents on an MS-DOS compatible computer.

Another difference between PRISM files and other MS-DOS files is that PRISM has its own file types. When a listing of files is viewed in a PRISM menu, the file type is spelled out alongside the file name (see the Disk Services menu shown in Figure 6-1). When viewed on a personal computer, the file type is identified by a three-character extension appended onto the file name.

NOTE

Do not modify the extensions on PRISM file names. Each type of file is used for specific functions by PRISM. If you change the extension so that the file type is unknown, you will not be able to use the file in the PRISM.

While the PRISM allows you to place any file you want in any directory, there are several directories that are used for special purposes by the PRISM:

1. The BOOT directory contains most of the files that make up the PRISM's operating system.
2. The DEVICE directory contains the files that allow the PRISM to communicate with installed modules and with devices connected to communication ports.
3. The DIAG directory contains the diagnostic software that checks the functionality of the mainframe.
4. The REFMEMS directory contains acquisition files. Initially this directory contains a sample acquisition that you can inspect with the disassembler.
5. The SUPPORT directory contains applications software.

NOTE

Be careful about removing files from the BOOT, DEVICE, DIAG, and SUPPORT directories. These files are essential to the PRISM's operation and your mainframe may not function correctly if you remove them. Adding files to these directories will not interfere with normal operation.

Also, never place files with the same name in the same directory, even if the extension is different.

The size of files and directories is limited only by the available disk space. However, you cannot put more than 110 directories on a single floppy disk. If you have a

20 megabyte hard disk installed in your mainframe, it can hold up to 112 directories.

When you first create a directory on the hard disk, it is allocated 8 kilobytes of disk space. If the directory gets to be larger than that, more disk space is allocated to it in 2 kilobyte parcels.

You can control the data stored on disk through the Disk Services menu.

Disk Services Menu Overview

The Disk Services menu lets you perform most common disk operations. In the Disk Services menu, you can do the following:

- copy files and directories
- delete files and directories
- rename files and directories
- create new directories
- back up files
- receive files from and send files to external devices
- check disks for unused memory space that can be reallocated
- format floppy disks. (To reformat the hard disk, you must use the Diagnostics menu rather than the Disk Services menu. This procedure is described under *Formatting the Hard Disk* later in this section.)
- duplicate floppy disks
- install new versions of system software onto the hard disk
- archive the contents of the hard disk
- restore the contents of a hard disk from a floppy disk archive

The Disk Services menu is divided into three parts, which this discussion refers to as the operation, parameter, and disk content portions. Figure 6-1 shows the Disk Services menu with the parts labeled.

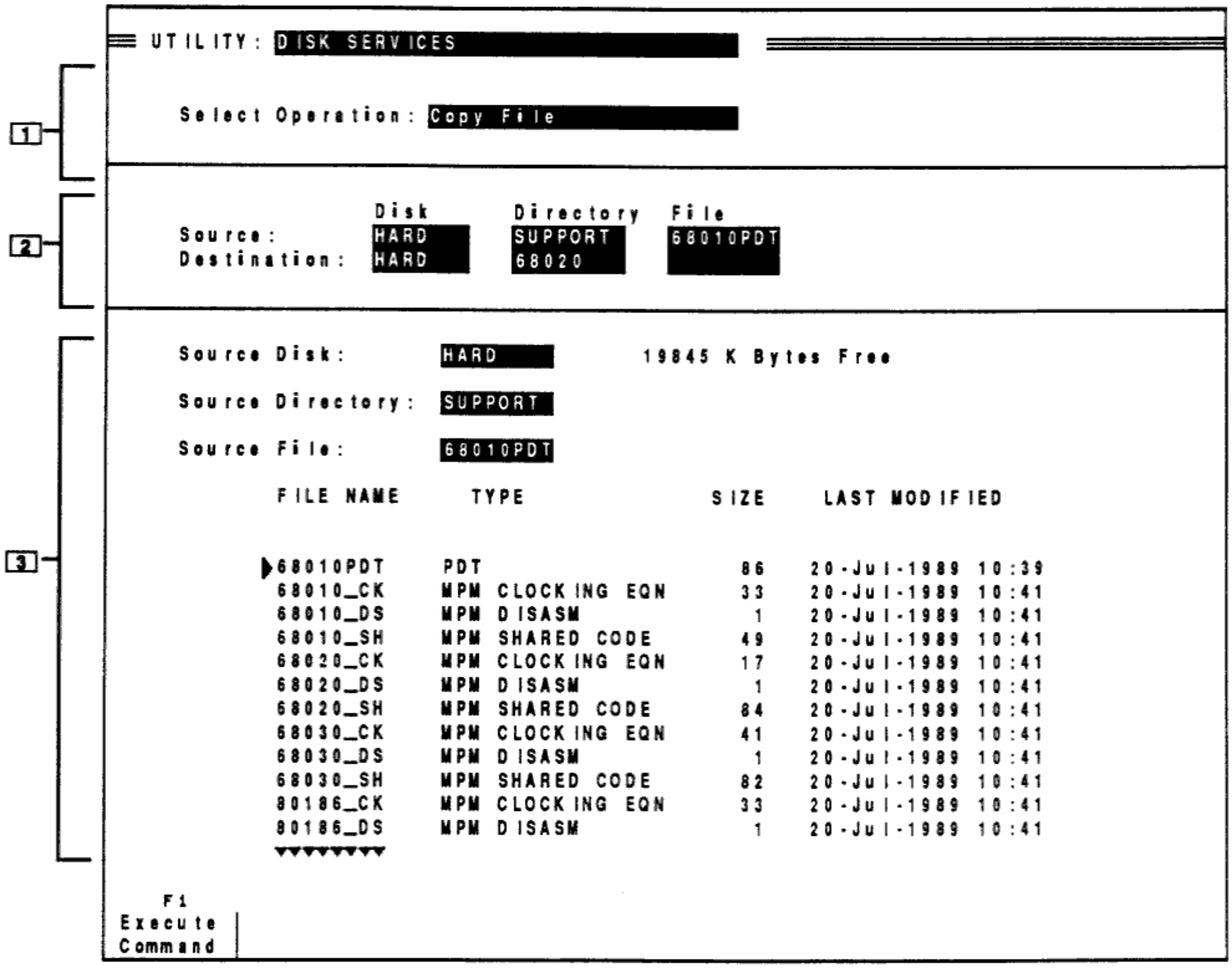


Figure 6-1. Disk Services menu.

1 **Operation.** Lets you select which disk operation to perform.

2 **Parameter.** Contains the fields required to specify the source and destination for the operation.

3 **Disk content.** Gives you a listing of the disk files available for the operation.

Function Key

F1: Execute Command. Executes the operation.

The operation portion of the Disk Services menu contains the field in which you select the operation you want to perform. Except for the operation you select, this portion of the menu always stays the same.

The parameter portion of the Disk Services menu contains fields that let you identify which files, directories, and disks on which you want to perform the selected operation. These fields change depending on the operation you select in the operation portion of the menu. If no fields are required for the operation you select, the parameter portion of the menu displays information about the operation.

NOTE

If you select an operation in the menu that cannot be performed with the current source or destination selections, the fields in the parameter portion are replaced with a message suggesting an alternate disk operation.

The disk content portion of the Disk Services menu contains fields that allow you to select a source disk, directory, and file. It also lists the files that are available for the operation selected in the menu. For each file listed, the Disk Services menu also tells you the file type (see *Some Facts About the File System*, earlier in this section), how large the file is in kilobytes, and when the file was last modified. An arrow at the left of the file name list always points to the currently selected file.

The source disk, directory, and file fields in the disk content portion of the Disk Services menu map to the corresponding source fields in the parameter portion of the menu. For example, suppose you've selected Copy File as the operation. If you change the field in the parameter portion of the menu that identifies which file is to be copied, the source file in the disk content portion of the menu also changes. Likewise, whatever file you select as the source file in the disk content portion of the menu becomes the file to be copied in the parameter portion.

Copying Files and Directories

The two copy operations (Copy File and Copy Directory) perform a bit-by-bit copy of data from one disk to another or from one disk location to another location on the same disk. Figure 6-2 shows the Copy File fields.

Use the Copy File operation to copy single files. There are other operations for copying multiple files.

The Copy File operation is intended to copy single files. There are other operations that might be more efficient if you want to copy multiple files. For example, consider using the Backup File, Duplicate Floppy, Install Software, or Archive Hard Disk operations. If you want to copy a file from one floppy disk directly to another floppy disk, you must use the Backup Floppy Disk operation.

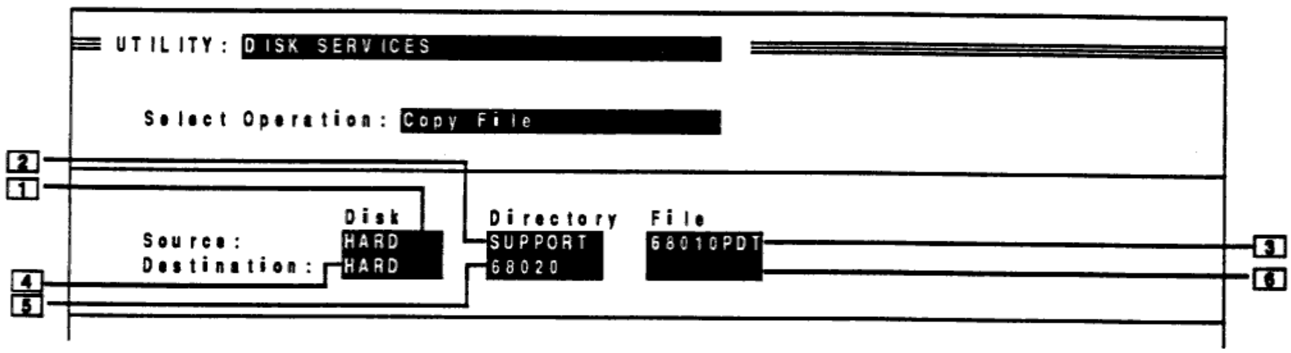


Figure 6-2. Copy File fields.

1. **Source Disk**. Identifies which disk that the source file resides on.
2. **Source Directory**. Lets you select the directory containing the file to be copied.
3. **Source File**. Lets you select the file to be copied.
4. **Destination Disk**. Lets you specify which disk the new file is copied onto.
5. **Destination Directory**. Lets you specify which directory the new file is copied into.
6. **Destination File**. Lets you type in the new file name.

The Copy Directory operation copies the contents of one directory into another. Remember, the PRISM does not allow you to nest one directory inside another. Before you can copy the contents of a directory, you must make sure that the destination directory already exists. To make a new directory, use the Create Directory operation (discussed later in this section).

To copy a file or directory, do the following:

1. Access the Disk Services menu by pressing Util, then scroll through the menus until Disk Services is selected. This menu is shown in Figure 6-1.
2. Select Copy File (or Copy Directory) as the operation.
3. Fill in the fields in the parameter portion of the menu that specify the source and destination of the file (or directory) to be copied. The Disk Services menu in Figure 6-2 shows the fields associated with copying files. The fields associated with copying directories are similar.

   NOTE

   If you do not enter a file name in the destination file field, the new file receives the same name the source file has.

4. Press F1: Execute Command to start the copy. A message on the top line of the display screen tells you when the operation is complete.

Deleting Files and Directories

The Delete File and Delete Directory operations let you erase specific files and directories from a disk. If you want to erase everything on a disk, consider using the Format Disk operation.

NOTE

There is no undo for delete operations. Once you've deleted a file or directory, there is no way to recover it again with the PRISM.

To delete a file or directory, do the following:

1. Access the Disk Services menu by pressing Util, then scroll through the menus until Disk Services is selected. This menu is shown in Figure 6-1.
2. Select Delete File or Delete Directory in the operation portion of the menu.

3. In the parameter portion of the menu, select the disk (floppy or hard), directory, and file that you want to delete. The fields for specifying a file to be deleted are shown in Figure 6-3. The fields for specifying a directory are the same except that there is no field for the file name.

NOTE

If you try to delete a directory that still has files in it, a message appears at the top of the display asking you to confirm that you want to delete the directory. Press X to confirm that you want to delete the directory and all its files. To abort the delete operation, press any key except X.

4. Press F1 to start the delete operation. A message tells you when the operation is complete.

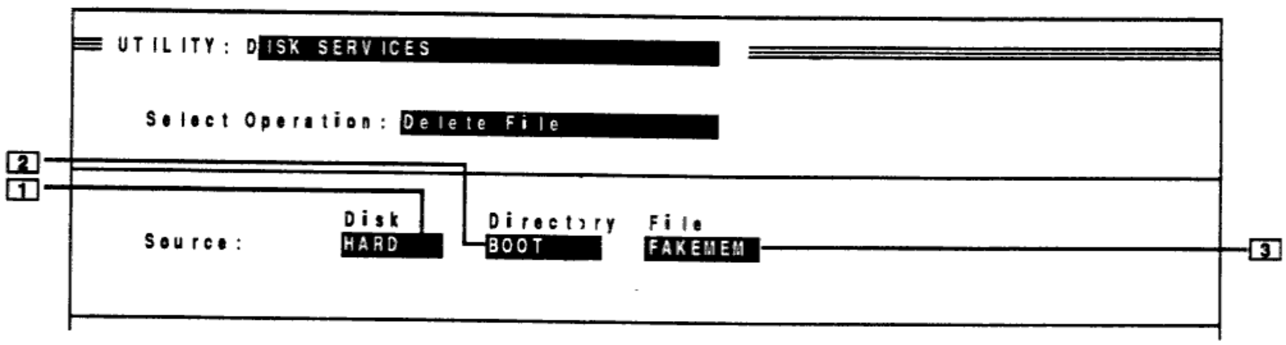


Figure 6-3. Delete File fields.

[1] **Disk**. Identifies which disk (floppy or hard) that the file resides on.

[2] **Directory**. Lets you select the directory containing the file to be deleted.

[3] **File**. Lets you select the file to be deleted.

Renaming Files and Directories

The Rename File and Rename Directory operations replace the old file and directory names with new ones. File and directory names can each be up to eight characters long.

NOTE

Do not rename the BOOT, DEVICE, DIAG, or SUPPORT directories. The PRISM needs these directories to function.

To rename a file or directory, do the following:

1. Access the Disk Services menu by pressing Util, then scroll through the menus until Disk Operations is selected. This menu is shown in Figure 6-1.
2. Select Rename File or Rename Directory in the operation portion of the menu.
3. In the parameter portion of the menu, select the disk, directory, and file you want to rename. Then, type in the new name. The fields for renaming a file are shown in Figure 6-4. The fields for renaming a directory are similar.
4. Press F1: Execute Command to start the rename operation. A message on the top line of the display screen tells you when the operation is complete.

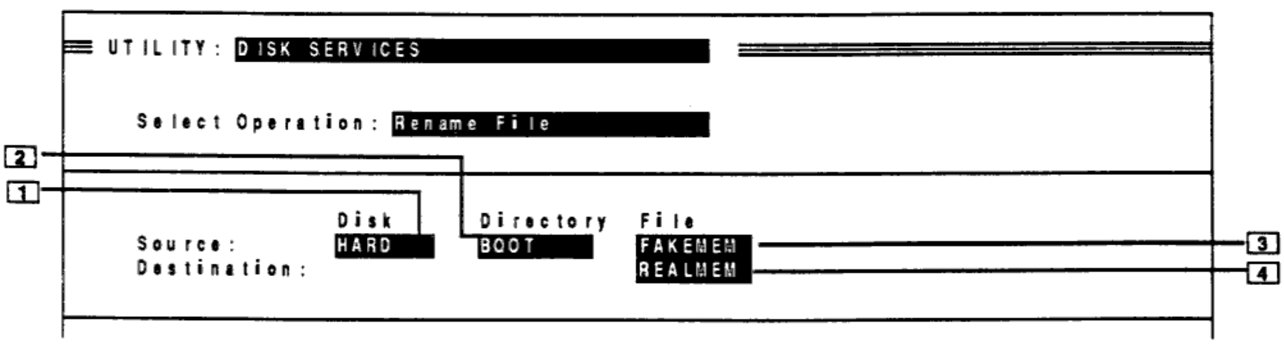


Figure 6-4. Rename File fields.

1 **Disk**. Identifies which disk the file resides on.

2 **Directory**. Lets you select the directory containing the file to be renamed.

3 **File**. Lets you select the file to be renamed.

4 **New Name**. Use this field to type in the new file name.

Creating New Directories

The Create Directory operation lets you make a new directory on a disk.

To create a new directory, do the following:

1. Access the Disk Services menu by pressing Util, then scroll through the menus until Disk Services is selected. This menu is shown in Figure 6-1.

2. Select Create Directory in the operation portion of the menu.
3. In the parameter portion of the menu, type in a name for the new directory. Directory names can be up to eight characters long. Then, select either the hard or the floppy disk as the destination for the new directory. These fields are shown in Figure 6-5.
4. Press F1 to start the create operation. A message on the top line of the display screen tells you when the operation is complete.

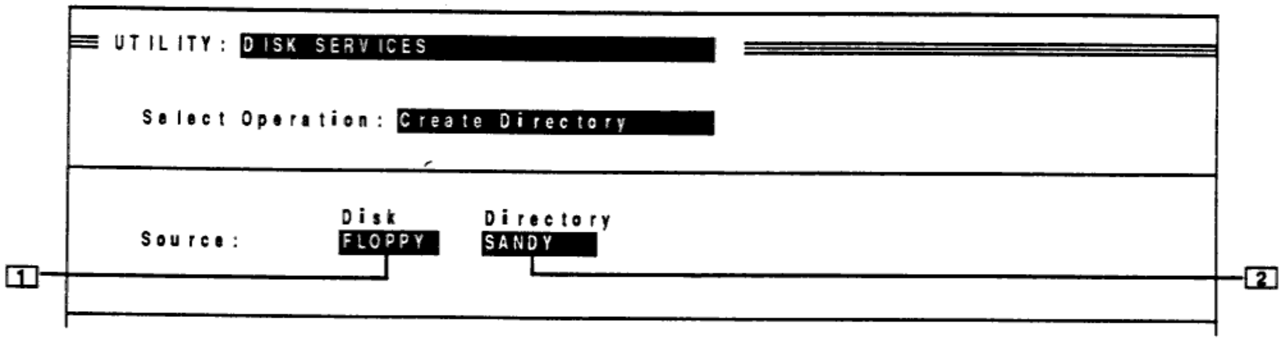


Figure 6-5. Create Directory fields.

[1] **Disk**. Identifies the disk on which the new directory will be created.

[2] **New Name**. Use this field to type in a name for the new directory.

Backing Up Files

Use Backup Floppy File to copy a file from one floppy disk to another.

The Backup File operation lets you copy a file from one floppy disk to the same directory on another floppy. If a directory of the same name does not exist on the destination floppy, this operation creates one. This operation cannot be performed with the hard disk as either the source or the destination.

To back up a file, do the following:

1. Access the Disk Services menu by pressing Util, then scroll through the menus until Disk Services is selected. This menu is shown in Figure 6-1.
2. Select Backup File in the operation portion of the menu.

3. Insert the floppy disk containing the source file.
4. Select Floppy as the source disk in the disk content portion of the menu.
5. Select the source directory and file in the parameter portion of the menu. These fields are shown in Figure 6-6.
6. Press F1: Execute Command to start. A message on the top line of the screen tells you how many disk swaps will be required to back up the selected file and asks you to confirm that you want to continue.

NOTE

If the number of required disk swaps seems excessive, you can reduce the number by unloading unnecessary applications or memories from a module or from System RAM. Unloading is explained in the Save/Restore menu discussion later in this section.

7. Press X to confirm the operation.
8. A message at the top of the display will tell you when to insert the destination floppy. Eject the original floppy and insert the destination floppy.
9. Press X to let the PRISM know that you have inserted the destination floppy.
10. A message at the top of the display will tell you to insert the original floppy. Eject the destination floppy and insert the original.
11. Press X to let the PRISM know you have inserted the original again.
12. Repeat steps 8 through 11 until the message tells you that the operation is finished.

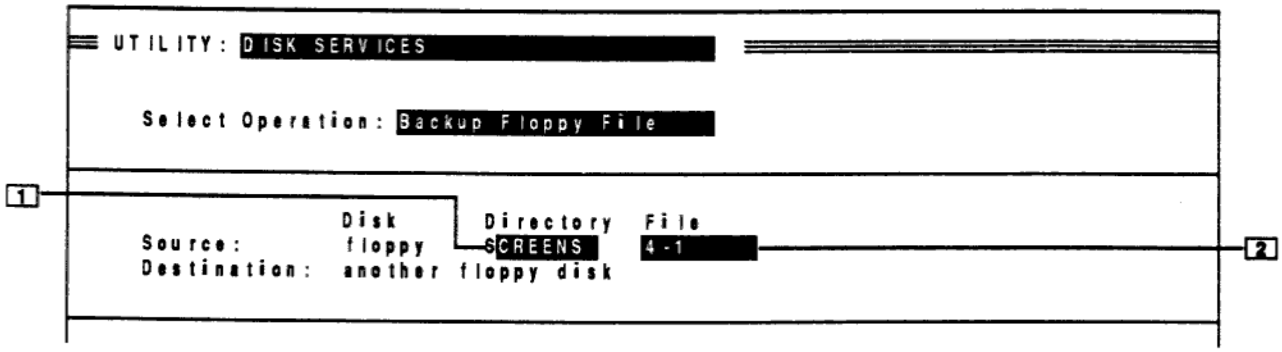


Figure 6-6. Backup File fields.

[1] **Directory**. Identifies the directory containing the file to be backed up. The new copy of the file will be placed in a directory with the same name on the backup disk.

[2] **File**. Lets you select the file to backup. The new copy of the file will have the same name.

Receiving and Sending Files

The PRISM can communicate with a host computer connected to the PRISM's RS-232C port. The PRISM uses the Kermit file transfer protocol, which is widely used and available on many host computers. You can transfer either binary or ASCII files.

To send or receive files, your host must be connected to one of the two ports on the PRISM's rear panel: the standard RS-232C port or the Comm Pack port. If you are using a Comm Pack, make sure the pack is pressed firmly into the slot before connecting the cable between the host and the pack.

CAUTION

To avoid damaging your equipment, always power down your mainframe before plugging in a Comm Pack.

Receiving a File

To receive a file sent from the host using Kermit file transfer protocol, follow these steps:

1. Set the PRISM port baud rate parameter to match that of your host computer:
   a. Go to the Remote Control menu (in the Utility menu group). See Figure 6-7.
   b. Select the port you want to use for the file transfer. (You have a choice only if you have a Comm Pack installed.)
   c. Press F3: Protocol Setup to open the Protocol Setup submenu.
   d. Set the baud rate parameter. (The default is 19200 baud.)
   e. Exit the submenu.

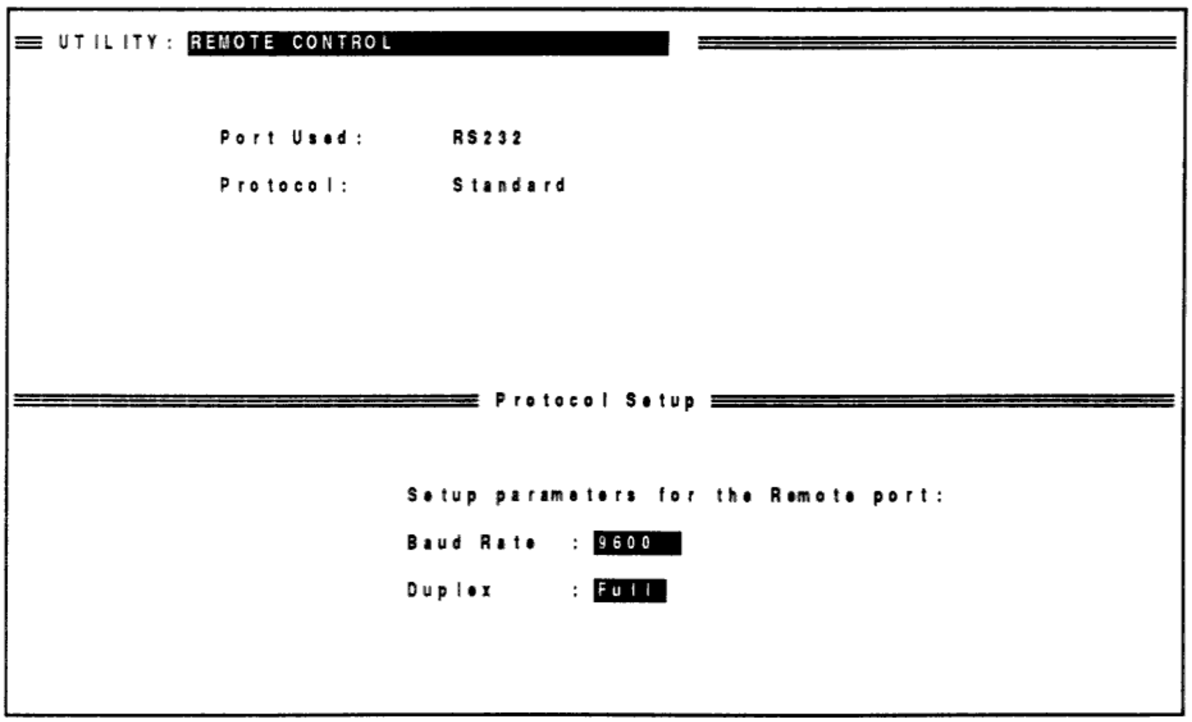


Figure 6-7. Setting the PRISM baud rate for a Kermit file transfer.

2. Go to the Disk Services menu. Then move to the Select Operation field and select Receive File, as shown in Figure 6-8.

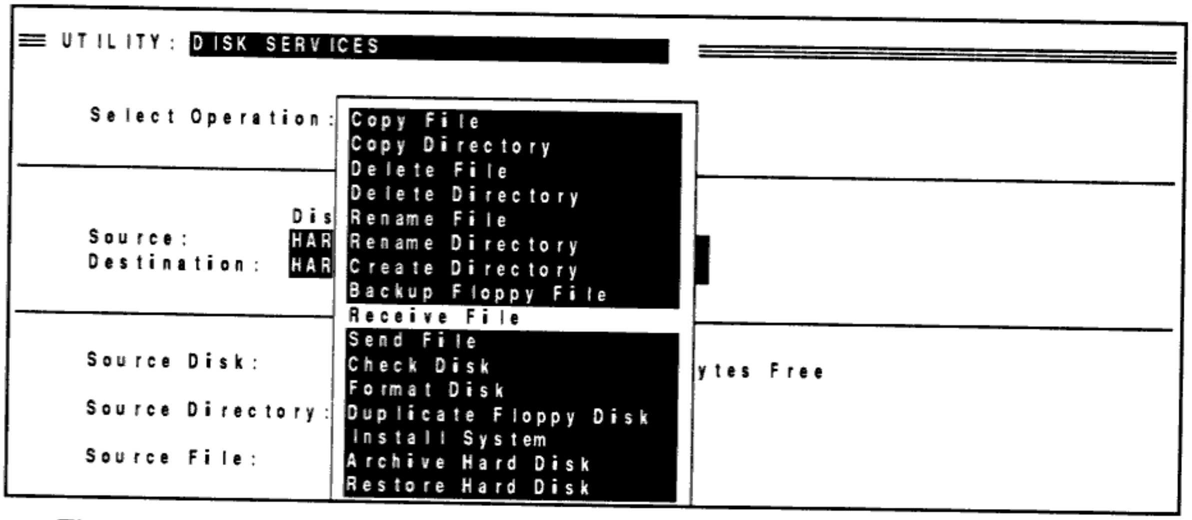


Figure 6-8. Selecting a file transfer operation. This example uses a pop-up menu to select the Receive File operation.

3. Enter a file name in the Destination File field. The file name can be different than the name on the host. Do not include a file extension in the file name. In Figure 6-9, the name of the file to be received is TMEM.

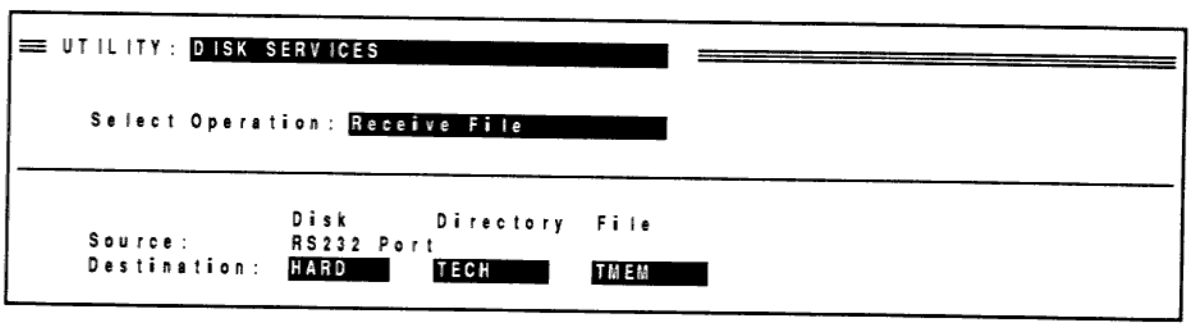


Figure 6-9. Preparing to receive a file from the host using Kermit file transfer protocol. Do not include an extension in the file name.

Note that for Receive File operations, the three-character extension (if any) from the host file name is preserved. The extension is appended to the file name that you specified in the Destination File field. (The extension is not visible on the PRISM.) For more information about PRISM file extensions, refer to *Some Facts About the File System*, earlier in this section.

4. Press F1: Execute Command to start the transfer.

5. Start your host Kermit process. (This procedure is specific to your host and Kermit configuration.) The PRISM displays a window that shows you the status of the file transfer.

NOTE

Some versions of Kermit (for example, UNIX Kermit, but not PC Kermit) distinguish between ASCII and binary files. If your host Kermit makes this distinction, remember to enter the SET (MODE) ASCII or SET (MODE) IMAGE command on the host computer before starting the file transfer. If you fail to do so, the data may be transferred incorrectly.

This completes the file transfer procedure. If you want to terminate the file transfer before it is complete, press the Start/Stop key on the PRISM keyboard.

Sending a File

To send a file from the PRISM to a host using Kermit file transfer protocol, follow these steps:

1. Set the PRISM port baud rate parameter to match that of your host computer:
   a. Go to the Remote Control menu (in the Utility menu group). The Remote Control menu is shown in Figure 6-7.
   b. Select the port you want to use for the file transfer. (You have a choice only if you have a Comm Pack installed.)
   c. Press F3: Protocol Setup to open the Protocol Setup submenu.
   d. Set the baud rate parameter. (The default is 19200 baud.)
   e. Exit the submenu.
2. Go to the Disk Services menu. Then move to the Select Operation field and select Send File, as shown in Figure 6-10.

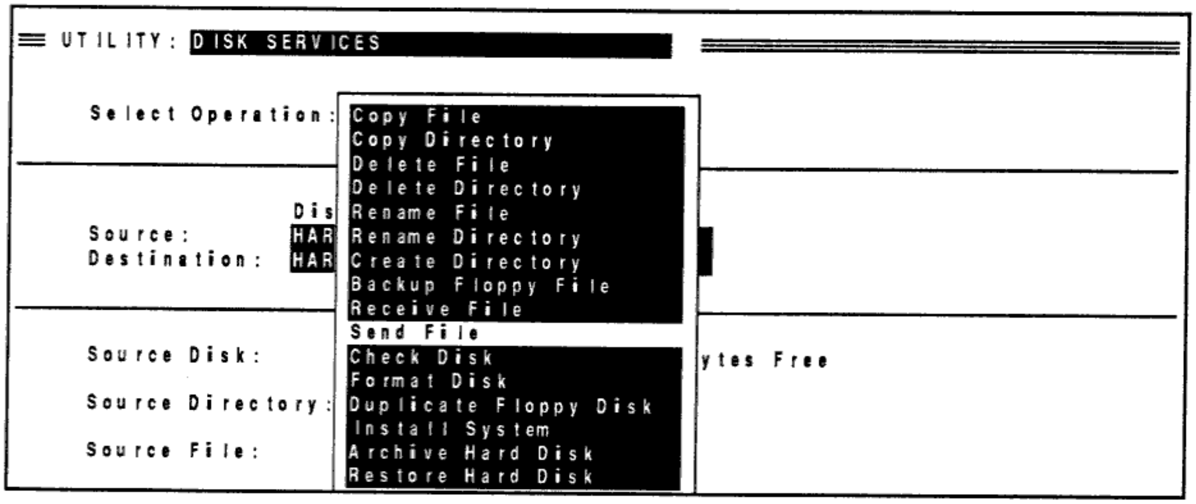


Figure 6-10. Selecting the Send File operation.

3. Select the file you want to send. In Figure 6-11 the name of the file is MEM1.

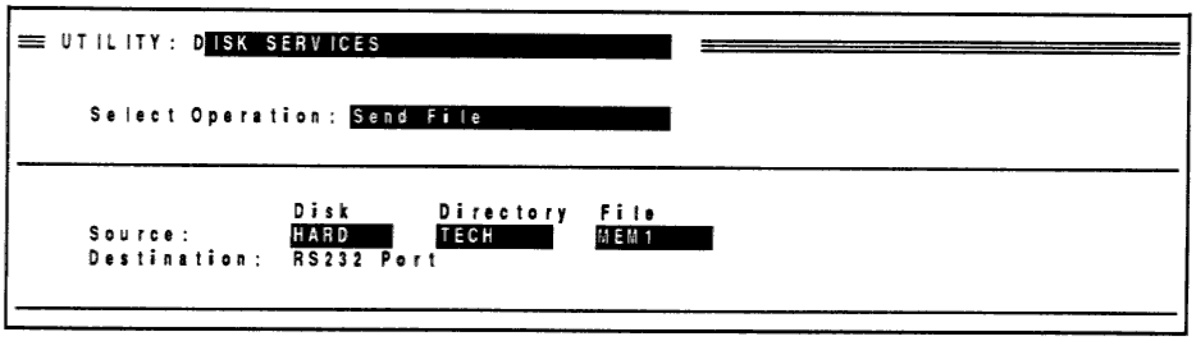


Figure 6-11. Preparing to send a file to the host using Kermit file transfer protocol.

Note that for Send File operations, the PRISM file extensions are not preserved; files arrive at the host with no extension. (The file extensions aren't visible on the PRISM.) For more information about PRISM file extensions, refer to *Some Facts About the File System*, earlier in this section.

4. Press F1: Execute Command to start the transfer.

5. Start your host Kermit process. (This procedure is specific to your host and Kermit configuration.) The PRISM displays a window that shows you the status of the file transfer. This window includes a bar graph that shows how much of the file has been transferred.

NOTE

Some versions of Kermit (for example, UNIX Kermit, but not PC Kermit) distinguish between ASCII and binary files. If your host Kermit makes this distinction, remember to enter the SET (MODE) ASCII or SET (MODE) IMAGE command on the host computer before starting the file transfer. If you fail to do so, the data may transfer incorrectly.

This completes the file transfer procedure. If you want to terminate the file transfer before it is complete, press the Start/Stop key on the PRISM keyboard.

Checking a Disk

The Check Disk operation looks for memory space on disks that can be reallocated. Sometimes repeated disk writes and deletions, power failures, or system crashes leave more disk space assigned to a file than is needed. The Check Disk operation looks for that space and reallocates it as free space that can be used to store additional data. Use this operation if you suspect that you have lost disk space.

To check a disk, do the following:

1. Access the Disk Services menu by pressing Util, then scroll through the menus until Disk Services is selected. This menu is shown in Figure 6-1.
2. Select Check Disk in the operation portion of the Disk Services menu.
3. If you are checking a floppy disk, make sure it is not write protected and insert it in the floppy disk drive slot.
4. Select the disk (floppy or hard) that you want to check in the parameter portion of the menu.
5. Press F1: Execute Command to start checking the disk. A message on the top line of the display tells you when the operation is complete and the amount of disk space recovered.

Formatting a Floppy Disk

The Format Disk operation in the Disk Services menu initializes a floppy disk with the MS-DOS format. New floppy disks must be formatted before the PRISM can write to or read from them.

NOTE

Formatting a disk erases everything on the disk.

The Format Disk operation is only used to format floppy disks. To reformat a hard disk, see *Formatting a Hard Disk* later in this section.

To format a floppy disk, do the following:

1. Access the Disk Services menu by pressing Util, then scroll through the menus until Disk Services is selected. This menu is shown in Figure 6-1.
2. Insert the floppy disk you want to format into the drive slot on the front panel.
3. In the operation portion of the Disk Services menu, select Format Disk.
4. Press F1: Execute Command to start the format operation. A message at the top of the screen warns you that formatting erases everything on the disk and asks you to confirm that you want to continue with the operation.
5. Press X to confirm the format operation. The PRISM formats the floppy. A message at the top of the screen tells you when the operation is complete.

Formatting a Hard Disk

Formatting the hard disk initializes the hard disk with the PRISM 's hard disk format. Hard disks are already formatted when they are sent from the factory. Since reformatting the hard disk erases everything stored on it, you should only reformat your hard disk if you suspect that file corruption has occurred.

Hard disk formatting is done through the Diagnostics menu, not through Disk Services. Since Diagnostics software is not automatically loaded, you must load diagnostics in order to format the hard disk.

To format the hard disk, do the following:

1. Insert the diagnostics floppy disk.

NOTE

If you already have diagnostics software in a DIAG directory on your hard disk, you can load diagnostics from the hard disk.

If you suspect diagnostics software on the hard disk is corrupt, insert a floppy containing diagnostics software.

2. Access the Save/Restore menu by pressing Util, then scroll through the menus until SAVE/RESTORE is selected. This menu is shown in Figure 6-12.
3. In the operation portion of the Save/Restore menu, select Load Application as the operation.
4. Fill in the parameter portion of the Save/Restore menu as described in Figure 6-12 callouts.

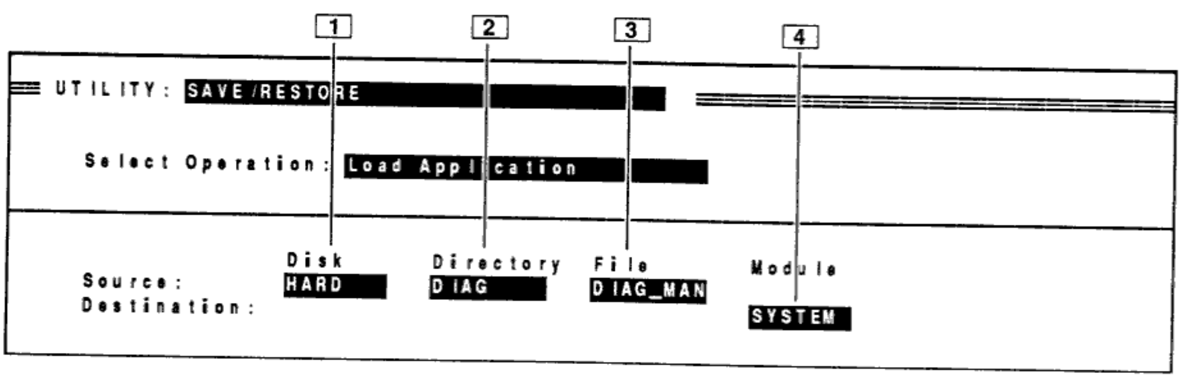


Figure 6-12. Save/Restore fields for loading diagnostics.

[1] **Source Disk**. Select the disk (floppy or hard) from which you want to load diagnostics.

[2] **Source Directory**. Select DIAG since this is the directory that contains diagnostic software.

[3] **Source File**. Select DIAG_MAN since this is the file that contains diagnostic monitor software.

[4] **Destination Module**. Select SYSTEM since you want to load diagnostics into RAM resident on the MPU board.

5. Press F1: Execute Command to load diagnostics. A message on the top line of the display tells you when the load operation is complete.

NOTE

If you are loading diagnostics software from a floppy disk, leave it inserted throughout this operation as software is loaded from the disk as needed.

6. Select the Diagnostics menu (also in the Utility menu group). This menu is shown in Figure 6-13.

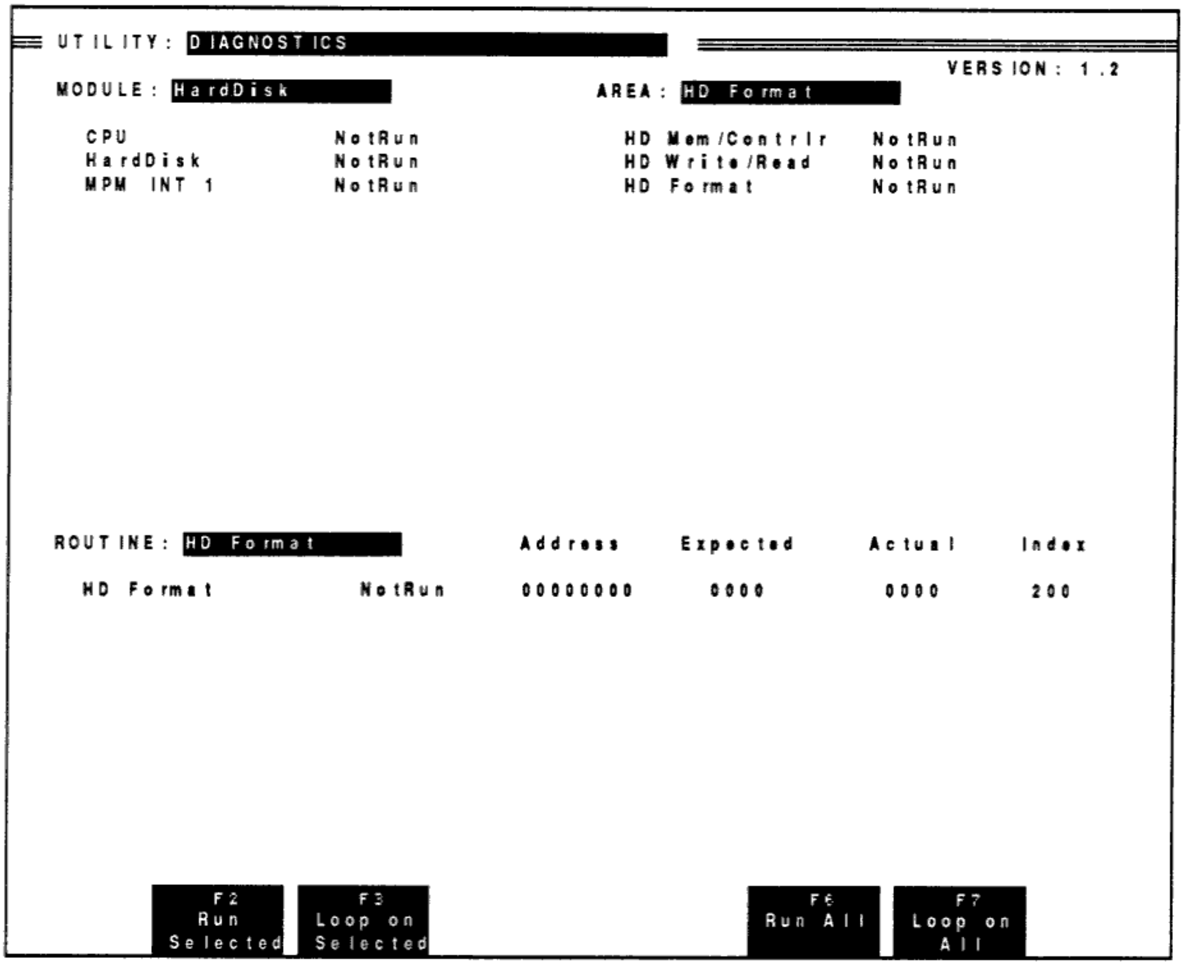


Figure 6-13. Diagnostics menu showing hard disk formatting.

7. In the MODULE field, select HardDisk.
8. In the AREA field, select HD Format.

9. Move the cursor to the ROUTINE field. The cursor must be in this field to execute the format operation.

10. Press function key F2 to start formatting the hard disk. A message at the top of the display asks you to confirm that you want to continue.

11. Press X to confirm the operation. A table lists hard drive selections. Enter the number of the hard disk drive installed in your system. Information about the hard disk drive installed in your system is shown on an identification label on the back of the mainframe.

NOTE

If there is no label on the back of the mainframe, you may need to look at the information located on the hard disk housing. Refer to your mainframe service manual for instructions on accessing the hard disk.

12. Press Return to effect the hard disk selection. A message then displays, asking if you want to re-enter the manufacturer's bad block data.

13. Choose whether or not to re-enter the bad block data. Normally, this is not necessary. Re-enter the bad block data only if you have reason to believe the existing bad block data is incorrect (for example, if the disk has been physically damaged the bad block data, which is stored on track 0, might be corrupted). Choose **one** of the following steps:

    a. Press any key other than X to continue the format process using the existing bad block data stored on track 0 of the hard disk.

    b. Press X to re-enter the manufacturer's bad block data. The software will guide you through the re-entry process.

    Upon completion of this step, the system displays the message "Warning! All hard disk data will be lost. Press X to continue."

14. Press X to format the hard disk. Press any other key to terminate the process without changing any data on the hard disk.

    NOTE

    If new bad blocks are found, the format process updates the bad block data stored on track 0. Record the bad block data. Refer to your mainframe service manual for instructions.

If you pressed X to format your hard disk, you now have a completely blank, newly formatted hard disk. It is recommended that you install new system software onto the hard disk now. Otherwise, you must use a floppy disk containing system software to power up the mainframe. If you have a floppy disk archive of your hard disk, use the Restore Hard Disk operation to reinstall your PRISM software. If you do not have an archive you want to restore your hard disk from, follow the instructions for installing software in Appendix A of this manual.

Duplicating a Floppy Disk

Be careful when using the Duplicate Floppy Disk operation; all previous data existing on the destination disk is replaced by the new data.

The Duplicate Floppy Disk operation makes an exact, bit-by-bit copy of an entire floppy disk onto another floppy.

To duplicate a floppy, do the following:

1. Access the Disk Services menu by pressing Util, then scroll through the menus until Disk Operations is selected. This menu is shown in Figure 6-1.
2. If the floppy disk you want to use as a duplicate has not been formatted, format it now using the Format Floppy Disk operation.
3. Insert the floppy disk you want to copy into the drive slot on the front panel.
4. Select Duplicate Floppy Disk in the operation portion of the Disk Services menu.
5. Press F1: Execute Command to start duplication. A message on the top of the screen tells you how many disk swaps will be required to duplicate the floppy and asks you to confirm that you want to continue.

NOTE

If the number of required disk swaps seems excessive, you can unload unnecessary applications and memories from RAM allocated to an application module or to the System. Unloading is explained in the Save/Restore menu discussion later in this section.

6. Press X to confirm the operation.
7. A message at the top of the display tells you when to insert the duplicate floppy. Eject the original floppy and insert the duplicate floppy.
8. Press X to let the PRISM know that you have inserted the duplicate floppy.
9. A message at the top of the display tells you to insert the original floppy. Eject the duplicate and insert the original.
10. Press X to let the PRISM know you have inserted the original again.
11. Repeat steps 7 through 10 until the message tells you that the operation is finished.

Installing New Versions of System Software

If your PRISM is configured with a hard disk, the Install Software operation lets you upgrade the operating system software resident on a hard disk. It copies files from directories on floppy disks to your PRISM's hard disk. The Install Software operation replaces hard disk system files with files of the same name that reside on a floppy disk and creates any new files or directories that are needed. This allows you to upgrade all the system files with one operation rather than having to copy the new versions one at a time. Any files on the hard disk that do not have corresponding files on the floppy are left undisturbed.

NOTE

The Install Software operation cannot be used to install FasTrak software setups—those files contained in the directories LABS_MPM and LABS_MPX.

To install new system software, do the following:

1. Access the Disk Services menu by pressing Util, then scroll through the menus until Disk Services is selected. This menu is shown in Figure 6-1.
2. Insert the new system floppy disk into the floppy disk drive on the front of the PRISM mainframe.
3. In the operation portion of the Disk Services menu, select Install Software as the operation.
4. Press F1: Execute Command to start the install operation. A message at the top of the display tells you when the operation is complete.

Archiving the Contents of the Hard Disk

The Archive Hard Disk operation gives you a single-step method to archive the contents of the hard disk onto floppy disks. This operation not only keeps you from having to do numerous individual copy operations, but also reduces the total number of floppy disks required by making more efficient use of floppy disk space. To copy the archive back to the hard disk, refer to *Restoring the Contents of the Hard Disk* later in this section.

NOTE

When files are archived, they are not stored in MS-DOS format. The floppy disks cannot be used to transfer files to a personal computer.

The Archive Hard Disk operation lets you choose to do either an incremental or a full archive. If you do an incremental archive, only the files that have been modified since the hard disk was last archived are backed up on floppy disks. A full archive backs up everything on the hard disk.

Also, you can choose to create a new set of archive floppy disks or to add the latest archive to an existing archive.

When you add to an existing archive, the backup copies are appended to the end of the existing archive. This is useful when you want to do incremental backups and maintain only one set of archive floppy disks.

There is no checking to prevent duplication within the archived files. So, if you add a full archive to a pre-existing full archive, you will have two full backups of the hard disk stored contiguously on a series of floppy disks, and only the most recent version can be restored.

When you archive, make sure you number the disks so that you know the order in which they were created. When you restore the contents of the hard disk, you must insert the disks in the same order as they were created. Each disk in the series is referred to as a "volume" by the messages on the screen.

NOTE

Before starting the Archive Hard Disk operation, make sure you have enough formatted floppy disks to complete the archive. If your hard disk is extremely full, it could take as many as 30 floppy disks to create a full archive.

To archive the contents of the hard disk, do the following:

1. Access the Disk Services menu by pressing Util, then scroll through the menus until Disk Services is selected. This menu is shown in Figure 6-1.
2. If your floppy disks are not already formatted, format them with the Format Disk operation described earlier in this section. Floppy disks must be formatted before the PRISM can write to them.
3. After you format all the floppy disks for archiving, select Archive Hard Disk in the operation portion of the Disk Services menu.
4. In the parameter portion of the menu, select whether to perform a full or an incremental backup. This menu is shown in Figure 6-14.

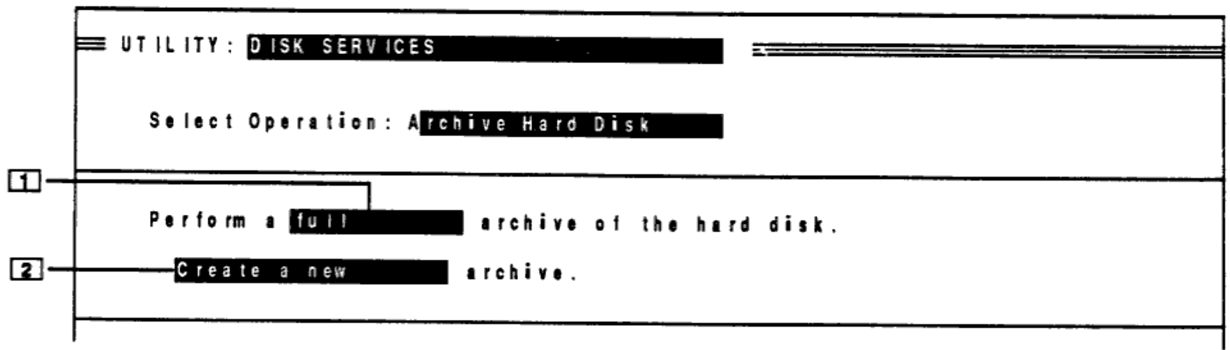


Figure 6-14. Archive Hard Disk fields.

[1] **Archive Type**. Lets you select whether to do an incremental or a full backup of the hard disk.

[2] **Archive Disks**. Lets you select whether to create a new set of archive floppy disks or to append the new archive to the end of an existing archive.

5. Still in the parameter portion of the menu, select whether to create a new archive or append the new archive files to the end of an existing archive.
6. Press F1: Execute Command to start the archive operation. A message at the top of the screen prompts you to insert a volume (floppy disk).
7. Insert the floppy disk on which the archive should start. If you selected **Add to an existing** archive in step 5, insert the last volume of the existing archive. If you selected **Create a new** archive, insert the disk that you want to be Volume 1 of the new archive.
8. Press X to confirm that the correct disk is inserted and to start the archive operation. A message at the top of the display keeps you informed of the archive operation status.

NOTE

If pressing X does not start the archive operation, remove the floppy and insert it again. If you insert the floppy disk before pressing F1 in step 6, the PRISM does not recognize it as a new disk to be used for archiving.

9. Insert a new floppy disk whenever the message at the top of the display prompts you to insert a new volume. Make sure you number each floppy disk so you will know which volume of the archive is which when you restore the files. To restore the hard disk, you must insert the archive volumes in the same order as they were created.

The message at the top of the display will tell you when the archive operation is complete.

Restoring the Contents of the Hard Disk

The Restore Hard Disk operation copies files archived on floppy disks back onto the hard disk. You can choose to restore all of the files in the archive, or you can restore only selected files.

This operation only works with files that were stored on floppy disks with the Archive Hard Disk operation. It is not useful for copying files that were stored on floppy disks with copy operations.

To restore the contents of the hard disk, do the following:

1. Access the Disk Services menu by pressing Util, then scroll through the menus until Disk Services is selected. This menu is shown in Figure 6-1.
2. In the operation portion of the menu, select Restore Hard Disk.
3. In the parameter portion of the menu, select **Do not prompt** if you want to restore all the files in the archive. Or, select **Prompt** if you want to restore only selected files.
4. Press F1: Execute Command to start restoring the archive. A message at the top of the screen prompts you to insert the first volume (floppy disk).
5. Insert Volume 1 (the first floppy disk in the series of archive disks).
6. Press X to confirm that Volume 1 is inserted.

NOTE

If you selected Prompt to restore only selected files, a message at the top of the display asks you to confirm each file before it is restored.

7. A message at the top of the screen prompts you to insert the next volume when the contents of the floppy disk are restored onto the hard disk.
8. Eject the disk and insert the next volume. Then, press X to notify the PRISM that you have inserted a new disk.
9. Repeat steps 7 and 8 until the message at the top of the screen tells you the operation is complete.

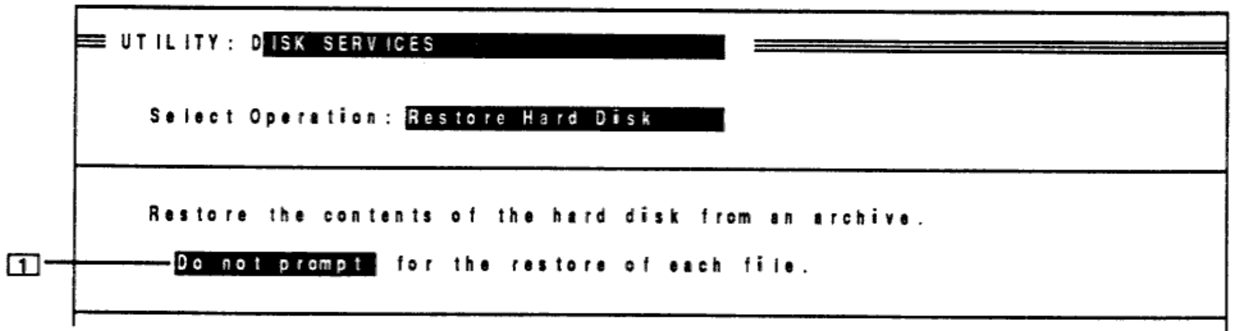


Figure 6-15. Restore Hard Disk fields.

[1] **Prompt**. Lets you select whether or not you want to be prompted to confirm the restoration of each file onto the hard disk.

SAVE/RESTORE OPERATIONS

Save and restore operations let you move files between dynamic RAM (random access memory) and floppy or hard disks. You can save data acquisitions on disk, load and unload application software, and restore setup information.

Before the PRISM can use the contents of any file, the file must be loaded into RAM. Some files (those essential to the mainframe's operation) are automatically loaded when you power up the mainframe. Other files (those containing optional applications software and stored data) must be manually loaded before you can use them.

NOTE

During power up is the only time the PRISM reads data from disk automatically. To access any applications software or data stored on disk, you must first load it into RAM through the Save/Restore menu.

When you power up the PRISM, system files stored in the BOOT, SUPPORT, and DEVICE directories are automatically read into RAM (for more information about the contents of these directories, see *Disk Operations* earlier in this section). Most of the time, these will be all the files you need to use the PRISM. However, there are times when you may have to manually load application software. If you want to restore a setup previously stored on disk, you must do it manually. (For instructions on creating an instrument setup that loads automatically when you power up the mainframe, refer to *Saving an Instrument Setup* later in this section.) Or, if you want to view a reference memory stored on disk, you must restore the Refmem.

This Save/Restore Operations section begins with a general discussion of PRISM RAM and an overview of the Save/Restore menu followed by instructions on how to perform the various operations.

RAM Allocations

RAM resident on the PRISM MPU board is allocated either to an application module or to the operating system. When you perform load, save, or restore operations, you have to specify the module associated with the software. For example, if you load application software, you must specify the module to which you want to load the application. Depending on the module it's allocated to, RAM can only be loaded with certain file types. For example, module setups can only be loaded into the RAM allocated to an application module.

In general, System RAM accepts file types that are not specific to any one type of application module. Most of these files are automatically loaded at power up.

Module RAM is designated by the type of application module and the order in which the card slot relates to other slots containing the same type of application module. For example, MPX1 refers to the RAM assigned to the 30MPX application module in the lowest numbered mainframe slot containing a 30MPX module. If all the slots contain 30MPX modules, then MPX1 would indicate the module in slot 1. However, if a 30MPX module resides in slot 2 and a different type of application module resides in slot 1, then MPX1 would refer to the 30MPX module in slot 2.

In general, Module RAM accepts files containing software that controls the application module. If these files are contained in the SUPPORT directory and the required hardware is present, they are automatically loaded at power up. However, if the file is in any directory other than SUPPORT, or if the associated hardware is not connected at power up, you must manually load software to RAM allocated to the module.

NOTE

If you want to perform a diagnostic operation, load diagnostics into System RAM with the Load Application operation in the Save / Restore menu.

Save/Restore Menu Overview

The Save/Restore menu gives you control over what data is stored in RAM and lets you move files between dynamic RAM and floppy or hard disks.

In the Save/Restore menu, you can do the following:

- load and unload application software
- unload reference memories
- unload all, which unloads all applications and reference memories currently loaded into RAM
- save and restore a single module setup, all module setups, the entire instrument setup, a reference memory, or a symbol table. (Symbol tables are discussed in Section 5.)
- save (to a disk file) the contents of acquisition memory as a reference memory

The Save/Restore menu is divided into three parts, which this discussion refers to as the operation, parameter, and disk content portions. Figure 6-16 shows the Save/Restore menu.

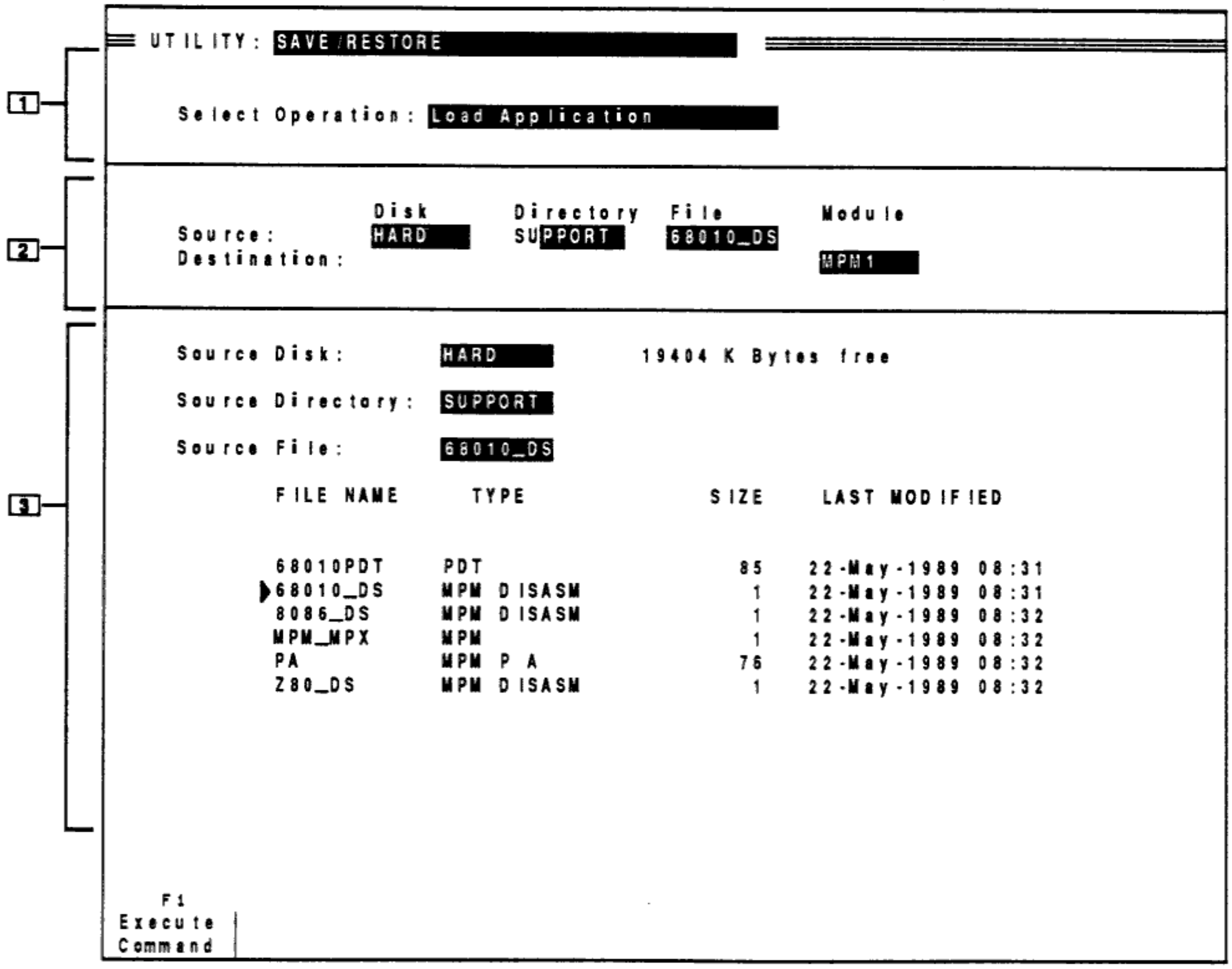


Figure 6-16. Save/Restore menu.

1 **Operation.** Lets you select which load, unload, save or restore operation to perform.

2 **Parameter.** Contains the fields required to specify the source and destination for the operation.

3 **Disk content.** Gives you a listing of the disk files that are available for the operation.

Function Key

F1: Execute Command. Executes the operation.

Operation Fields

The operation portion of the Save/Restore menu contains the field in which you select the operation you want to perform.

Except for the operation you select, this portion of the menu always stays the same.

Parameter Fields

The parameter portion of the Save/Restore menu contains fields that let you specify which RAM (system or module) to load data into or save data from. These fields change depending on the operation you select in the operation portion of the menu. If no fields are required for the operation you select, the parameter portion of the menu displays information about the operation.

Disk Content Fields

The disk content portion of the Save/Restore menu contains fields that allow you to select a source disk, directory, and file. It also lists the files that are available for the operation selected in the operation portion of the menu. For each file listed, the Save/Restore menu also tells you the file type (refer to *Some Facts About the File System* earlier in this section), how large the file is, and when the file was last modified. An arrow at the left of the file name list indicates the currently selected file.

The source disk, directory, and file fields in the disk content portion of the Save/Restore menu map to the corresponding source fields in the parameter portion of the menu. For example, suppose you've selected Load Application as the operation. If you change the field in the parameter portion of the menu that identifies which file is to be loaded, the source file in the disk content portion of the menu also changes. Likewise, whatever file you select as the source file in the disk content portion of the menu becomes the file to be loaded in the parameter portion.

Loading Applications

Before you can use any application software, it must be loaded into RAM. Most of the time, your system will load the files it needs to operate at power up. However, if you purchase optional application software or power up the mainframe without probes and leadsets connected, you may have to manually load some applications into RAM. For example, if you purchase performance analysis software, you must load it into RAM before you can use it to view data.

NOTE

For application software to be automatically loaded at power up, it must reside in the SUPPORT directory.

To load application software, do the following:

1. Access the Save/Restore menu by pressing Util, then scroll through the menus until Save/Restore is selected. This menu is shown in Figure 6-16.
2. Select Load Application in the operation portion of the menu.
3. Fill in the parameter portion of the menu, specify whether to load the application into System RAM or into RAM allocated to one of the application modules. Most applications set up modules and should be loaded into the associated module RAM.
4. Fill in the fields in the parameter portion of the menu to specify the disk, directory, and file containing the application you want to load. These fields are shown in Figure 6-17.
5. Press F1 to load the application. A message at the top of the display tells you when the operation is complete.

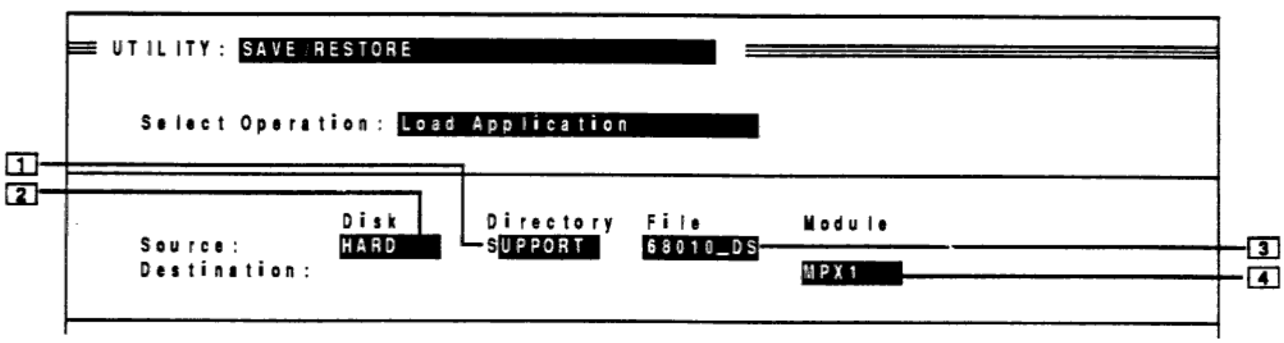


Figure 6-17. Load Application fields.

[1] **Source Disk**. Lets you select the disk (floppy or hard) on which the application software resides.

[2] **Source Directory**. Lets you select the directory in which the application file is stored.

[3] **Source File.** Lets you specify which application file to load.

[4] **Destination Module.** Lets you specify which module to load the application software into.

Once you've loaded the application in RAM, you can access the menus associated with it. Refer to your application user's manual for information on using the application.

Unloading Applications

The Unload Application operation lets you remove application software from RAM allocated to an application module or to the system. Unloading applications you do not need frees up RAM space for other uses.

For example, making more RAM space available can reduce the number of disk swaps necessary to backup files or duplicate disks. It can free up space for you to load alternate applications. And, it can make it possible for you to restore large Refmems that otherwise would not fit into RAM.

NOTE

If you want to unload all applications, consider using the Unload All operation.

To unload an application from RAM, do the following:

1. Access the Save/Restore menu by pressing Util, then scroll through the menus until Save/Restore is selected. This menu is shown in Figure 6-16.
2. In the parameter portion of the menu, select the module from which you want to remove an application. Then, select the application you want to unload. These fields are shown in Figure 6-18.
3. Press F1: Execute Command to unload the application. A message at the top of the display tells you when the operation is complete.

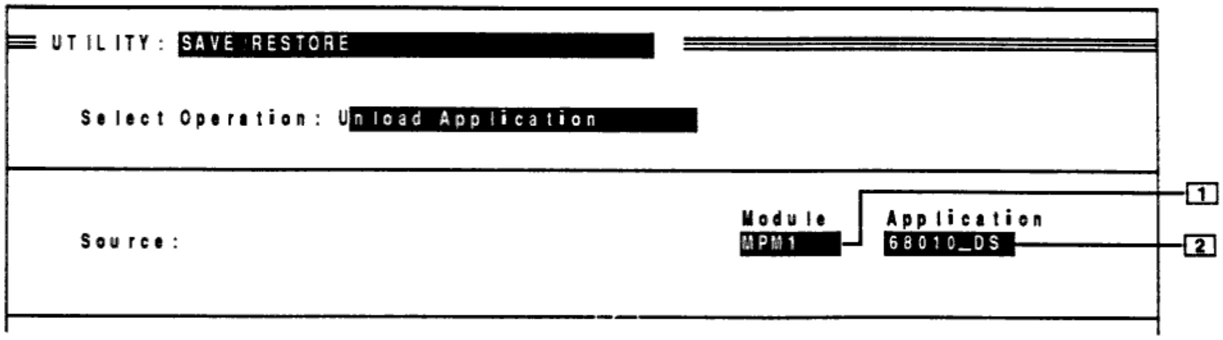


Figure 6-18. Unload Applications fields.

[1] **Source Module.** Lets you specify the RAM to unload from. You can remove applications either from System RAM or from an application module.

[2] **Application.** Lets you select which application to remove from RAM.

Unloading Reference Memories

The Unload Refmem operation lets you remove reference memories from Module RAM. If you are not using a Refmem, consider unloading it to make more RAM space available for applications or other Refmems.

NOTE

There is no undo operation for Unload operations. If you have not saved the contents of Refmem on disk, you cannot restore them after performing the Unload All operation.

To unload a Refmem, do the following:

1. Access the Save/Restore menu by pressing Util, then scroll through the menus until Save/Restore is selected. This menu is shown in Figure 6-16.
2. Select Unload Refmem in the operation portion of the menu.
3. In the parameter portion of the menu, select the application module associated with the Refmem you want to unload. These fields are shown in Figure 6-19.

4. Press F1: Execute Command to unload the Refmem. A message at the top of the display tells you when the operation is complete.

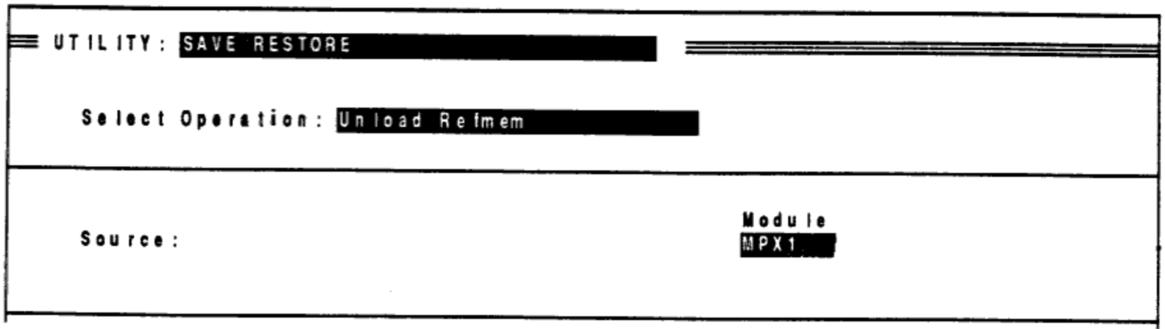


Figure 6-19. Unload Refmem fields.

Unloading All Applications and Refmems

The Unload All operation removes from RAM everything that is not essential to the PRISM 's operation. This includes all optional applications, and Refmems.

NOTE

There is no undo operation for Unload operations. If you have not saved the contents of Refmem on disk, you cannot restore them after performing the Unload All operation.

To unload all applications, do the following:

1. Access the Save/Restore menu by pressing Util, then scroll through the menus until Save/Restore is selected. This menu is shown in Figure 6-16.
2. Select Unload All in the operation portion of the menu.
3. Press F1: Execute Command to unload all applications and Refmems. A message at the top of the display tells you when the operation is complete.

Saving Acquisition Setups

If you save a setup as AUTOINIT in the SUPPORT directory, the setup will load automatically when you power up the PRISM.

Three operations are provided to let you save your logic analyzer setups on disk: Save Module Setup, Save All Module Setups, and Save Instrument Setup. The Save Module Setup operation saves the menu selections made in a single module. The Save All Module Setups operation saves the selections for all application modules. The Save Instrument Setup operation saves selections for all modules, plus the contents of the acquisition memories (as refmems), all the symbol tables in the system, and the selections made in the Utility menus. Reference memories are not saved.

If you name the saved setup file AUTOINIT and store it in the SUPPORT directory on your startup disk, the PRISM will power up with the setup loaded.

To reuse stored module and instrument setups, reload them with the corresponding restore operation: Restore Module Setup, Restore All Module Setups, or Restore Instrument Setup. These operations are discussed later in this section.

Save Module Setup. The selections made in application module Setup menus or any software that automatically configures these menus, and module trace names.

Save All Module Setups. All the menu selections made in all application module Setup menus or any application associated with the modules. Save All Module Setups also saves Utility menu selections, trace names, and most Display menu configuration settings.

Save Instrument Setup. All the selections saved by Save All Module Setups, plus symbols and acquisition memories.

To save a module or instrument setup, do the following:

1. Access the Save/Restore menu in the Utility menu group. This menu is shown in Figure 6-16.
2. In the operation portion of the menu, select Save Module Setup, Save All Module Setups, or Save Instrument Setup as the operation.
3. If you selected Save Module Setup, select the module whose setup you want to save in the parameter portion of the menu.
4. In the parameter portion of the menu, select the destination disk and directory. Then, enter a name for the destination file. These fields are shown in Figure 6-20.

5. Press F1:Execute Command to save the setup. A message at the top of the display tells you when the operation is complete.

NOTE

If you have a refmem you'd like to save, use the Save Refmem operation to store it to a file. Save Module / Instrument Setup operations do not preserve refmems.

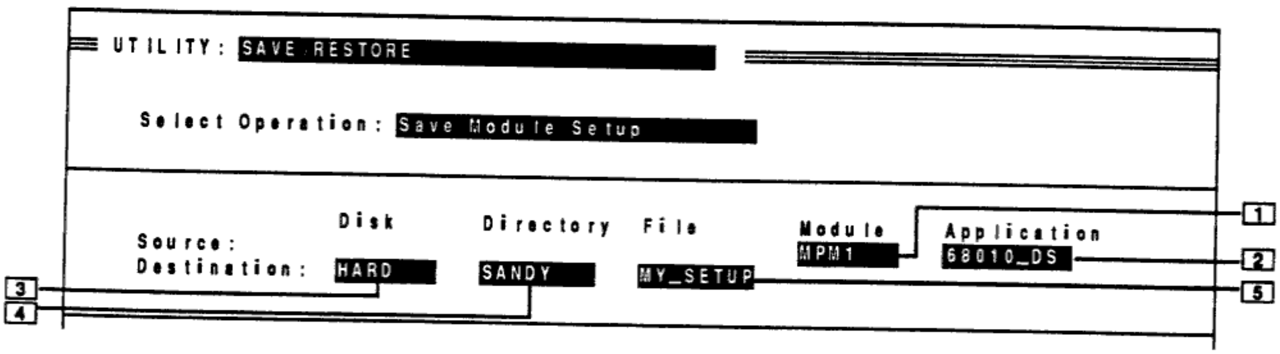


Figure 6-20. Save Module Setup fields.

[1] **Source Module**. Lets you select the module setup to be saved.

[2] **Source Application**. Lets you specify whether to save the module's setup or an application associated with the module.

[3] **Destination Disk**. Lets you identify the disk (floppy or hard) on which the destination directory resides.

[4] **Destination Directory**. Lets you select the directory in which to store the destination file.

[5] **Destination File**. Lets you name the file in which the setup will be saved.

Restoring Module Setups

Use the restore operation that corresponds to the save operation used to create the setup file.

If you stored an application module setup on disk, you can restore it with either the Restore Module Setup or the Restore All Module Setups operation. These operations load the contents of a setup file into the instrument so you can use it to control data acquisition. The operation that you must use depends on which operation you used to save the setup. Each restore setup operation corresponds to a save setup operation. Save setup operations are discussed under *Saving Acquisition Setups* earlier in this section.

To restore a setup, do the following:

1. Access the Save/Restore menu by pressing Util, then scroll through the menus until Save/Restore is selected. This menu is shown in Figure 6-16.
2. In the operation portion of the menu, select the restore setup operation that corresponds to the type of setup you are restoring.

NOTE

Use the Restore Instrument Setup operation discussed later in this section to load a setup that was created with the Save Instrument Setup operation.

3. In the parameter portion of the menu, select the disk, directory, and file containing the setup you want to restore. These fields are shown in Figure 6-21.
4. If you are restoring a single module setup, select the destination module and application.
5. Press F1: Execute Command to load the setup. A message at the top of the display tells you when the operation is complete.

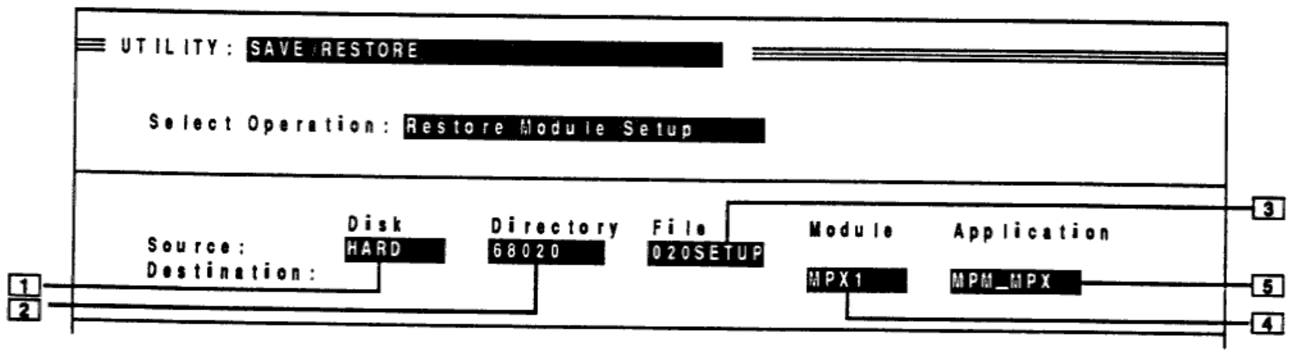


Figure 6-21. Restore Module Setup fields.

1 **Source Disk**. Identifies the disk (floppy or hard) on which the source file resides.

2 **Source Directory**. Identifies the directory in which the source file resides.

3 **Source File**. Lets you specify which setup file to load into module RAM.

4 **Module.** Lets you specify the module you want to save the setup from.

5 **Application**. Identifies which application the setup is for.

Once you've restored a module setup, you can acquire data by pressing Start/Stop. In the module's setup menus you can see the setup selections that were loaded.

Restoring the Instrument Setup

If you have a file that contains setup information for both the mainframe and the installed application modules, you can restore it with the Restore Instrument Setup operation.

If your PRISM is not configured the same as the mainframe from which the instrument setup was saved, you can still load the setup. When you load a setup that was made with more application modules than are currently in your instrument, the PRISM creates a "virtual slot" to load the software into. This allows you to view Refmems, even if your mainframe is not configured with the appropriate module.

PRISM creates virtual slots to let you view setups and Refmems for application modules that are not in your system.

Virtual slots can be used to view any menu associated with an application module, and you can make selections in virtual slot menus. However, you cannot actually acquire data with a virtual slot module, since the module hardware is not present. You can acquire data with a setup that includes virtual slot modules, however the virtual slot module software is ignored by the trigger circuitry.

In the System Configuration menu, virtual slots are differentiated from actual hardware modules by a V next to the module name.

To restore an instrument setup, do the following:

1. Access the Save/Restore menu by pressing Util, then scroll through the menus until Save/Restore is selected. This menu is shown in Figure 6-16.
2. In the operation portion of the menu, select Restore Instrument Setup.
3. In the parameter portion of the menu, select the disk, directory, and file containing the instrument setup you want to restore. These fields are shown in Figure 6-22.
4. Press F1: Execute Command to restore the setup. A message at the top of the display tells you when the operation is complete.

Once you've restored an instrument setup, you can acquire data by pressing Start/Stop. The menus show the setup selections that were loaded.

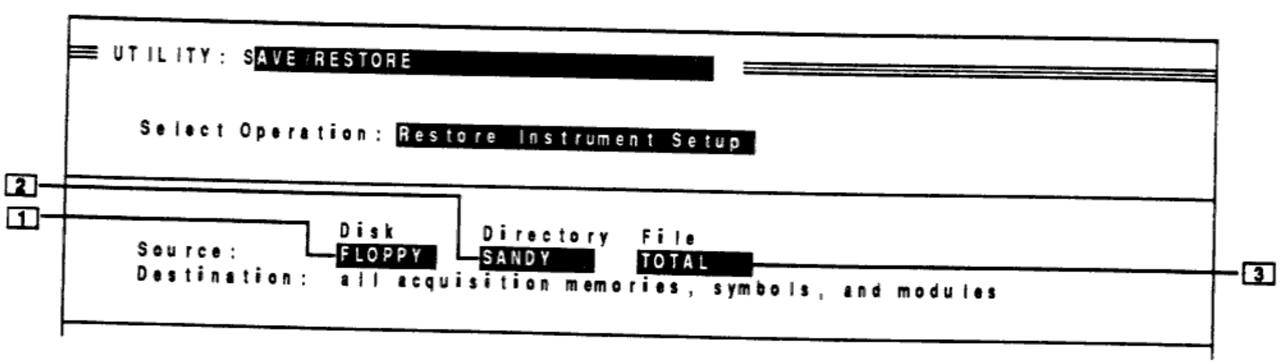


Figure 6-22. Restore Instrument Setup fields.

1 **Source Disk**. Identifies the disk (floppy or hard) on which the source file resides.

2 **Source Directory**. Identifies the directory in which the source file resides.

3 **Source File**. Lets you specify which setup file to load.

Saving Acquisition and Reference Memories

Using the Save Acqmem and Save Refmem operations, you can save data acquisitions in files on either the floppy or the hard disk. Once you store an Acqmem or Refmem on disk, you have a permanent record of it. To view the data, you load it back into Refmem with the Restore Refmem operation.

NOTE

Once you store an Acqmem on a disk, it becomes a Refmem. To view a Refmem stored on disk, use the Restore Refmem operation.

To save an acquisition or a reference memory, do the following:

1. Access the Save/Restore menu by pressing Util, then scroll through the menus until Save/Restore is selected. This menu is shown in Figure 6-16.
2. In the operation portion of the menu, select Save Acqmem (or Save Refmem) as the operation.
3. In the parameter portion of the menu, select the application module from which you want to save data.
4. In the parameter portion, select the destination disk and directory. Then, type in the name of the file in which the data will be stored. The fields for saving an Acqmem are shown in Figure 6-23. The fields for saving a Refmem are similar.
5. Press F1: Execute Command to save the contents of acquisition (or reference) memory. A message at the top of the display tells you when the operation is complete.

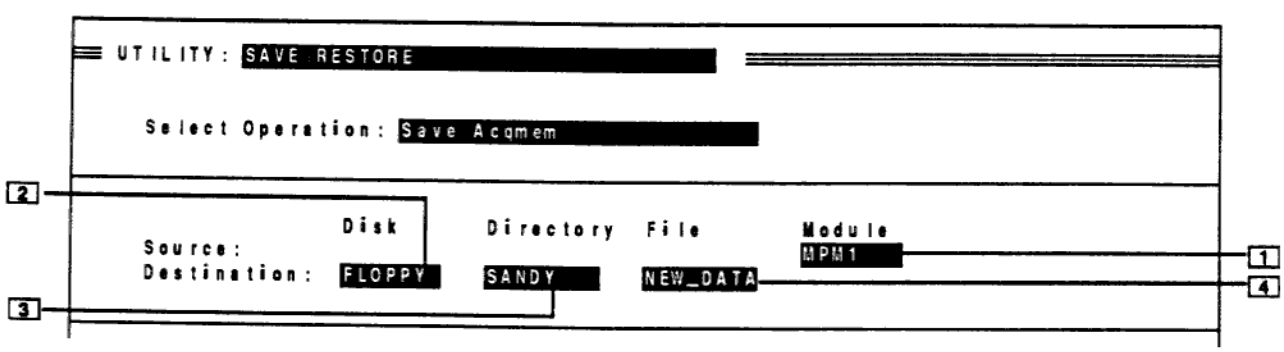


Figure 6-23. Save Acqmem fields.

[1] **Module**. Identifies the application module from which you want to save data.

[2] **Destination Disk**. Identifies the disk (floppy or hard) on which the destination directory resides.

[3] **Destination Directory**. Identifies the directory in which you want to store the data file.

[4] **Destination File**. Lets you enter the name of the file in which to store the data.

Restoring Reference Memories

Before you can view a Refmem stored on disk, you must load it into Module RAM with the Restore Refmem operation.

NOTE

For the Refmem to display data correctly, the instrument must have the same channel groups defined that existed when the Refmem data was originally acquired.

To restore a reference memory, do the following:

1. Access the Save/Restore menu by pressing Util, then scroll through the menus until Save/Restore is selected. This menu is shown in Figure 6-16.
2. In the operation portion of the menu, select Restore Refmem as the operation.
3. In the parameter portion of the menu, select the module to which you want to restore the Refmem.
4. Still in the parameter portion of the menu, select the disk, directory, and name of the file containing the Refmem you want to restore. These fields are shown in Figure 6-24.
5. Press F1: Execute Command to restore the reference memory. A message at the top of the display tells you when the operation is complete.

Once you've restored a Refmem, you can view its data in any of the display menus. You can also compare it to data being acquired by the same module running in Auto-Run mode.

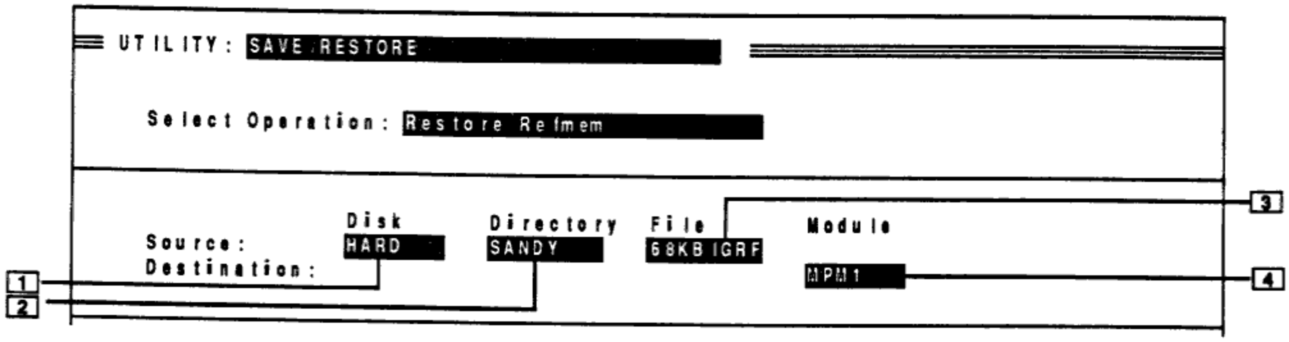


Figure 6-24. Restore Refmem fields.

[1] **Source Disk**. Identifies the disk (floppy or hard) on which the source directory resides.

[2] **Source Directory**. Identifies the directory in which the source file resides.

[3] **Source File**. Lets you specify which setup file to load into the module's reference memory.

[4] **Destination Module**. Lets you select the module to which the Refmem will be restored.

Saving Symbols

The Save Symbols operation saves both pattern and range symbols.

The Save Symbols operation lets you save symbol tables from Module RAM to disk files. You can view the symbol table that will be saved in the Symbol Definition menu of the Edit menu group. For more information about symbol tables, refer to Section 5 of this manual.

Once you have saved the symbols in a disk file, you can reload them with the Restore Symbols operation, discussed later in this section.

To save a symbol table, do the following:

1. Access the Save/Restore menu in the Utility menu group. This menu is shown in Figure 6-16.

2. In the operation portion of the menu, select Save Symbols as the operation.
3. In the parameter portion of the menu, select the module from which you want to save symbols.
4. In the parameter portion of the menu, select the disk and directory in which you want to store the symbols file. Then, type in the name of the destination file. These fields are shown in Figure 6-25.
5. Press F1: Execute Command to save the symbol table. A message at the top of the display tells you when the operation is complete.

Once you've stored a symbol table on disk, you can load it into other application modules. Symbols can be used to input and display data values.

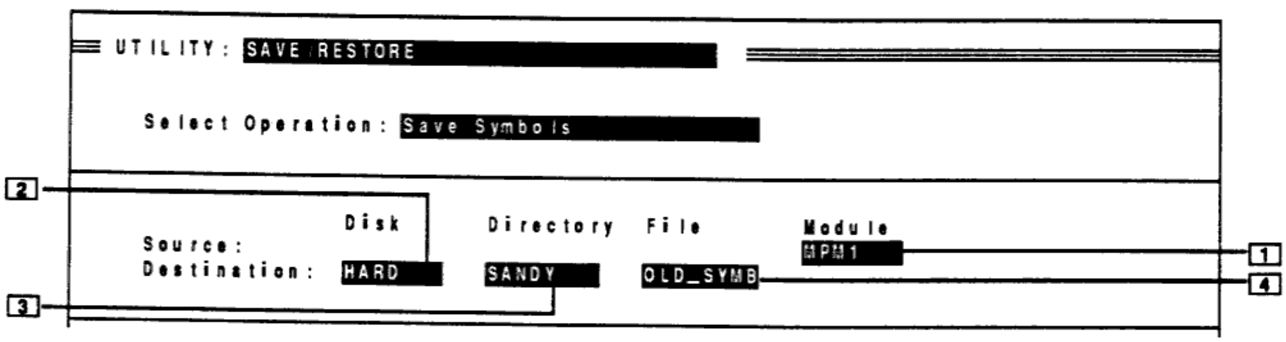


Figure 6-25. Save Symbols fields.

[1] **Source Module**. Identifies the module associated with the symbol table you want to save.

[2] **Destination Disk**. Identifies the disk on which the destination directory resides.

[3] **Destination Directory**. Identifies the directory in which to store the destination file.

[4] **Destination File**. Lets you name the file in which to save the symbols.

Restoring Symbols

The Restore Symbol operation restores both pattern and range symbols.

Symbols are names that represent data values or ranges. If you have a table of symbols stored on disk, you can load it with the Restore Symbols operation.

You can create symbol tables in the Symbol Definition menu of the Edit menu group. Or, you can obtain a symbol table as part of a mnemonic disassembly application package or as a file produced by application software such as LA Connect. For more information about symbols, refer to Section 5.

To restore a symbol table, do the following:

1. Access the Save/Restore menu in the Utility menu group. This menu is shown in Figure 6-16.
2. In the operation portion of the menu, select Restore Symbols as the operation.
3. In the parameter portion of the menu, select the application module with which you want to use the symbols.
4. In the parameter portion, select the disk, directory, and file containing the symbol table you want to load. These fields are shown in Figure 6-26.
5. Press F1: Execute Command to restore symbols. A message at the top of the display tells you when the operation is complete.

Once you've restored a symbol table, you can view (or edit) it in the Symbol Definition menu of the Edit menu group. And, you can specify Pattern or Range as the radix used to input or display data values.

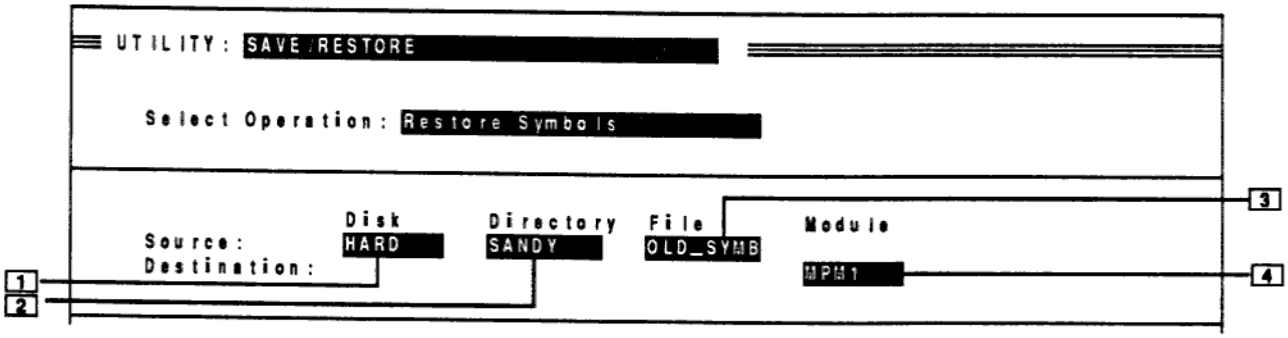


Figure 6-26. Restore Symbols fields.

1 **Source Disk**. Identifies the disk (floppy or hard) on which the source directory resides.

2 **Source Directory**. Identifies the directory in which the source file resides.

3 **Source File**. Lets you specify which symbol file to load.

4 **Destination Module**. Identifies the module with which you want to use symbols.

Loading Range Symbols From a File

The Convert & Restore Ranges operation allows you to load range symbols from a file produced by application software such as LA-CONNECT. Figure 6-27 illustrates how to create a range symbol file that you can load. Once you have loaded the file, you can view and edit the range symbols in the Symbol Definition menu of the Edit menu group. For more information about symbol tables, refer to Section 5 of this manual.

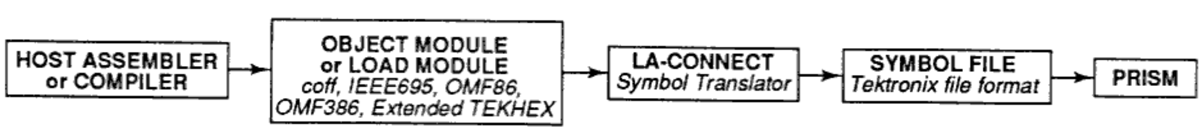


Figure 6-27. Producing a range symbol file for the PRISM.

To load a range symbol file, use this procedure:

1. Transfer the range symbol file to the PRISM, either through one of the PRISM ports (using the Receive File operation in the Disk Services menu) or by means of a floppy disk.
2. Access the Save/Restore menu in the Utility menu group.
3. Select the Convert & Restore Ranges operation.
4. Specify the location of the symbol file to be loaded, using the Source Disk, Directory, and File fields. Figure 6-28 shows an example that loads the file MAXSYMS, located in the BOOT directory on the hard disk.
5. Specify the Module and channel group to which the symbols will be loaded. In Figure x-x the symbol file is loaded to the MPX State module's address channel group.
6. Press F1: Execute Command.

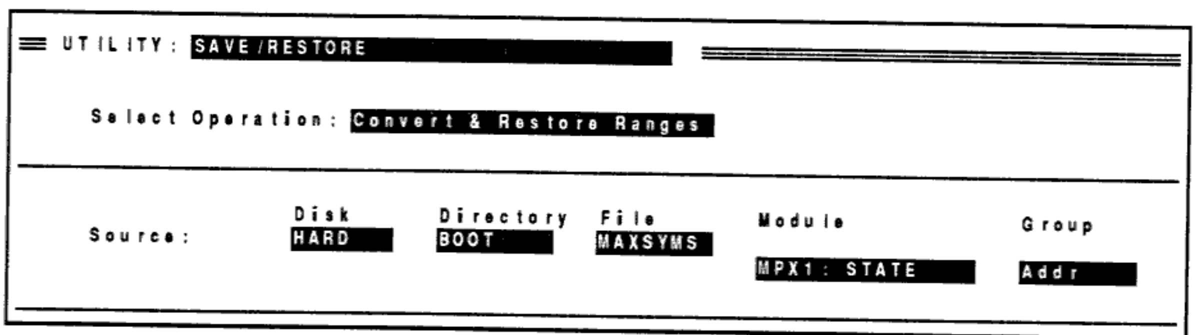


Figure 6-28. Loading a symbol table.

For your symbols to be meaningful, the Base Offset field must be set correctly. The Base Offset field corresponds to the load module address. Check your assembler or compiler software for switches that allow you to specify the load module address. Most packages allow you to set switches such that the correct load module address is provided automatically.

PRINT OPERATIONS

Print operations let you print what is displayed on the screen. You can use Print Scrn to print an exact copy of your screen display, or you can use Print All to print out all or part of your State Display. In either case you have the choice of directing your output to a printer or to a file.

NOTE

If you are unable to print to your printer, check the settings (particularly the baud rate) in the Printer Setup menu. This menu resets to default settings every time you power up the mainframe (unless its settings were saved as part of an autoloading instrument setup). If the default settings do not match your printer, you need to change the printing parameters every time you power on the mainframe. You can avoid this problem by saving your instrument setup in a file called AUTOINIT in the SUPPORT directory. (Printer Setup parameters are included in Save Instrument Setup operations).

Printing Screens

You can print an exact copy of what is displayed on the screen. The Print Screen function supports both PostScript and Epson Graphics output formats.

To print a menu or display screen, perform the following steps:

1. If you want to send your screen output directly to a printer, you should first make sure that your printer is properly connected to the port that you want to use: either the standard RS-232C port or the Comm Pack port. For instructions on making connections to these ports, refer to Appendix A of this manual.

   If you are directing your screen output to a file, you don't need an attached printer. Continue to step 2.

2. Access the Printer Setup menu by pressing the Util key, then selecting Printer Setup in the menu select field. Using Figures 6-29 and 6-30 as guides, set the parameters in the Printer Setup menu to match those of your printer.

3. Return to the menu that you want to print.

4. Press the Print Scrn key to begin printing. You can stop printing anytime by pressing the X key.

NOTE

Print Operations do not include the messages that are displayed on the top line of the screen (line 0). During the print operation, the PRISM uses this line to report the print operation status.

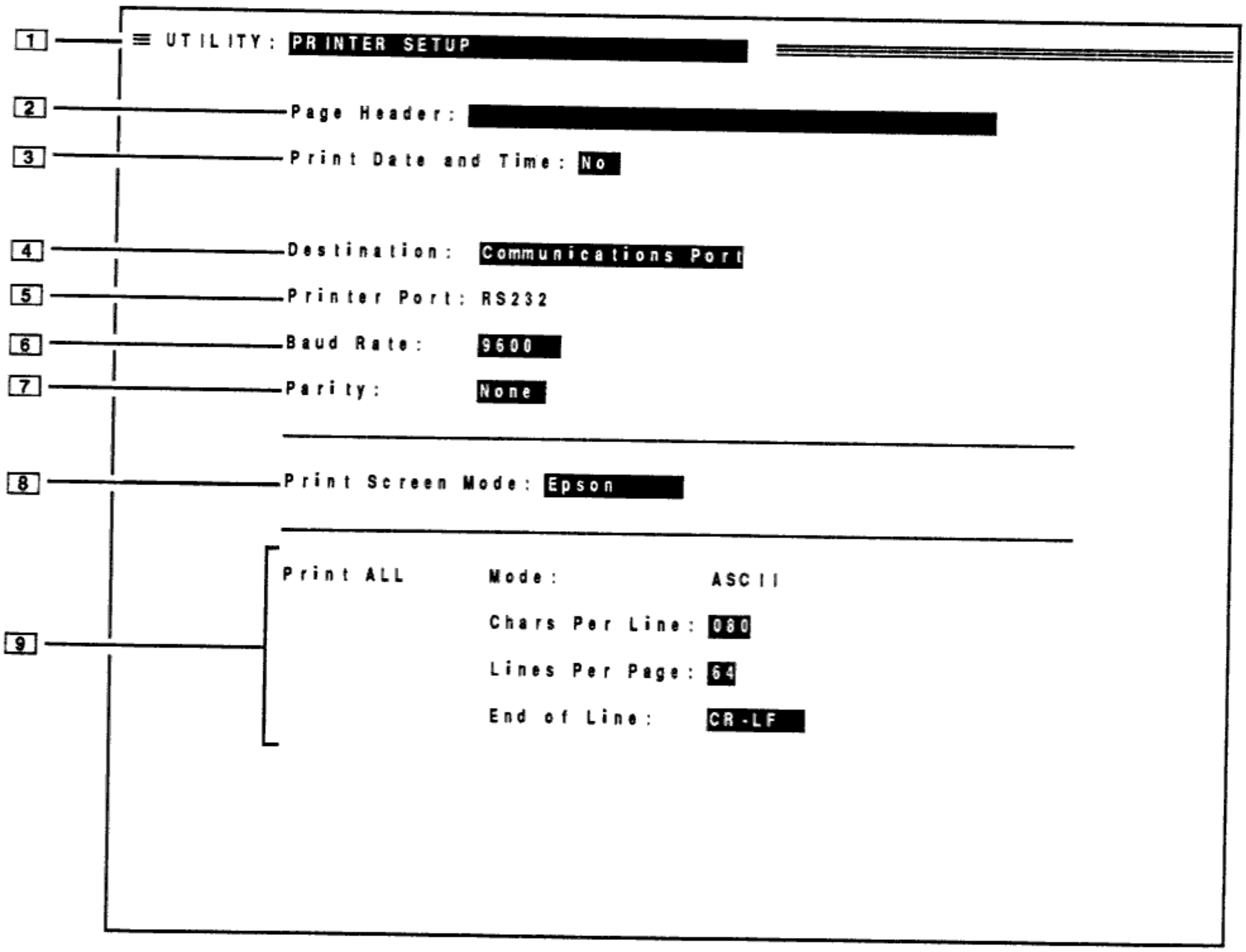


Figure 6-29. Printer Setup menu for printing a screen image on an Epson printer.

1 **Menu Select.** Determines which menu in the Utility menu group is displayed.

2 **Page Header.** Text entered in this field will be printed at the top of the page.

3 **Date and Time.** Lets you select whether or not to print the date and time at the top of the page.

4 **Destination**. Lets you select whether to send the screen image out through a Communications Port or to save it to a file on a Storage Device.

5 **Printer Port.** Lets you select between the standard RS-232C port and the Comm Pack port.

6 **Baud Rate**. Sets the rate that data is transmitted. The baud rate must be set to match that of the printer.

7 **Parity**. Checks the accuracy of transmitted data. Parity must be set to match that of the printer. Selections are Odd, Even, or None.

8 **Print Screen Mode**. Lets you select the printer format. The available selections are Epson graphics format and PostScript.

9 **Print ALL Selections**. These selections are used only with Print All. Not used with Print Scrn. Refer to *Printing a State Display (Print All)* for more information.

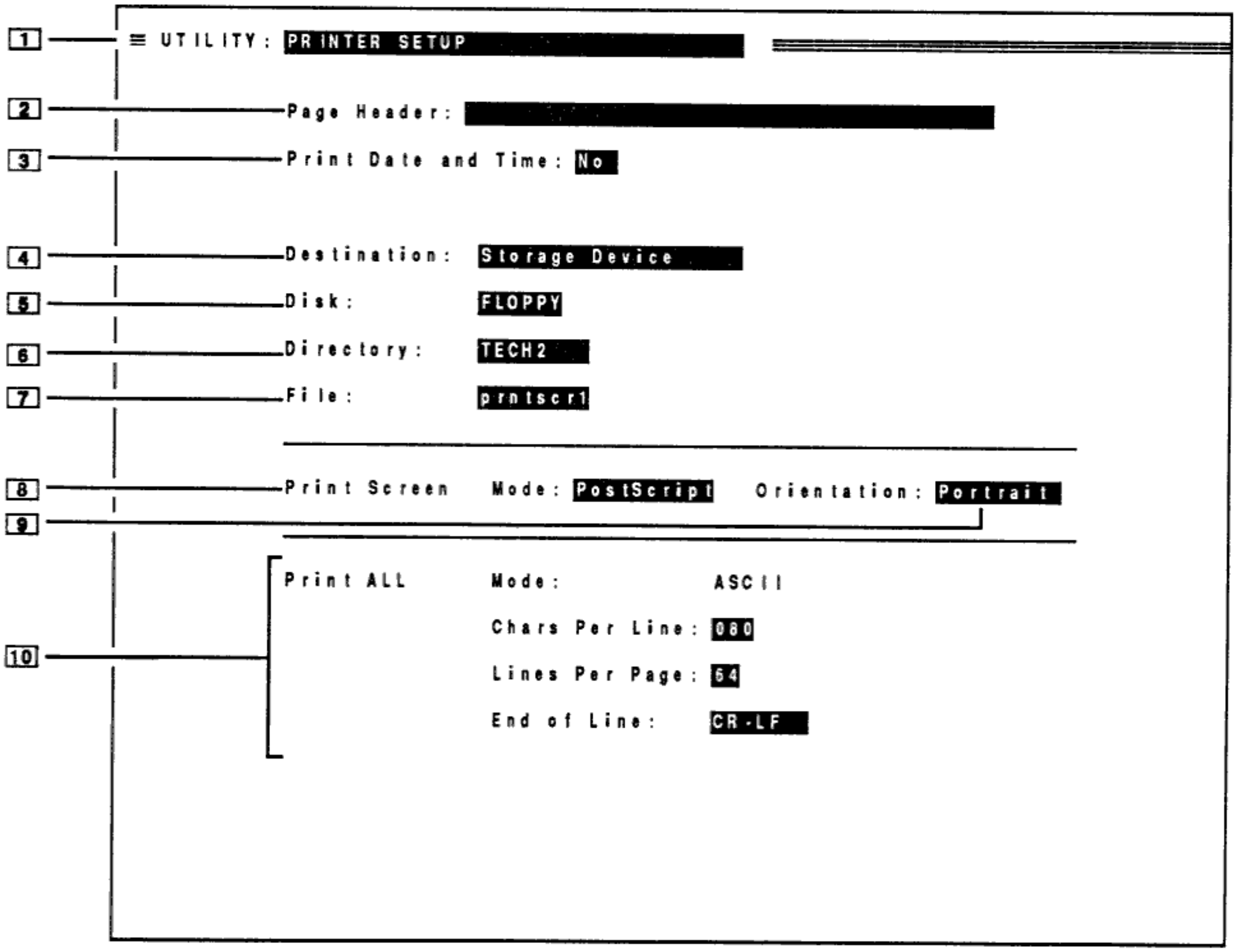


Figure 6-30. Printer Setup menu for sending a screen image to a PostScript file on disk.

1 **Menu Select.** Determines which menu in the Utility menu group is displayed.

2 **Page Header.** Text entered in this field will be printed at the top of the page.

3 **Date and Time.** Lets you select whether or not to print the date and time at the top of the page.

4 **Destination.** Lets you select whether to send the screen image out through a Communications Port or to save it to a file on a Storage Device.

5 **Disk.** Lets you select which disk (hard or floppy) on which to store the file.

6 **Directory.** Lets you select the destination directory.

7 **File.** Lets you name the destination file.

[8] **Print Screen Mode**. Lets you select the printer format. The available selections are Epson graphics format and PostScript.

[9] **Orientation**. Lets you select whether to place the screen image vertically (Portrait) or horizontally (Landscape) on the page.

[10] **Print ALL Selections**. These selections are used only with Print All. Refer to *Printing a State Display (Print All)* for more information.

Printing a State Display (Print All)

Using Print All (Shift-Print Scrn) you can print all or part of the State Table.

Using Print All, you can print the State Table in ASCII format. You can print the entire State Table, or you can print just a selected portion. As with Print Scrn, you can direct the output to either a printer or to a file. Print All is available only from the State Display menu.

Generally, Print All attempts to match the screen display format. However, memory differences and pattern matching are not included in the Print All output.

To print the State Display, perform the following steps:

1. If you want to send your State Display output directly to a printer, you should first make sure that your printer is properly connected to the port that you want to use: either the standard RS-232C port or the Comm Pack port. For instructions on making connections to these ports, refer to Appendix A of this manual.

   If you are directing your State Display output to a file, you don't need an attached printer. Continue to step 2.
2. Access the Printer Setup menu. Using Figure 6-31 as a guide, set the parameters in the Printer Setup menu to match those of your printer.
3. Return to the State menu. (If you want to use the cursors to select a part of the State Table to print, position the cursors now, at the beginning and end of the selection.)
4. Press the Print All key (Shift-Print Scrn). The Print All submenu appears.
5. Using Figure 6-32 as a guide, set the parameters in the Print All submenu.
6. Press F1: Print All to execute the Print All function.

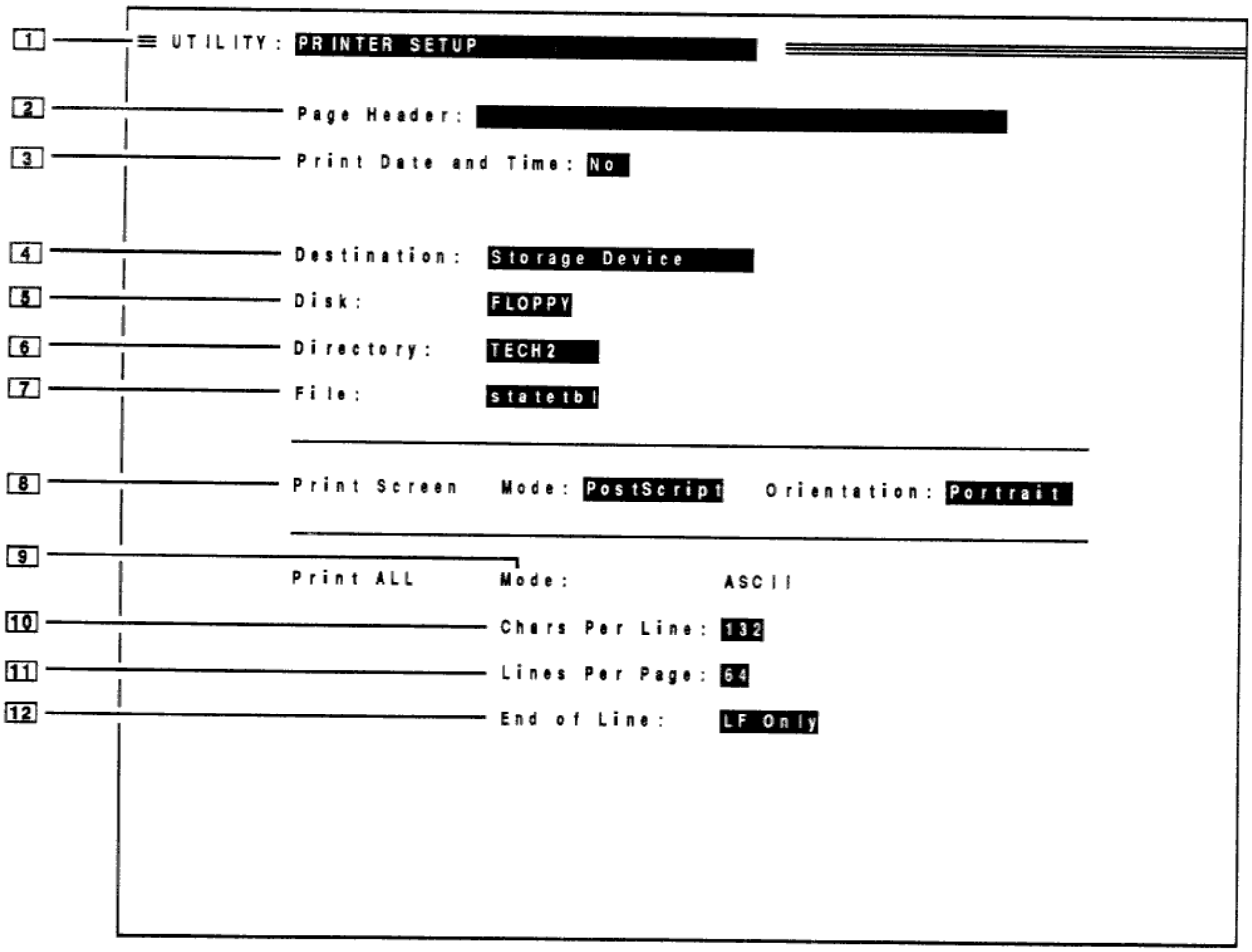


Figure 6-31. Printer Setup menu for printing a State Display to a file.

1 **Menu Select.** Determines which menu in the Utility menu group is displayed.

2 **Page Header.** Text entered in this field will be printed at the top of the first page in the file. It will not be printed on subsequent pages.

3 **Date and Time.** Lets you select whether or not to print the date and time at the top of the first page in the file. The date and time will not be printed on subsequent pages.

4 **Destination.** Lets you select whether to send the screen image out through a Communications Port or to save it to a file on a Storage Device.

5 **Disk.** Lets you select which disk (hard or floppy) on which to store the file.

6 **Directory.** Lets you select the destination directory.

7 **File.** Lets you name the destination file.

[8] **Print Screen Mode**. Selects Print Screen format only. Not used with Print All.

[9] **Print ALL Mode.** Print All always uses ASCII format (non-selectable).

[10] **Print ALL Chars Per Line.** Determines the number of characters printed on each line. This parameter should be set to match that of the printer. If the number of characters in a State Display line exceeds the number specified in this field, a truncation mark is shown at the end of the line (or just before the timestamp) in the printed file.

[11] **Print ALL Lines Per Page.** Determines the number of lines printed on each page. This parameter should be set to match that of the printer.

[12] **Print ALL End of Line.** Determines the end-of-line character, so that you can configure the output for a printer or for transfer to a PC or mainframe host. The choices are: CR-LF (carriage return-line feed), LF Only (line feed only), and CR Only (carriage return only). Check the requirements of your printer or other output device for the correct end-of-line parameter setting.

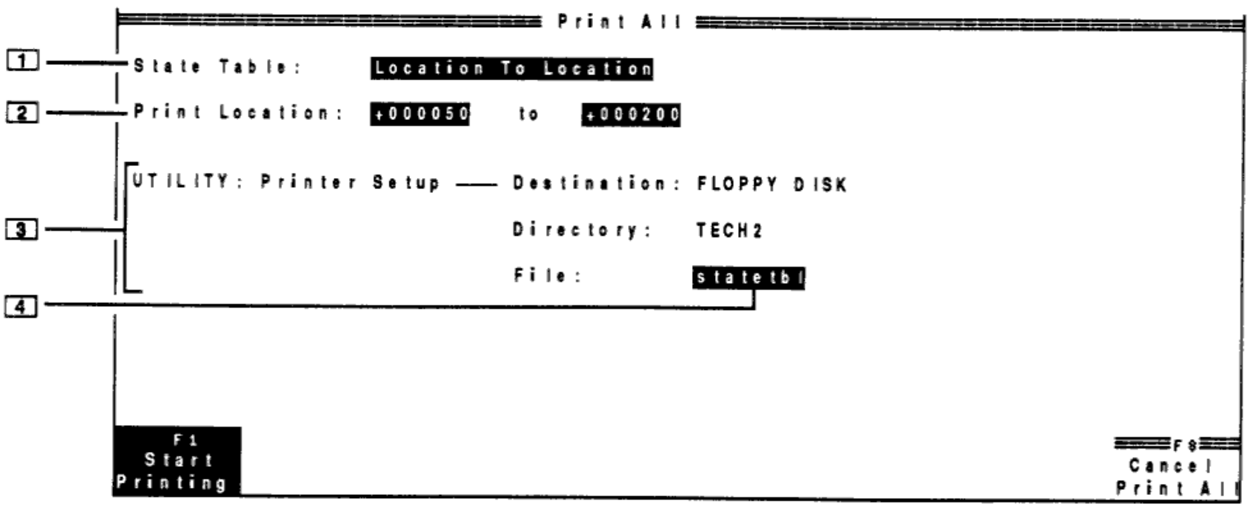


Figure 6-32. Print All submenu. To select, press the Print All key (Shift-Print Scrn) while in the State Table menu.

[1] **State Table.** Determines whether all or part of the State Table is to be printed. The selections are All Locations, Cursor to Cursor, or Location to Location. All Locations prints the entire State Table. Cursor to Cursor prints just the portion between the two data cursors. Location to Location prints the data between the two specified locations.

[2] **Print Location.** This field is selectable when you choose Location to Location in the Print State Table field. Enter the location numbers for the part of the State Table you want to print. The first location number is always smaller than the second location number

[3] **Printer Setup Information.** Shows information about the Printer Setup parameters affecting Print All. The information displayed here depends on your Printer Setup selections. To change the parameters shown, return to the Printer Setup menu.

[4] **File.** Specifies the destination file for the print operation. This field is available only if the Printer Setup menu is configured to save the output to a file. The destination file is the same for both Print All and Print Scrn, so be sure to enter a new file name for your next print operation. (If you don't specify a new file name, the old file will be overwritten.)

Function Keys

F1: **Start Printing.** Executes the Print All procedure.

F8: **Cancel Print All.** Aborts the Print All procedure and closes the submenu.

COMMUNICATING WITH A REMOTE HOST

One of the features of the PRISM is that you can use it as a component in an integrated system. You can transmit data between the PRISM and a remote host, or you can use it as a terminal to communicate with a host computer. Two communication ports are provided on the rear panel for making connections to other devices: a standard RS-232C port and a port which accepts 1200 Series Comm Packs. Instructions for making the connections are given in Appendix A.

This section explains how to use the Remote Control menu and its associated submenus to set port communication parameters so they match those of other devices. This discussion does not contain instructions for printing. If you want to configure a port to transmit data to a printer for output, refer to *Printing Screens* in this section.

Setting the Communications Protocol for File Transfers

The PRISM communicates with host systems through the use of standard protocols. The PRISM has two communication ports on its rear panel. One port always uses a standard RS-232C interface protocol. The other port uses the protocol that matches the communication pack plugged into it. These instructions pertain to RS-232C protocol. Instructions for uploading and downloading data are discussed under *Sending and Receiving Files* earlier in this section. The actual formats for data and symbol table files are discussed in Appendix D of this manual.

To transmit data between the PRISM and a remote host, set the communication parameters in the Remote Control menu. Then, use the Send File and Receive File operations in the Disk Services menu. Instructions for using these operations are given earlier in this section.

To configure a port for RS-232C communications, do the following:

1. Connect one of the PRISM ports to the host. If you are using the Comm Pack port, plug in a Comm Pack. Instructions for plugging in packs and making port connections are given in Appendix A.
2. Access the Remote Control menu by pressing Util and scrolling through the menus until Remote Control is selected. This menu is shown in Figure 6-33.

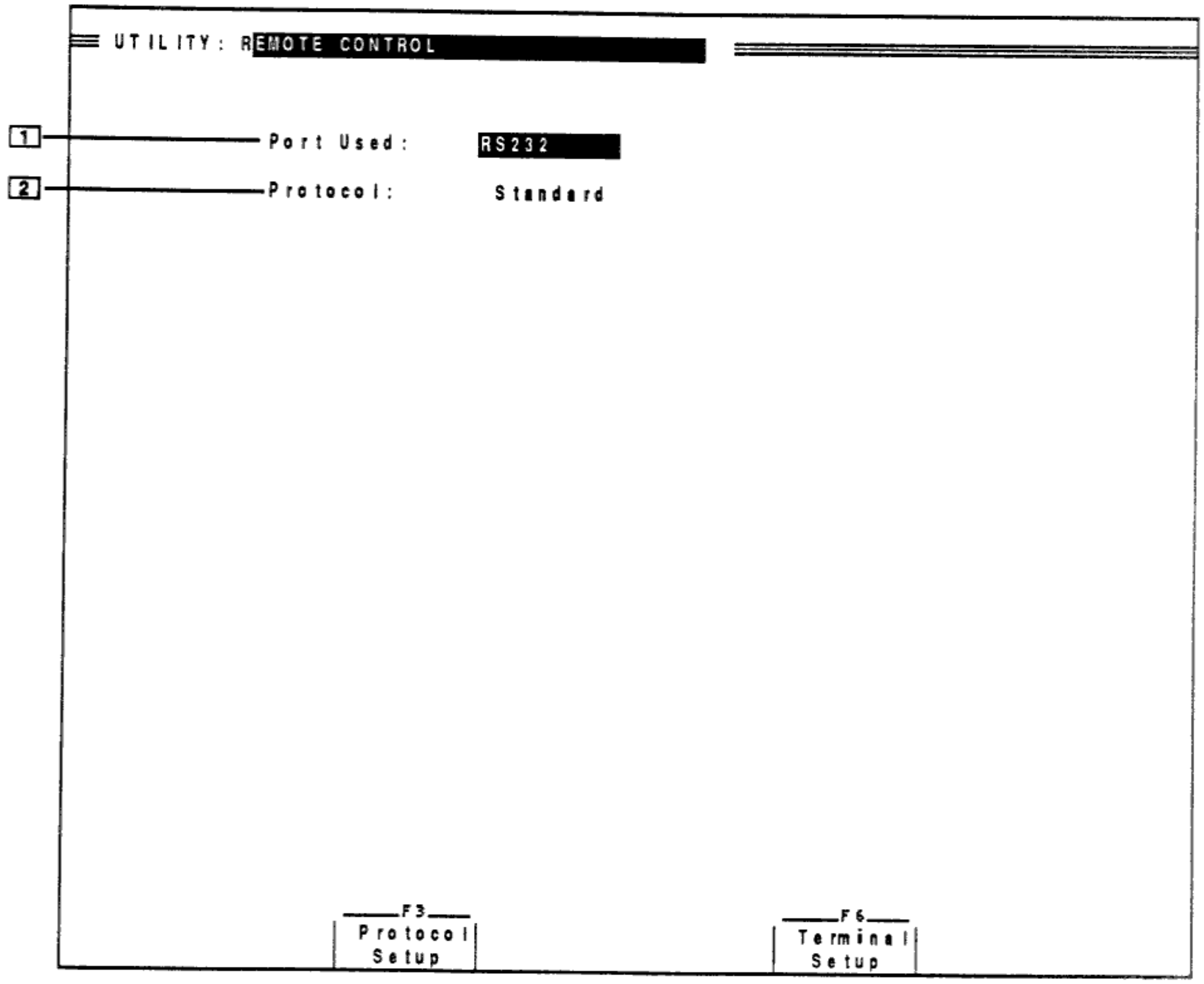


Figure 6-33. Remote Control menu.

[1] **Port**. Lets you specify the port to which the host is connected.

[2] **Protocol**. Identifies the communications protocol for the selected port.

Function Keys

F3: Protocol Setup. Opens the Protocol Setup submenu. This submenu sets remote communications parameters for data transfers.

F4: Terminal Setup. Opens the Terminal Setup submenu. This submenu lets you use PRISM for terminal emulation.

3. In the Remote Control menu, select the port to which the host is connected.
4. Open the Protocol Setup submenu by pressing F3. This submenu is shown in Figure 6-34.

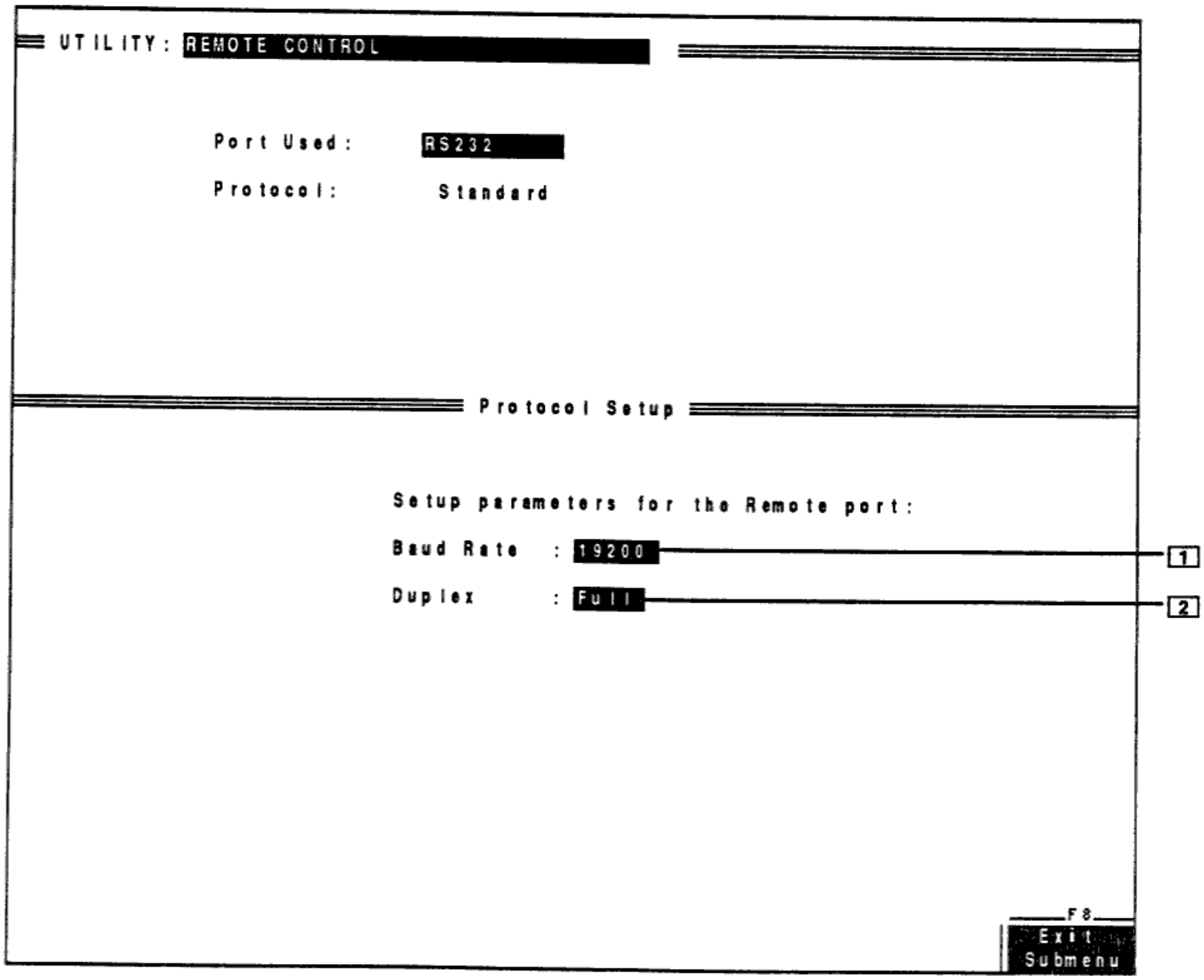


Figure 6-34. Protocol Setup submenu. Shows the parameters required for RS-232C communications.

1 **Baud Rate**. Lets you set the rate of data transmission. The baud rate must be set to match that of the host.

2 **Duplex**. Lets you select whether data is transmitted in Full or Half duplex.

Function Key

F8: **Exit Submenu**. Closes the Protocol Setup submenu and returns to the Remote Control menu.

5. Set the communications parameters in the Protocol Setup submenu to match those of the host.
6. Press F8: Exit Submenu to exit the Protocol Setup submenu.

The PRISM is now set up to communicate with a remote host.

Emulating a Terminal

For your convenience, the PRISM can emulate a terminal. This allows you to use it as a terminal connected to a host computer.

PRISM emulates a "dumb" or "unknown" terminal. The only control codes recognized are CR (carriage return), LF (line feed), and BS (back space). All other control characters are ignored.

Either the RS-232C port or the Comm Pack port (with an appropriate Comm Pack plugged into it) can be used to communicate with the host. The instructions given here assume that you are using the RS-232C port.

To use the PRISM as a computer terminal, perform the following steps:

1. With the power turned off, connect the host to the RS-232C port according to the instructions given in Appendix A.
2. Power up the mainframe.
3. Access the Remote Control menu by pressing Util, then selecting Remote Control in the menu select field at the top of the screen.
4. Press F6: Terminal Setup to open the Terminal Setup submenu. This submenu is shown in Figure 6-35.
5. Select the port connected to the host (in this case, RS232).
6. Select the baud rate, parity, and duplex so that they are compatible with the host.

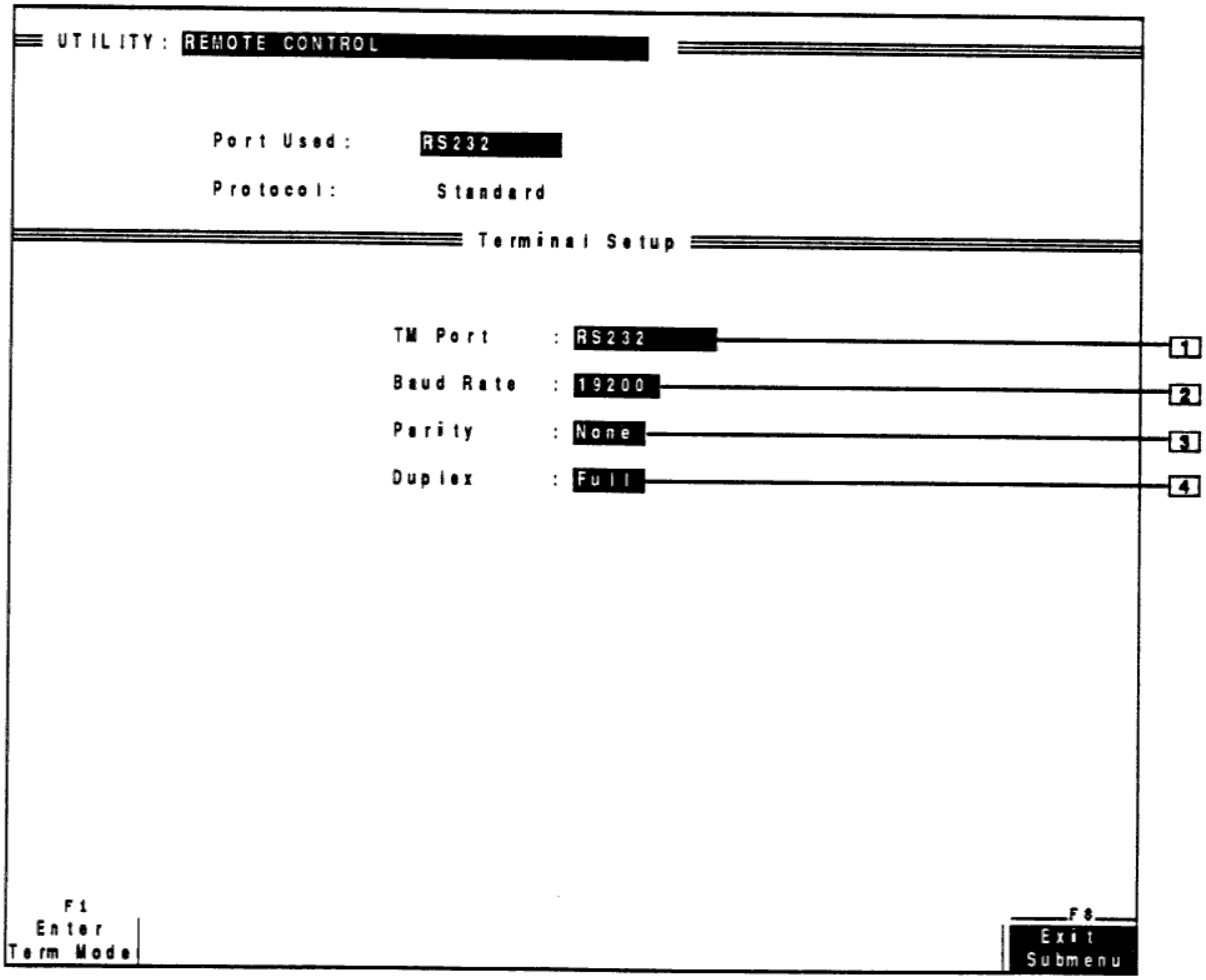


Figure 6-35. Terminal Setup submenu.

1 **Port**. Lets you identify the port to which the host is connected.

2 **Baud Rate**. Lets you select the rate of data transfer. The baud rate must be set to match that of the host.

3 **Parity.** Lets you select the type verification check run on transmitted data. Set the parity to match that of the host. The selections are Odd, Even, and None.

4 **Duplex.** Lets you select whether data is transmitted in Full or Half duplex.

Function Keys

F1: Enter Term Mode. Starts terminal emulation.

F8: Exit Submenu. Exits the Terminal Setup submenu and returns to the Remote Control menu.

7. Press F1: Enter Term Mode to start communicating with the host. The PRISM screen will respond just like the display screen on any terminal.

NOTE

While you are operating in terminal mode, only the QWERTY portion of the mainframe's keyboard is active; the special-purpose keys are not recognized by the host.

8. When you are ready to return to normal PRISM operation, press F8. This returns you to the Terminal Setup submenu, but does not disconnect you from the host.

CHECKING THE SYSTEM CONFIGURATION

The System Configuration menu (shown in Figure 6-36) is the first menu displayed after power up diagnostics run. It shows you:

- the modules installed
- the communication protocols for each port
- the disk drives available
- the version of system software installed

If you load a setup or Refmem for an application module not currently available in the system, PRISM creates a virtual module and slot for it. This allows you to view setups and Refmems stored on disk even if you do not have the same hardware as was used to create the setup or acquire the data.

You can access the System Configuration menu any time by pressing Util, then selecting System Configuration in the menu select field located in the upper left of the display screen.

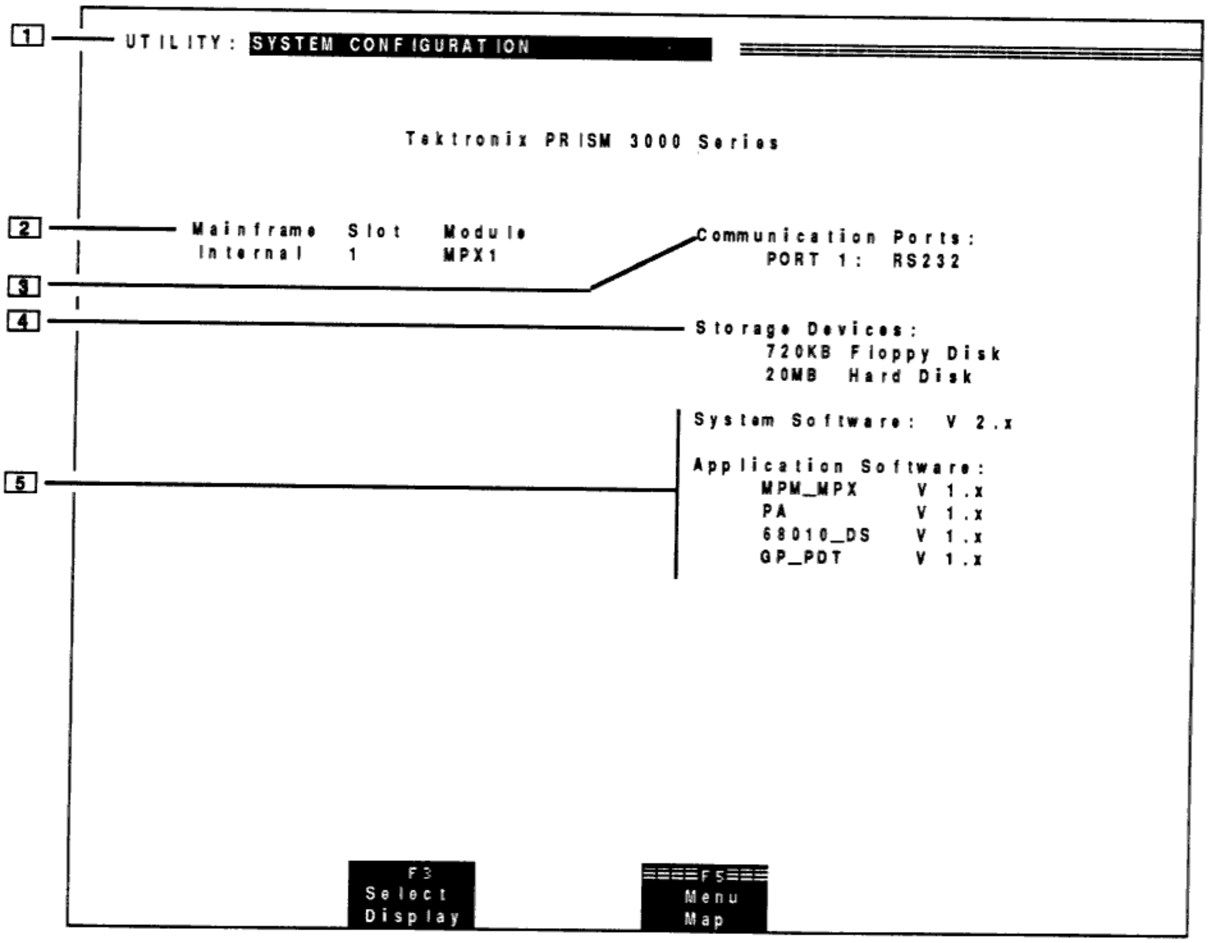


Figure 6-36. System Configuration menu. Shows the instrument configuration.

1 **Menu Select**. Lets you select which menu is displayed.

2 **Mainframe Slot**. Shows which application module occupies each slot. Internal slots are those inside the mainframe. Expansion slots are those inside an expansion mainframe. Note: Module names preceded by a V are virtual; that is, software has been loaded for a type of application module not currently installed in the system.

3 **Communication Ports**. Shows the protocol for which each port is configured.

4 **Storage Devices**. Shows the type of disk drives in the system.

5 **Software**. Tells the version of the operating system software that the system is running. Identifies the different types of application software installed along with the software version numbers.

Function Keys

F3: **Select Display**. Opens the Select Display submenu, used to specify the type of display monitor used with the PRISM.

F5: **Menu Map**. Displays information about the PRISM menus.

The Select Display Submenu

If you have a 30DSM, you'll need to set the Display Type parameter so that the waveform display is shown correctly.

Some applications, such as the 30DSM, need to know whether the display device is color or monochrome. For these applications, you'll need to set the Display Type parameter in the Select Display submenu. Figure 6-37 shows a Select Display submenu.

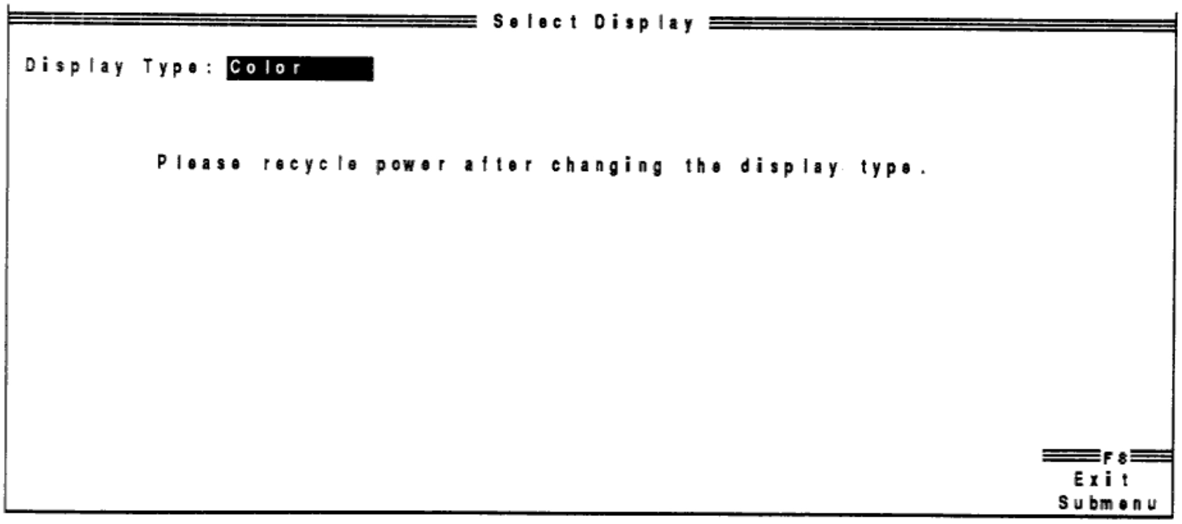


Figure 6-37. Select Display submenu, configured for a color monitor.

The Display Type parameter is stored in nonvolatile memory; you need to set it only once.

SETTING THE DATE AND TIME

The PRISM contains a clock/calendar that is used to record when the date and time files are modified and to print the date and time on screens that are output to a printer. The clock/calendar has a back up battery so you will not have to set it often.

Setting the date and time is performed from the Diagnostics menu.

To change the system's date and time, do the following :

1. Access the Save/Restore menu by pressing Util, then scroll through the menus until Save/Restore is selected. This menu is shown in 6-16.
2. In the operation portion of the Save/Restore menu, select Load Application as the operation.
3. Fill in the parameter portion of the Save/Restore menu as shown in Figure 6-38.
4. Press F1:Execute Command to load diagnostics. A message on the top line of the display tells you when the load operation is complete.

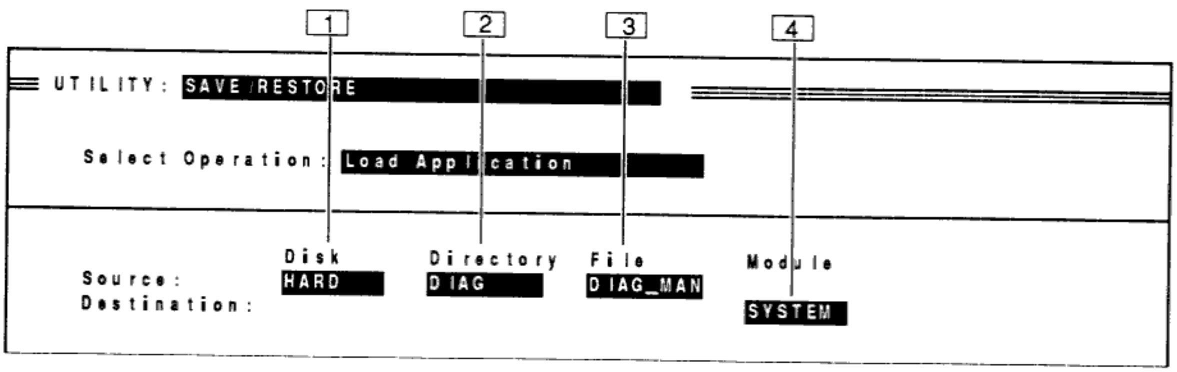


Figure 6-38. Fields for loading diagnostics software.

[1] **Source Disk.** Select the disk (floppy or hard) from which you want to load diagnostics.

[2] **Source Directory**. Select DIAG since this is the directory that contains diagnostic software.

[3] **Source File**. Select DIAG_MAN since this is the file that contains diagnostic monitor software.

[4] **Destination Module.** Select SYSTEM since you want to load diagnostics into RAM allocated to the MPU board.

5. Access the Diagnostics menu by pressing Util, then scrolling through the menus until DIAGNOSTICS is selected. This menu is shown in Figure 6-39.

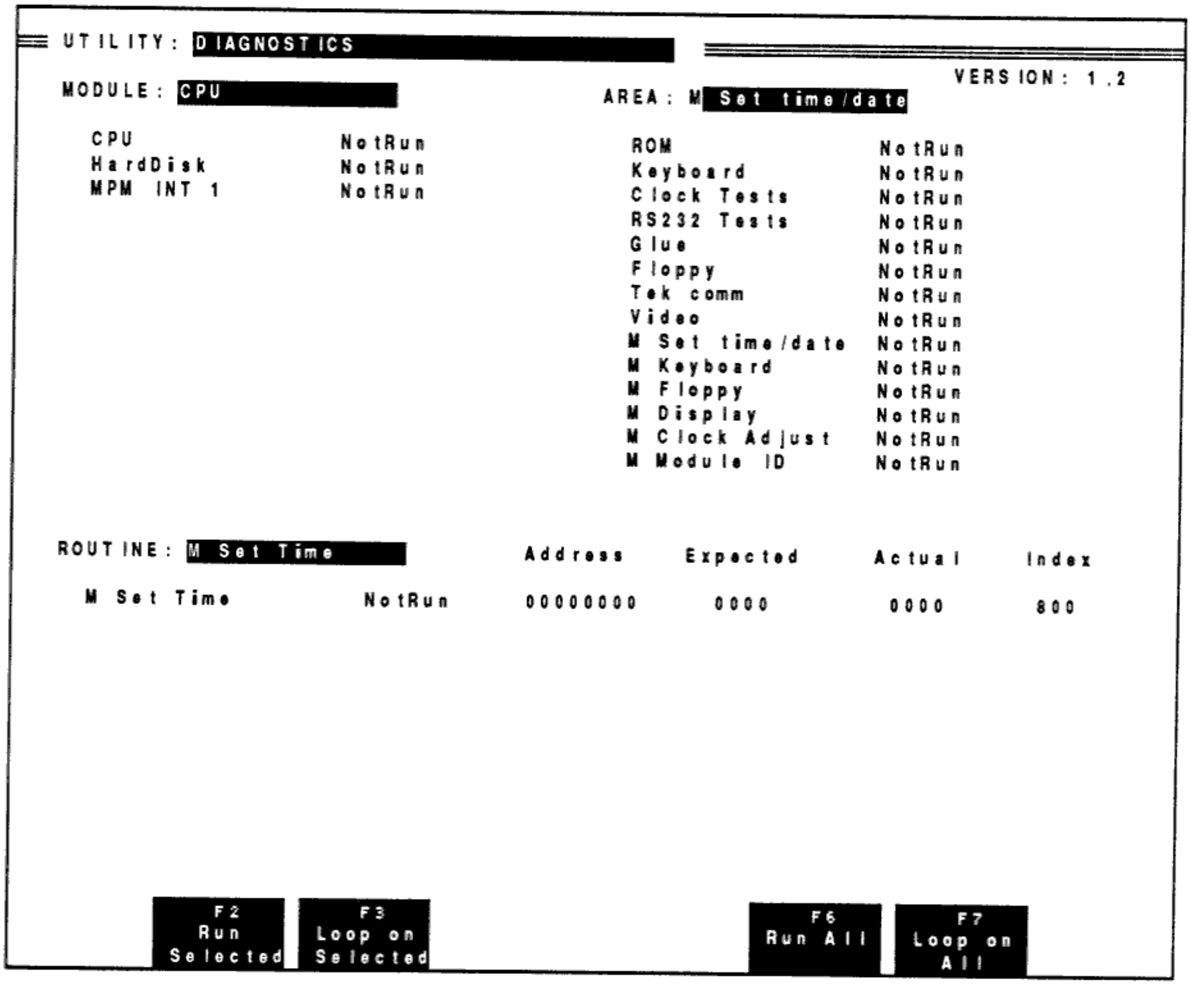


Figure 6-39. Diagnostics menu showing setting date and time.

6. In the MODULE field, select CPU.
7. In the AREA field, select M Set time/date.
8. Move the blinking field cursor to the ROUTINE field. The cursor must be in this field to execute the M Set time/date operation.
9. Press F2: Run Selected to open the Set Time and Date submenu. shown in Figure 6-40.

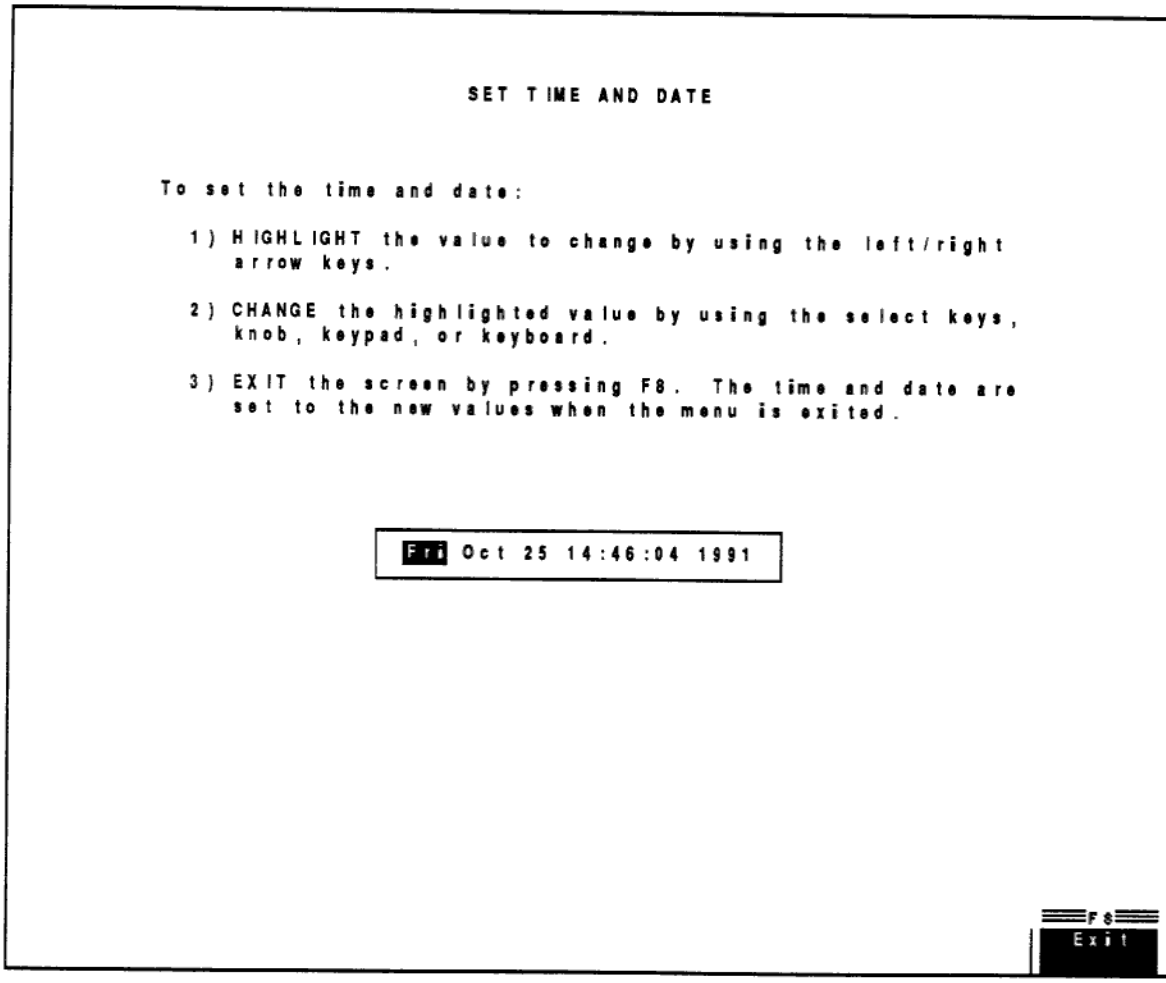


Figure 6-40. Set Time and Date submenu.

10. Use the cursor keys to highlight the date and time value you want to change. Then, type in the new value or scroll to the correct value with the SELECT knob.
11. When you have finished setting the date and time, press F8 to exit the submenu and return to the Diagnostics menu.

The new date and time you set is now in effect.

Appendix A: INSTALLATION AND CONNECTIONS

OVERVIEW

This appendix will give you the information you need to set up your mainframe and connect it to other system components. For each step, refer to the section in this appendix for more details. To set up your mainframe, follow these steps:

1. Determine an appropriate location for the mainframe (see *Site Considerations*).
2. Unpack the mainframe and its accessories.
3. Set up the mainframe (see *Site Considerations*).
4. Plug in keyboard (see *Connections*).
5. Plug in monitor (see *Connections*).
6. Plug in any optional accessories you have purchased with your mainframe (see *Connections*).
7. Plug in the power cord (see *Connections*).
8. Power up (see *Powering Up the System*).
9. Load software
10. Duplicate the system disk

SITE CONSIDERATIONS

The mainframe is intended for use in normal or semi-harsh environments. The mainframe will operate in a temperature environment between +10°C and +40°C (+50°F and +104°F). The mainframe's maximum heat dissipation is 1700 BTUs/hour.

Once the mainframe is unpacked, place it on a stable, level work surface. For proper cooling, allow at least six inches (15 cm) of clearance in front of, behind, and on each side of the mainframe. The mainframe should not be placed near other equipment containing large motors, fans, or other electromagnetic devices. Large magnetic fields will distort the display image.

The mainframe may be used as a portable instrument. While not in use and with no probes or connectors plugged into any of its ports, the mainframe can be stood on its back. There is a handle located in the front of the mainframe. The keyboard can be stored in the bottom of the mainframe.

MAINFRAME PACKAGING

Unpacking the Mainframe

The mainframe is packed in one box. This box will contain the keyboard and all probes and connectors you have ordered. If you have purchased the monochrome flat-panel display, this will also be in the box. If you have purchased the color monitor, this will be packed in a separate box.

The mainframe was inspected both mechanically and electrically before shipment. It should be free of blemishes or scratches and should meet or exceed all electrical specifications. To confirm this, inspect the instrument for physical damage incurred during transit. Always retain the product's packaging in case shipment for repair is necessary. Also, retain any anti-static module packaging in case you need to store modules outside of your mainframe.

To test the product's functional performance, follow the *Operator's Checkout Procedure* later in this section. To verify performance requirements of the instrument, refer a qualified service technician to the Mainframe Service Manual. If there is damage or deficiency, contact your Tektronix representative.

Repacking for Shipment

If the instrument is to be shipped to a Tektronix Field Service Center for repair, attach a tag to the instrument showing the owner's name and address, the instrument's serial number, and a description of the service required. Return probes with the instrument so that the entire system can be tested.

Use the original packaging. If it is unavailable or not fit for use, contact your local Tektronix Field Office to obtain new packaging.

POWER REQUIREMENTS

Line Voltage

Before connecting the mainframe to a power source, verify that the Line Voltage Selector switch on the rear panel. (Figure A-1 shows the correct nominal voltage for the power source you are using, either 115V or 230V.)

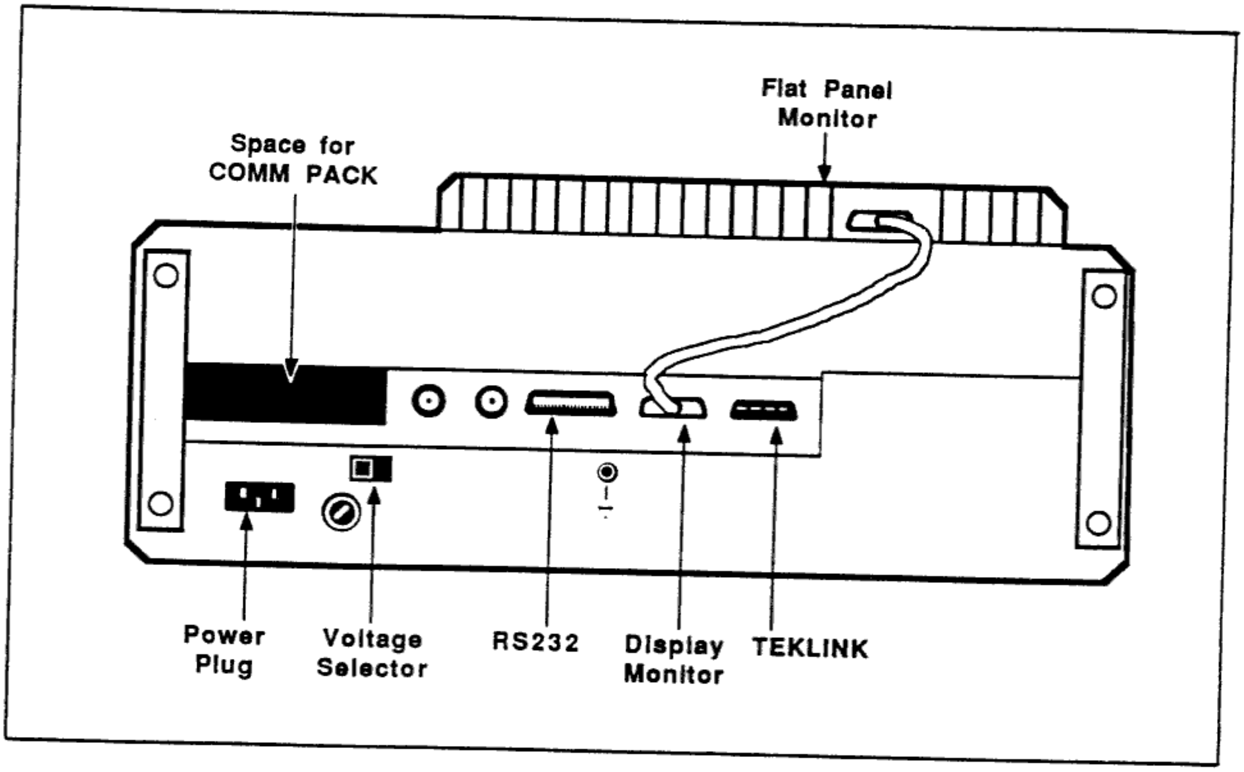


Figure A-1. Mainframe rear panel. Note the location of the Voltage Line Selector, input and output ports and power input.

Power Cord

The mainframe has a three-wire power cord with a three-contact plug for connection to the power source and protective ground. The plug protective-ground contact connects to accessible metal parts of the mainframe through the power cord protective grounding conductor. For protection against electrical shock, insert this plug into a power source socket that has a securely grounded protective-ground contact.

Hazardous voltages may be present on the exposed metal surfaces of the mainframe if the power source socket's protective-ground connection is not securely grounded. For protection against electrical shock, insert the power-cord plug into a power source receptacle that has a securely grounded protective-ground contact.

The power-cord connection for the mainframe is located on the rear panel. The standard power cord for the mainframe is rated at 12 amps.

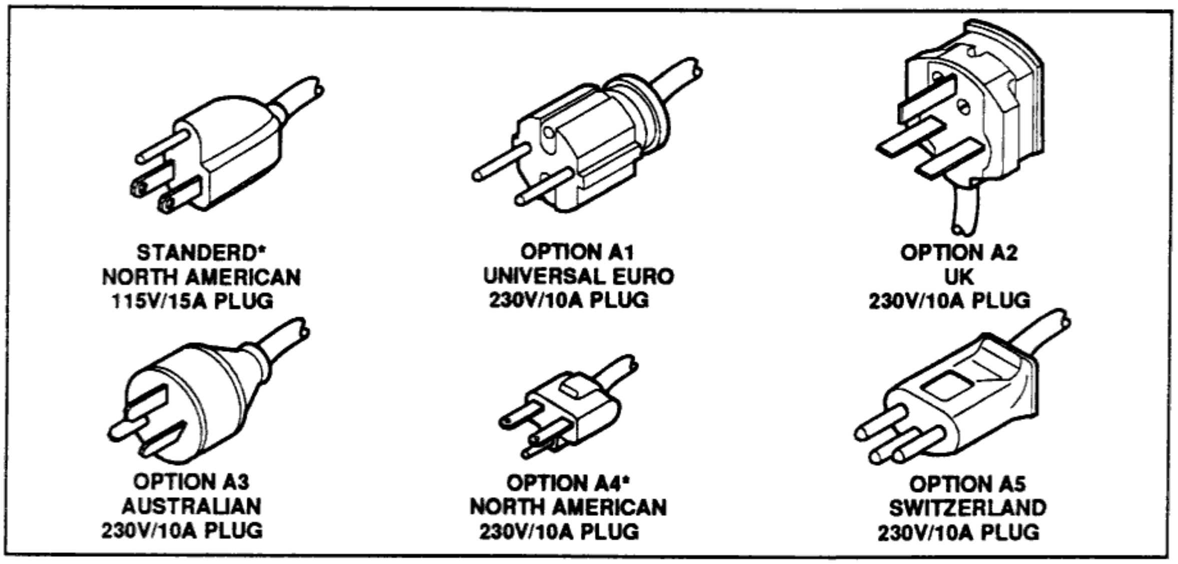


Figure A-2. Mainframe optional power cord plugs. The optional power cords use different plugs than the standard power cord's plug; the work site must provide proper connection for the plug being used. An asterisk (*) indicates Canadian Standards Association certification.

Note that the mainframe has no main power switch, the power cord provides the main power disconnect. The front panel switch is a standby switch.

Standby Switch

The standby switch is a white square switch located on the right of the front panel above the floppy disk drive. See Figure A-3 for location of the standby switch. To power up, press the switch once; the switch will remain flush with its bezel and the square will be lit. To power down, press the switch once; the switch will project beyond the surface of the front panel and the square will not be lit.

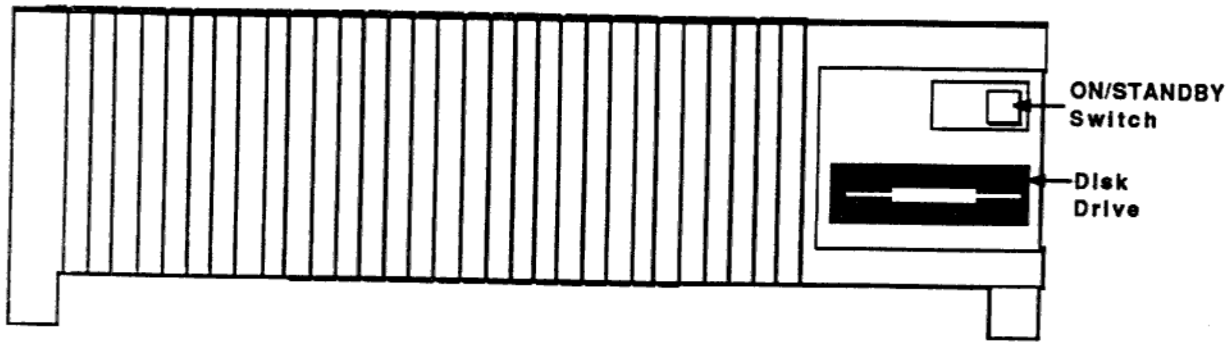


Figure A-3. Mainframe front panel. Note the location of the floppy disk drive and the standby switch.

Susceptibility to Dropped Cycles in Power Source

The mainframe power supply will maintain the DC voltage levels within the specified limits when the AC power is removed for 16 ms or less. However, the mainframe will perform a shutdown anytime the AC power is removed longer than 20 ms.

If the intended installation site is susceptible to dropped cycles in the power source, it is strongly recommended that a line-conditioning device be installed to help prevent dropped cycles. The line-conditioning device should be specified to handle line currents being drawn by the mainframe; for line currents, refer to *Mainframe Power Requirements* in Appendix B.

Grounding

To reduce susceptibility to line spike or line variations, we recommend that you connect a ground lead from the ground lug on the rear of the mainframe (see Figure A-1) to ground; a short lead made from braided strands is recommended.

CARD INSTALLATION

Your mainframe will arrive from the factory with the application module(s) already installed. If you want to change or add a module, you must have a qualified service technician make the change or addition.

WARNING

Installation of application modules should only be performed by a qualified service technician. Instructions for application module installation are in the Mainframe Service Manual.

CONNECTIONS

After setting the mainframe in an appropriate place, you must connect the monitor, plug in probes, connect any other optional equipment you have purchased, and connect the mainframe to a power source. Figure A-1 shows the rear panel of the mainframe, Figure A-3 shows the front panel, and Figure A-4 shows the keyboard and display connections.

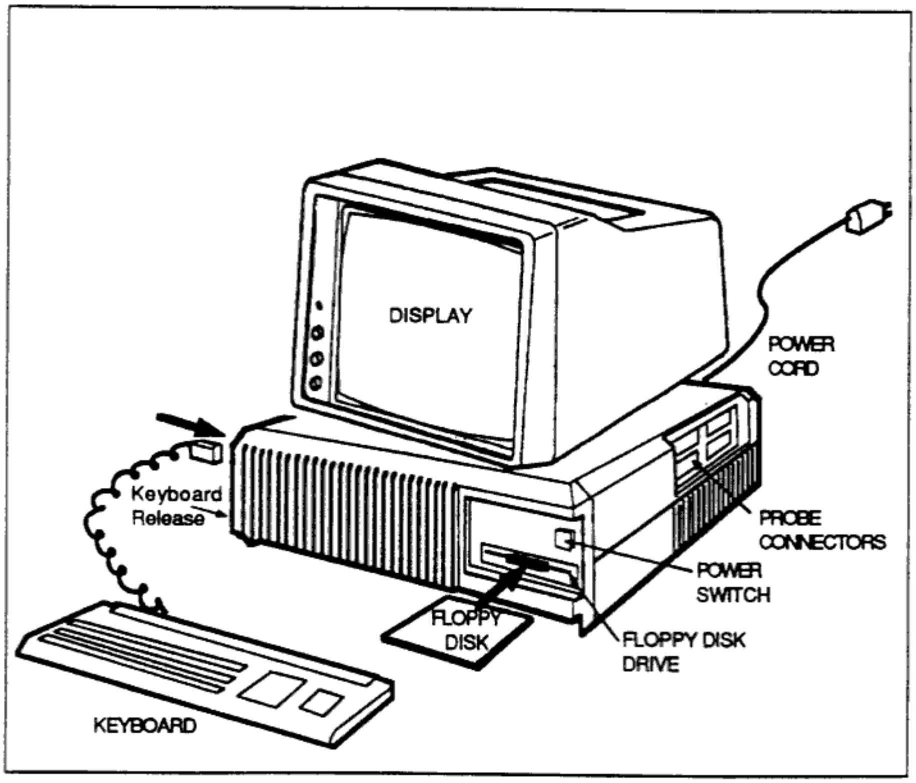


Figure A-4. PRISM 3002 connections.

Connecting the Keyboard

The keyboard is packed with the mainframe. The coiled keyboard cord is packed in a recessed slot on the rear edge of the keyboard. See Figure A-5 to see how the cord is stored. Pull the cord out of the back of the keyboard and plug the modular connector into the connector on the left side of the mainframe.

There are two feet on the bottom of the keyboard that you can fold out to prop the keyboard up at an angle. Unfolding these feet gives the keyboard a more comfortable position for typing.

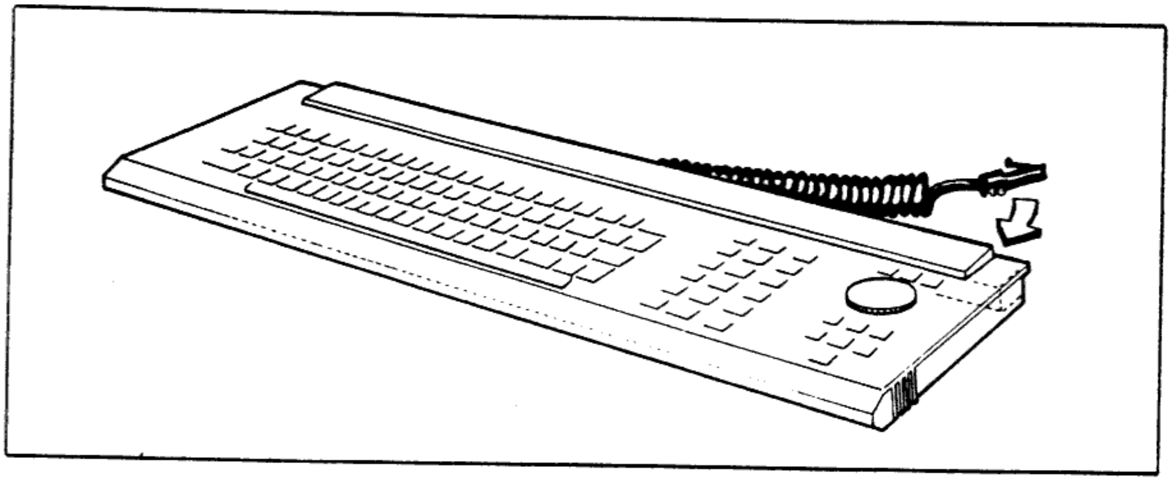


Figure A-5. Keyboard coiled cord storage.

The keyboard is designed to be stored in the mainframe when not in use or for transporting the mainframe. The keyboard can slide along a channel under the mainframe. To store the keyboard here, refer to Figure A-6 and follow these steps:

1. Unplug the coiled keyboard cable.
2. Store the cable in its recessed slot in the keyboard.
3. Fold flat the two feet on the bottom of the keyboard.
4. Align the lips on each side of the keyboard with the grooves in the bottom of the mainframe.
5. Slide the keyboard all the way into the mainframe.

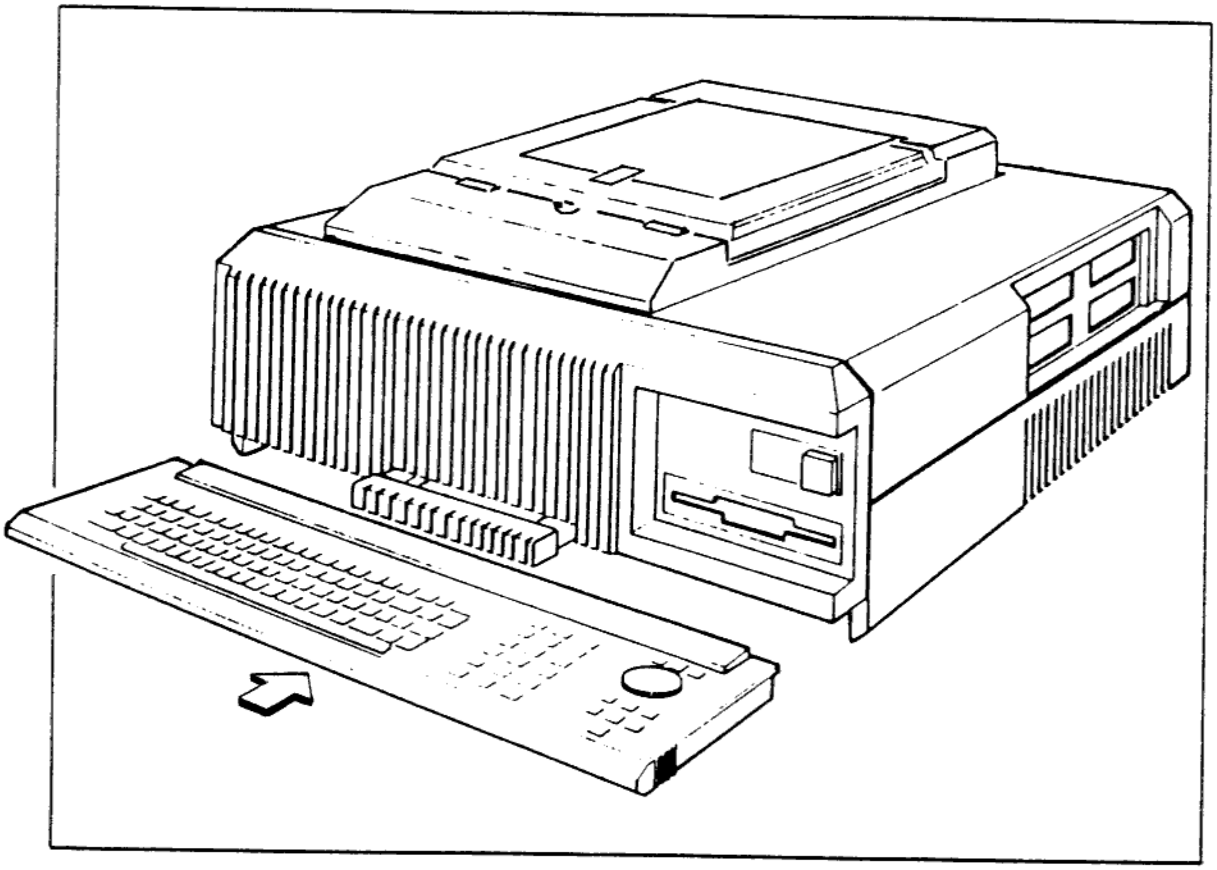


Figure A-6. Storing the keyboard in the mainframe.

To remove the keyboard from the mainframe, press on the two rectangular buttons on each side of the mainframe and pull the keyboard out.

Connecting the Monitor

You will receive a monitor and appropriate cable with your mainframe. If you chose the monochrome flat-panel monitor (Opt. 3002P), read the instructions under the heading *Installing the Flat-Panel Monitor* which follow. If you chose the color monitor (Opt 3002C), read the instructions under the heading *Installing the Color Monitor* which follow.

Installing the Flat-Panel Monitor

The flat-panel monitor is packed in the same box as the mainframe, but it is not attached to the mainframe. Follow these steps to install the Flat-Panel Monitor:

1. Place the flat-panel monitor on top of the mainframe as shown in Figure A-7.

NOTE

If your mainframe was previously used with a color monitor, a supporting plate may be screwed down in the recess for the flat panel. If this plate is installed, remove it with a small Phillips screwdriver. Then, install the flat panel.

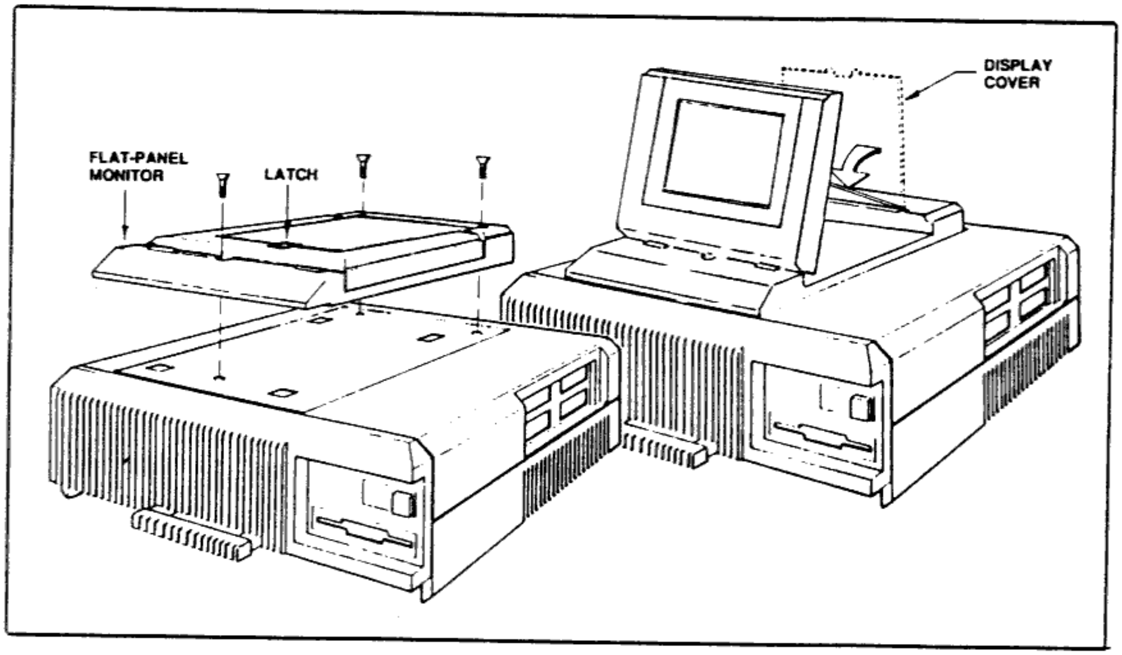


Figure A-7. Placement of the flat-panel monitor on the mainframe.

2. Line up the three screws in the flat-panel monitor with the three screw holes on the top panel of the mainframe.
3. Using a flat-tip screwdriver, screw down the three screws.
4. Plug the one end of the cable into the receptacle on the back of the monitor and the other end to the receptacle labeled Display/Monitor located on the rear panel of the mainframe. Both ends of the cable are alike.

NOTE

Once attached, the plugs are held securely by clips. To release the clips, squeeze the sides of the plug while you pull the plug from the socket.

5. Slide open the latch that holds the protective cover over the flat panel and raise it up.

6. The flat-panel monitor is hinged at the front. Lift it up and slide the edge of the cover into the groove on the back of the monitor. This holds the monitor securely at a convenient viewing angle.

Installing the Color Monitor

If you have a color monitor, use the cable provided with it. (Note: optional cables of varying lengths are available through your local Tektronix Field Office.) Plug the smaller end of the cable into the signal input connector on the rear of the monitor and tighten the retaining screws with a small flat-tip screwdriver.

CAUTION

If you are placing the color monitor on top of the mainframe, make sure that the supporting plate is screwed in place. This plate is used in place of the flat panel display to ensure the top of the mainframe is strong enough to bear the weight of the color monitor.

Plug the larger end of the cable into the receptacle labeled Display/Monitor located on the rear panel of the mainframe. Once attached, the plug is held securely by clips. To release the clips, squeeze the sides of the plug while you pull the plug from the socket.

Determine the Tektronix part number of the color monitor supplied with the PRISM 3002. These monitors are described in the following paragraphs.

119-3840-00. This color monitor has controls on the front, rear, and top. A power switch, a power-on indicator light, and contrast and brightness controls are located on the front. A line voltage switch and screen-color selector are located on the rear. The fine tuning adjustments are located under a hinged cover on the top of the monitor. The locations of these controls are shown in Figure A-8.

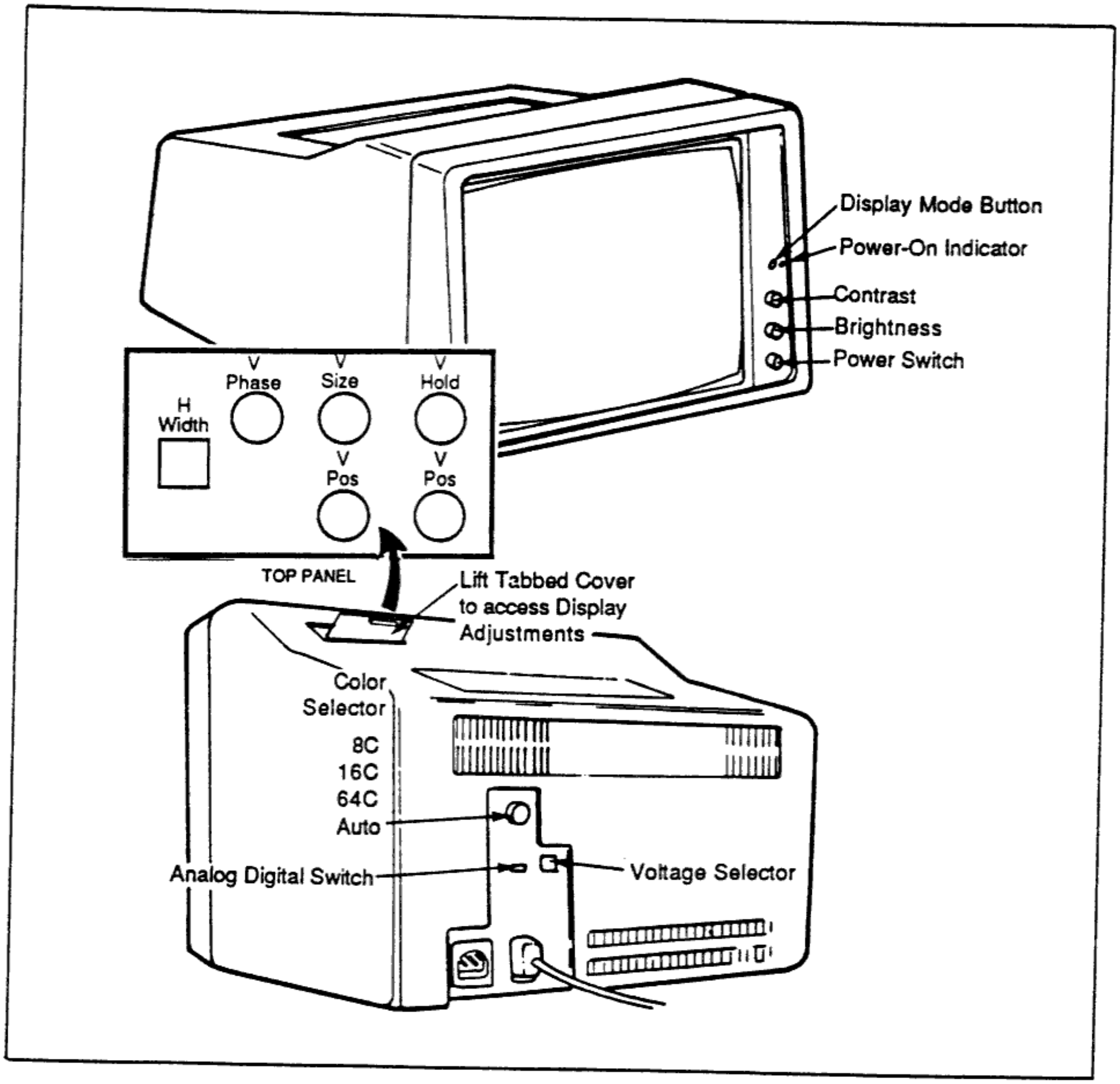


Figure A-8. Color monitor adjustment and switch locations (119-3840-00).

119-3840-01. This color monitor has controls on the front and rear. A power switch, power-on indicator light, and contrast and brightness controls are located in front. The size, position, and sync controls are also in front, located behind an access door. The Manual On/Off, Mode, and Color Mode switches are at the rear of the monitor near the power and data connections. The locations of these controls are shown in Figure A-9.

This monitor is factory set to work with the PRISM 3002. However, if you must reconfigure the monitor for use with the PRISM 3002, the following information summarizes the control settings.

Front Panel Switches	Setting	Back Panel Switches	Setting
HSize	On	Mode	Color
Text	Off	Color Mode	8
Text Color	don't care		

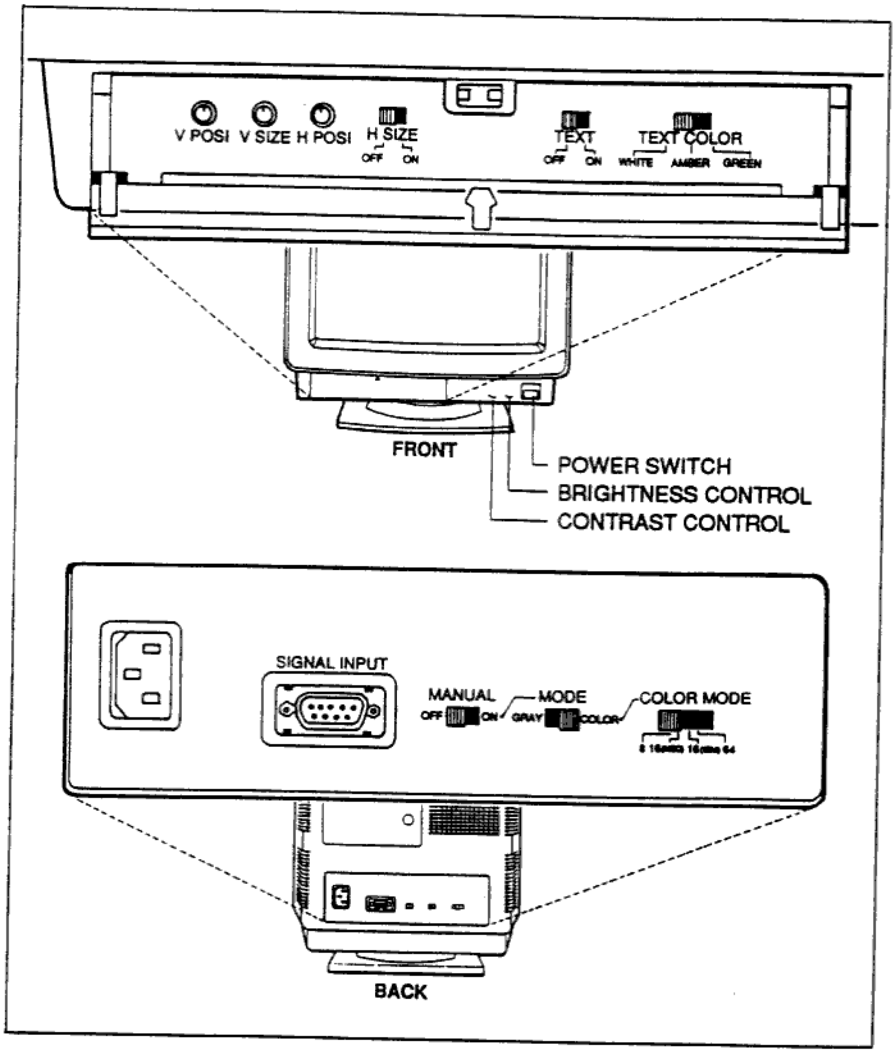


Figure A-9. Color monitor adjustment and switch locations (119-3840-01).

119-4011-00 (or 119-4012-00). This color monitor has controls and indicators on the front, right side, and rear. The power indicator light is located in front. The power switch and contrast and brightness controls are located on the right side. The size and sync controls are behind an access door at the rear of the monitor. The locations of these controls are shown in Figure A-10. The 119-4012-00 is a 220V version of the 119-4011-00; the operation is identical.

This monitor is factory set to work with the PRISM 3002. However, if you must reconfigure the monitor for use with the PRISM 3002, set the two switches (located behind the access door at the rear of the monitor) to the far left.

Switch	Setting
Norm/D1/D2	Norm
Digital/Analog	Digital

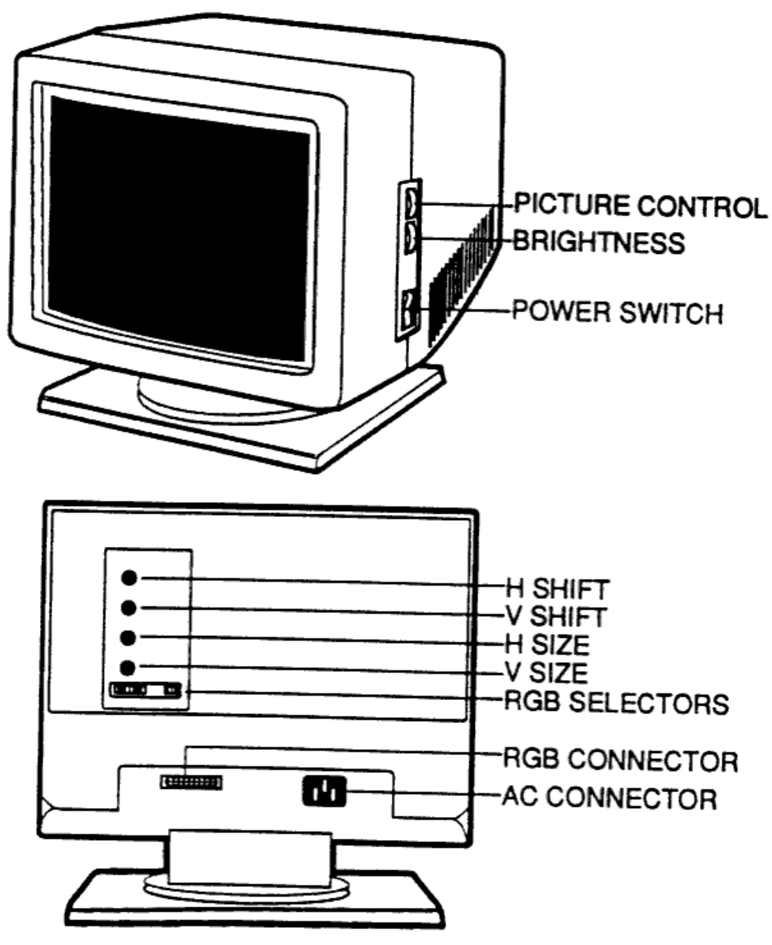


Figure A-10. Color monitor adjustment and switch locations (119-4011-00).

119-4279-00. This color monitor has controls and indicators on the front and rear. The power indicator light, the power switch, contrast control, and brightness control are located in front. The size, position, and sync controls are at the rear of the monitor. The locations of these controls are shown in Figure A-11.

This monitor is factory set to work with the PRISM 3002. However, if you must reconfigure the monitor for use with the PRISM 3002, the following information summarizes the control settings.

Switch	Factory Setting
ANALOG	TTL
COLOR	8
V-SCAN	AUTO
SCAN	UNDER

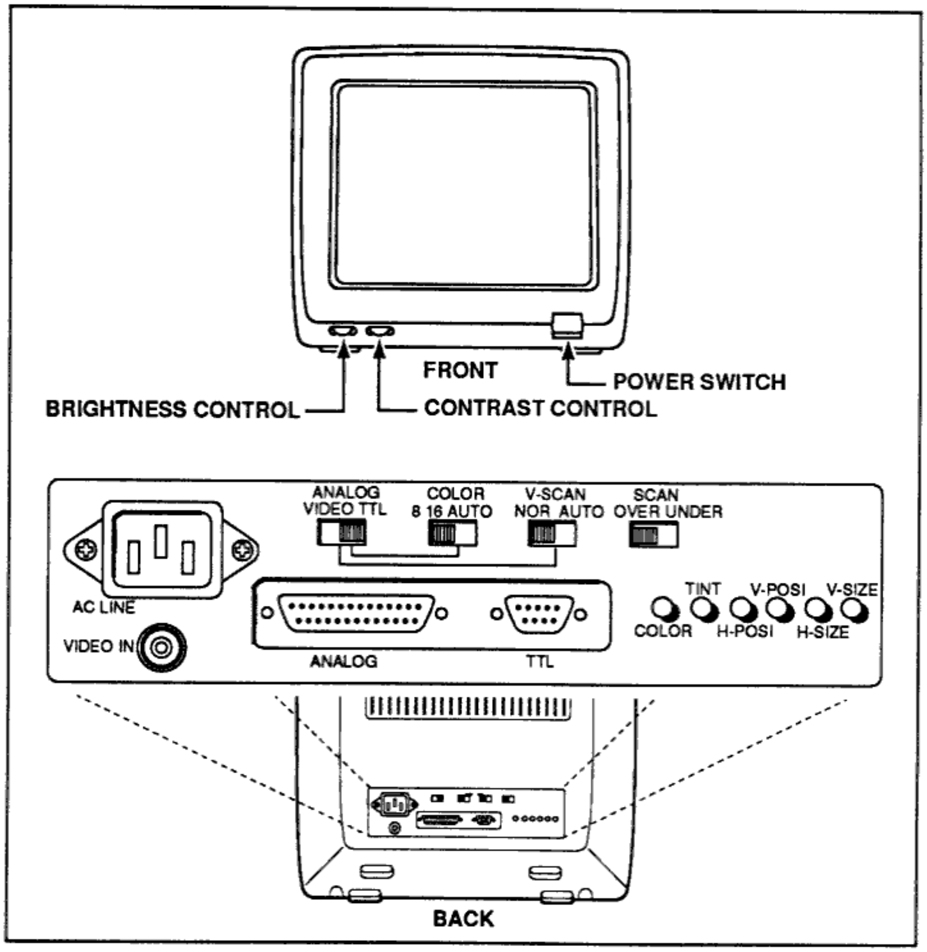


Figure A-11. Color monitor adjustment and switch locations (119-4279-00).

Connecting the Probes

Probes are connected to the application modules through slots located on the right side of the mainframe. The type of connectors used depends on the type of modules installed in your system. Refer to your application module user manual for detailed probe-connection instructions. Figure A-12 shows a P6480 probe attached to a system containing a 30MPX application module.

CAUTION

Do not "hot plug" the probes or leadsets (do not connect them to the PRISM mainframe while it is powered up). Hot plugging may damage probes, leadsets, or the PRISM mainframe.

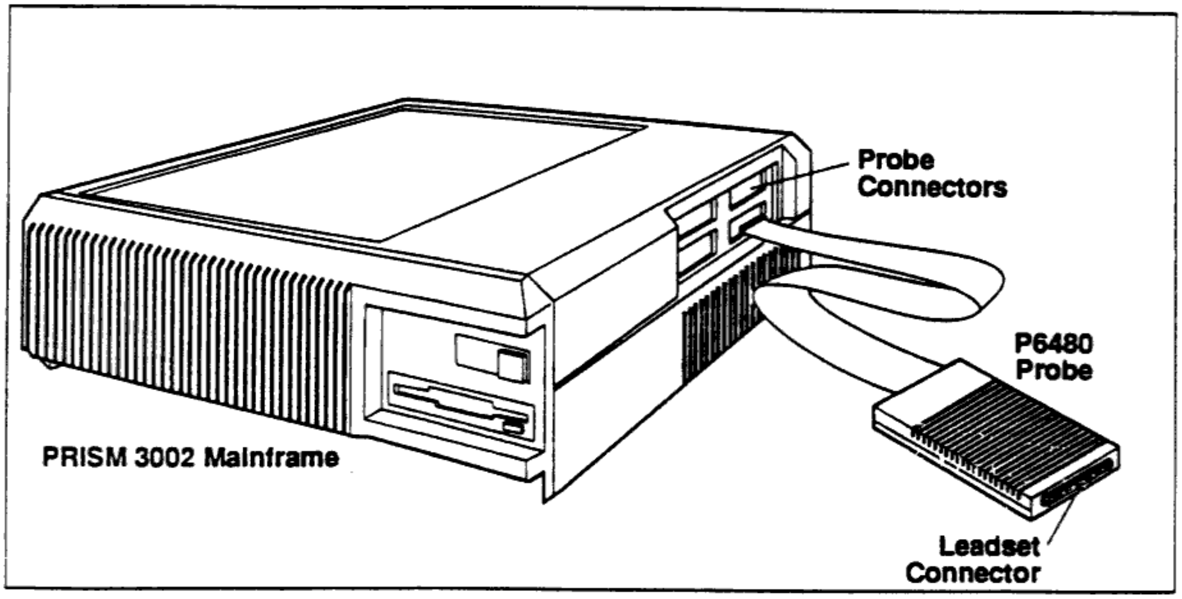


Figure A-12. Probe connections.

Connecting to a Host

You can connect the PRISM 3002 mainframe to a host through either of two ports located on the rear-panel. One port is a standard RS-232C pin connector. The other port is a slot that accepts 1200-Series Comm Packs.

Connecting the Expansion Mainframe

The 3002E Expansion Mainframe lets you expand your system with additional application modules. The expansion mainframe has slots for two modules, which allows you to configure a system with up to four application modules.

NOTE

When multiple application modules are installed in the system, there are jumpers on the circuit boards that must be set in specific positions. Modules should only be installed by qualified service technicians following the jumpering instructions contained in the documentation that accompanies application modules.

The cards in the mainframes communicate with each other over a high-speed serial bus called TekLink. The TekLink connector is located on the rear panel of the PRISM 3002 mainframe.

To connect an expansion mainframe to the PRISM 3002 mainframe, plug one end of a TekLink cable into the TekLink connector on the PRISM 3002 mainframe. Plug the other end of the cable into the TekLink connector on the expansion mainframe. (Older expansion mainframes may have a TekLink In and a TekLink Out connector. Attach the cable to the expansion mainframe's TekLink In connector.) Once attached, the plugs are held securely by clips. To release the clips, squeeze the sides of the plug while you pull the plug from the socket.

Connecting a Printer

You can connect a printer to the RS-232C port, or to a 1200C01 RS-232C Comm Pack installed in the Comm Pack port. Refer to *Print Operations* in Section 6 of this manual for instructions on printer settings. The following are the names of the signals on the pins of the RS-232C port. Pins not listed are not used.

There are a lot of variations in RS-232 implementations. If the pin-to-signal mapping on your printer does not match that given in Table A-1, you must make a plug adapter. For example, if you are using an Epson printer, you must make an adapter that connects the pins on the PRISM RS-232C port to the pins on the printer as follows:

PRISM	Printer
1	1
2	3
3	2
5	20
7	7
8	6

Table A-1
RS-232C PINS AND SIGNALS

Pin	Signal	Pin	Signal
1	GND	6	DSR
2	TD	7	GND
3	RD	8	DCD
4	RTS	20	DTR
5	CTS		

Installing a Comm Pack

The Comm Pack port takes 1200 Series Comm Packs. Orient the Comm Pack as shown in Figure A-13, so the label is on the top and the end with the output port and the metal handle is towards the outside of the mainframe. Insert the Comm Pack until it is snug in its port.

CAUTION

Make sure the PRISM 3002 and SUT are powered down before plugging in the Comm Pack. Plugging in the Comm Pack with the PRISM 3002 and SUT powered on can damage the Comm Pack.

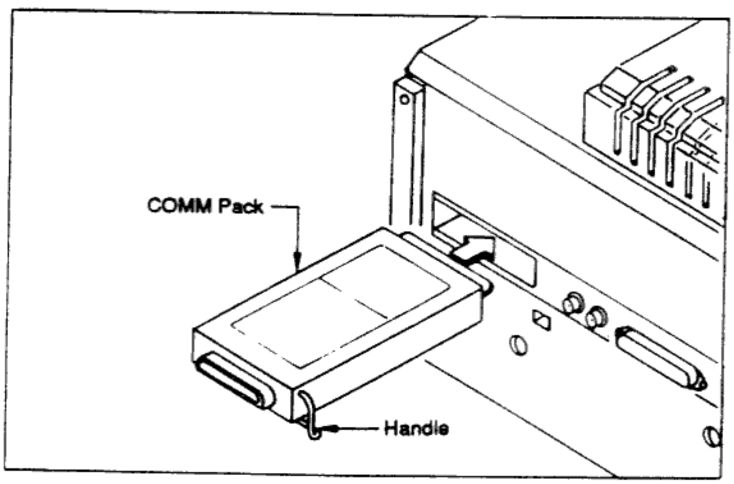


Figure A-13. Inserting a Comm Pack.

Refer to Section 6 of this manual for instructions on setting up communication protocols and printer settings.

Connecting the Power

Plug one end of a three-prong power cord into the power cord connector on the rear panel. The location of this connector is shown in Figure A-1. Plug the other end of the power cord into a grounded power receptacle.

Connecting the Power

Plug one end of a three-prong power cord into the power cord connector on the rear panel. The location of this connector is shown in Figure A-1. Plug the other end of the power cord into a grounded power receptacle.

POWERING UP THE SYSTEM

After you have made all the proper connections, you are ready to power up the mainframe. If you have a hard disk, the system software will already be installed on it. If you do not have a hard disk, you must insert your system floppy disk in the floppy disk drive before powering up the mainframe.

Make sure all the probes and leadsets that you will be using are connected to the system *before* you power up the mainframe. The system only loads software to drive hardware present at power-up. If you connect probes and leadsets after power-up, the software necessary to run them may not be loaded.

To power up the mainframe, press the On/Standby switch on the front panel. This switch remains lighted as long as the mainframe is powered up.

OPERATOR'S CHECKOUT PROCEDURE

You can run diagnostics programs on your mainframe as an incoming inspection to verify that the system is functioning properly. These diagnostics test most of the system hardware for basic functionality. Procedures for verifying the system's specifications are given in the mainframe, MPU board, and application module service manuals.

Basically, there are two types of diagnostic software: those that always run automatically at power-up and those that only run if you specifically load them. The PRISM 3002 mainframe contains ROM-based compute kernel diagnostics that always run automatically at power-up. Additional diagnostics are provided on floppy disks that are supplied with the mainframe and application modules.

There are three ways to load diagnostics. You can add diagnostics to your system disk so that they automatically load and run at power-up. You can put diagnostics on your system disk in a DIAG directory so they are always available for loading. Or, you can keep diagnostics on a separate disk (or in a non-autoloading directory) and load them manually whenever you want to run a system test.

To successfully power up, there must be a file named DIAGS in the BOOT directory on the PRISM system disk. If this file is the same as the file DIAG_STB from the Diagnostics floppy disk, no diagnostics (except for the ROM-based kernel tests) are run at power-up. If the DIAGS file is the same as the file DIAG_MAN from the Diagnostics floppy disk, diagnostics are run automatically at power-up.

Running Diagnostics Automatically at Power-Up

To configure your system disk to run diagnostics automatically at power-up, do the following (see Section 6 of this manual for instructions on copying files and creating directories):

1. Use the Copy File operation in the Disk Services menu to copy the file DIAG_MAN from your diagnostics floppy disk into a file called DIAGS in the BOOT directory on your system disk.
2. Create a directory called DIAG on your system disk, if it does not already exist.
3. Copy all the files (other than DIAG_MAN) from the DIAG directories on your diagnostic floppy disk and on your application module disks into the DIAG directory on your system disk.
4. If you are using a floppy disk as your system disk, remove it from the floppy disk drive.
5. Turn off your mainframe, wait a few seconds, then turn it on again. If you are using a floppy disk as your system disk, insert it into the floppy disk drive.

NOTE

Do not press any keys during the power-up sequence; this will cause a diagnostic keyboard failure to occur.

Diagnostics software gets loaded as needed from the DIAG directory. If you are using diagnostics on a floppy disk, leave the disk installed in the drive until all diagnostics tests are complete.

When the system is powered up with diagnostics in the BOOT directory, the diagnostics run automatically. The mainframe first runs Compute Kernel Diagnostics, after which the system software is loaded and testing continues with selected system tests that verify the functionality of other MPU board hardware, keyboard, floppy disk drive, color monitor, flat panel, display, hard disk controller, hard disk drive, and application modules.

If no diagnostic tests fail, the diagnostics are unloaded from RAM and the System Configuration menu appears on the screen. To run any diagnostic tests again, to set the date and time, or to reformat the hard disk, you must manually reload the diagnostics. Or, you can hold down a key during power up diagnostics to simulate a failure, thus causing diagnostics to remain loaded.

If a diagnostics failure occurs, one of the two diagnostic screens will remain displayed, indicating which test failed. If this occurs, record all displayed error information and refer to the service manual or contact your local Tektronix Service Center.

Manually Loading and Running Diagnostics

To configure your system disk for convenient manual loading of diagnostics, do the following (see Section 6 for instructions on copying files and creating directories):

1. Use the Copy File operation in the Disk Services menu to copy the file DIAG_STB from your diagnostics floppy disk into a file called DIAGS in the BOOT directory on your system disk.
2. Create a directory called DIAG, if it does not already exist. If you have a hard disk, create the DIAG directory on it. If you are using only floppy disks, you can put the DIAG directory on the system disk or on a floppy disk just for diagnostics.
3. Copy all the files (including DIAG_STB) from the DIAG directories on your diagnostic floppy disk and on your application module disks into the DIAG directory on your disk.
4. To manually load diagnostics, use the Load Application operation in the Save/Restore menu to load the file DIAG_MAN into the SYSTEM module. Detailed instructions for loading diagnostics are given in steps one through four in the procedure for *Setting the Date and Time* in Section 6 of this manual.
5. To run any diagnostic test, select the Module, Area, and Routine you want to run. Then, press one of the function keys to start the test. Detailed discussions of each diagnostic test are contained in the PRISM 3000 Series service manuals.

After you have finished running diagnostic tests, unload diagnostics with the Unload Application operation in the Save/Restore menu. Diagnostics require a significant amount of System RAM; unloading them will free up space for other applications.

If you have two or more application modules in your configuration, there may not be enough system memory to execute diagnostic software. If you have trouble loading diagnostic software, use the Unload All operation in the Save/Restore Utility menu to unload all application software. You should then be able to load and execute the diagnostics. For systems with 3 or 4 application modules, it may be necessary to reboot the system from the System SW floppy disk, enable the system without loading any application software, and then load the diagnostics software.

SOFTWARE

The first thing you should do after successfully powering up your system is make backup copies of all the floppy disks you received with the system. For directions, refer to *Duplicating Floppy Disks* in Section 6. You should always work from these backup disks and store the master disks in a safe place.

If you purchased a configured system with a hard disk, all the software you need to run the PRISM system already resides on the hard disk and will load automatically at power-up.

If your system does not have a hard disk, you must insert a system floppy disk in the drive every time you power up the system.

If you purchase additional application modules or software, you must make sure that the software gets loaded. There are two ways to do this. You can manually load the software you need with the Load Application operation described in Section 6. Or, you can build a system disk (or series of floppy disks) that loads all the software you need at power up.

Configuring a Hard Disk

If your PRISM system contains a hard disk, you can configure it so that all the software you need loads automatically at power up. If you purchased a configured system, the hard disk already has the necessary files and directories on it. However, if you purchase additional applications, or you ever reformat your hard disk, you must configure the hard disk manually before you can use it to power up your system.

NOTE

> *To upgrade your system software, follow the instructions given under* Installing New Versions of System Software *in Section 6 of this manual.*

This discussion assumes that you are starting with a totally blank, but formatted, hard disk. To configure a hard disk as the power-up system disk, perform the following steps (instructions for creating directories and copying files and directories are given in Section 6 of this manual):

1. Following the instructions given earlier in this section, make sure that your system hardware is set up in a suitable location, that the keyboard, display monitor, and power cord are properly connected to the mainframe, and that the power cord is plugged into an appropriate power source.
2. Insert the system floppy disk into the floppy disk drive on the front of the PRISM mainframe.
3. Press the ON/STANDBY switch on the front panel to turn the mainframe on.
4. If you are using a color monitor, turn the monitor on.
5. As the PRISM boots, it may request software from other floppy disks, depending on the configuration of your system. Watch for the messages displayed at the bottom of the screen and install the other disks as they are requested.
6. When the PRISM has booted from the system floppy disk, select the Disk Services menu (press Util, then scroll through the menus until Disk Services is selected).
7. Make sure the system floppy disk is installed in the floppy disk drive (if you have removed the system floppy disk to install other requested disks during the boot process, reinstall the system floppy disk now).
8. In the operation portion of the Disk Services menu, select Install System.
9. Press F1:Execute Command to start the install operation.

NOTE

If you want to automatically run diagnostics every time you power up your system, follow the procedure given earlier in this section.

10. Copy any optional software from the floppy disks to corresponding directories on the hard disk using Copy File (or Copy Directory) in the Disk Services menu.
11. Press the ON/STANDBY switch on the front panel to power down the system.

You can now power up and run your PRISM system from the hard disk. To ensure that all the necessary software gets automatically loaded, make sure all the probes and Comm Packs you plan to use are connected before you power up the system. Applications software is only loaded if the necessary hardware is connected.

If you have a particular setup that you plan to use often, you can choose to have your system power-up into that setup instead of into the normal defaults. To create an autoloading setup, set all the menus the way you want them. Then, save the instrument setup into the SUPPORT directory in a file called AUTOINIT. When this AUTOINIT file is in the SUPPORT directory, the system powers up to the setup stored in it.

Additional information about loading particular application software is contained in the application user manual.

CREATING A SERIES OF START-UP FLOPPY DISKS

When you power up your PRISM system from a series of floppy disks, messages on the start-up screen tell you what software has been loaded and what hardware still needs software loaded for it. After each floppy disk has been read, you are given the option of inserting another disk containing the unloaded software or of starting operation with only the software that has already been loaded. While you can choose to run your system without all the application software required to use all the hardware, you must have loaded all the system software.

With the exception of diagnostics software, all PRISM software gets loaded into RAM before operation begins. The system does not read additional software off the disk unless you manually perform a Disk Services or Save/Restore menu operation. So, after power-up, you should remove the start-up floppy disk from the disk drive.

To create a series of floppy disks from which to boot and run your PRISM system, do the following (instructions for formatting and duplicating floppy disks, creating directories, and copying files are given in Section 6 of this manual):

1. Use the Format Floppy Disk operation to initialize all the floppy disks you plan to use as start-up disks.
2. Use the Duplicate Floppy Disk operation to make a copy of the system floppy disk that came with your PRISM.

NOTE

You must use the Duplicate Floppy Disk operation rather than simply copying all the system files and directories. Files on the ROOT level are not accessible through the copy operations, but are necessary to create a start-up disk. The only way to copy ROOT files is through the Duplicate Floppy Disk operation.

3. On a second floppy disk, create a directory called SUPPORT.
4. Copy the directory contents of the SUPPORT directories on the application floppy disks into the SUPPORT directory on the second disk in your series of start-up disks.

   If you have more applications than will fit on one floppy disk, you can create an additional floppy disk containing a SUPPORT directory and store the additional applications software there.
5. On a third floppy disk, create a directory called DIAG. You will only use this floppy disk when you want to run diagnostics tests.
6. Copy the contents of the DIAG directory from your diagnostics floppy disk into the DIAG directory on the new floppy disk. At a minimum, this directory should contain the file called DIAG_MAN.

You now have a series of floppy disks with which to start up your PRISM system. To summarize, you have three types of disks. The first is a system disk that contains BOOT and DEVICE directories (plus a transparent ROOT directory). The second disk (or disks) contain a SUPPORT directory into which all application software has been copied. The third disk is a diagnostics disk containing a DIAG directory.

To power up your system, turn on the mainframe and insert the system disk. Then, insert the support disks as the message on the screen asks you for additional application software. The diagnostics disk is not necessary unless you want to use it to manually load and run diagnostics.

PREVENTIVE MAINTENANCE

Preventive maintenance consists of periodic cleaning, inspection, and performance testing. The electrical performance of the mainframe should be checked every 1.5 years of operation. This should be done by a qualified service technician using the steps outlined in the service manual.

CAUTION

To prevent water from getting inside the instrument during external cleaning, use only enough water to dampen the cloth or swab. DO NOT use chemical cleaning agents as they may damage the plastics used in the Mainframes. In particular, avoid chemicals that contain benzene, toluene, xylene, acetone, or similar solvents.

Mechanical inspection and cleaning should be performed as often as the operating environment dictates. Interior cleaning and inspection procedures for the mainframe are listed in the Mainframe Service Manual. These procedures should be performed whenever the mainframe has been subjected to abnormally dirty conditions for any significant amount of time. In a very clean environment, you can operate the mainframe for extended periods without cleaning.

Exterior cleaning may be performed by the operator. Dust the exterior surfaces with a dry, lint-free cloth or a soft-bristle brush. If hard dirt remains, you may use a cloth or swab dampened with 50% mild detergent and warm water solution. The swab is also useful for cleaning in narrow spaces around controls and keys. Use the detergent solution for cleaning the display screen also. Do not use abrasive compounds on any part of the mainframe.

Appendix B: SPECIFICATIONS

INTRODUCTION

This section lists two types of specifications: (1) those that are classified as environmental, physical, or "static" specifications (specifications that cannot be verified by the user); and (2) those that are actual operational parameters (specifications that are verifiable by the user). Refer to the service manuals of your system for verification procedures.

The following terms are used in the specification tables:

Characteristic: A property of the product.

Performance Requirement: The primary performance characteristics of the product that can be verified using verification procedures.

Supplemental Information: Statements that describe typical performance for characteristics of secondary importance (those that are not usually verified using verification procedures) or statements that further explain related performance requirements.

CHARACTERISTICS/SPECIFICATIONS

The performance characteristics in this section are valid under the following conditions:

1. The mainframe must be operating in an environment as specified in *Environmental Specifications,* Table B-2.
2. A warm-up period of at least 20 minutes must precede the verification/ operational procedures.
3. The mainframe power supplies must meet specified power requirements as in *Power Supply Specifications*, Table B-6.

The following tables list the specifications and performance characteristics of the mainframe:

B-1 Physical Characteristics

B-2 Environmental Specifications

B-3 Safety Compliance

B-4 Reliability

B-5 Installation Requirements

B-6 Power Supply Performance Requirements

B-7 Floppy Disk Functional Specifications

B-8 Keyboard Performance Specifications

B-9 Keyboard Key Codes

B-10 Function Key Codes

B-11 Keypad Key Codes

B-12 Hard-Disk Unit Functional Specifications

B-13 Flat-Panel Display Functional Specifications

B-14 MPU Board Electrical Characteristics

B-15 MPU Board Performance Requirements

Table B-1
PHYSICAL CHARACTERISTICS

Characteristic	Description
WEIGHT	
Mainframes (with two acquisition modules)	
3002C (with color display monitor)	62.5 lbs (28 kg)
3002P (with flat-panel display)	38.0 lbs (17 kg)
3002E	22.5 lbs (10 kg)
Hard Disk Drive (with controller board)	2.5 lbs (1.1 kg)
Flat-Panel Display	8.0 lbs (3.6 kg)
DIMENSIONS	See Figures B-1, B-2, and B-3

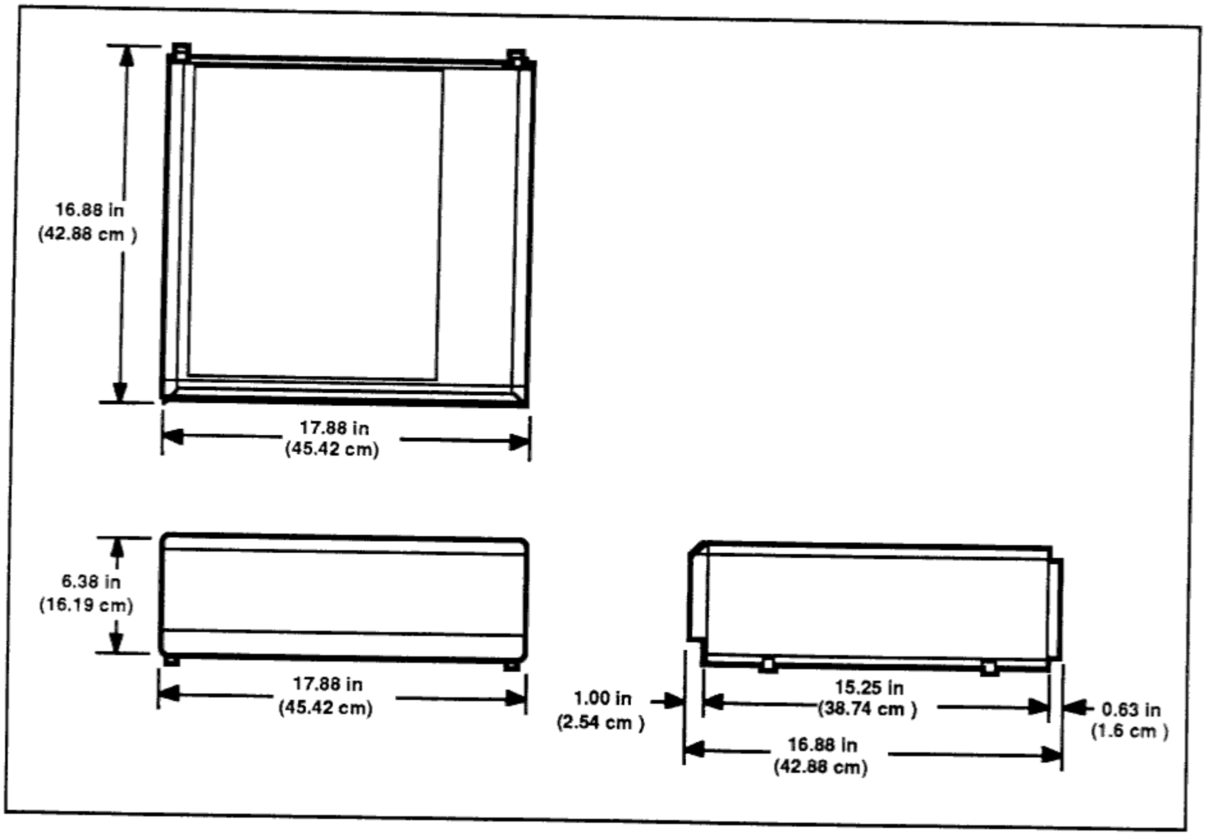


Figure B-1. Mainframe physical dimensions.

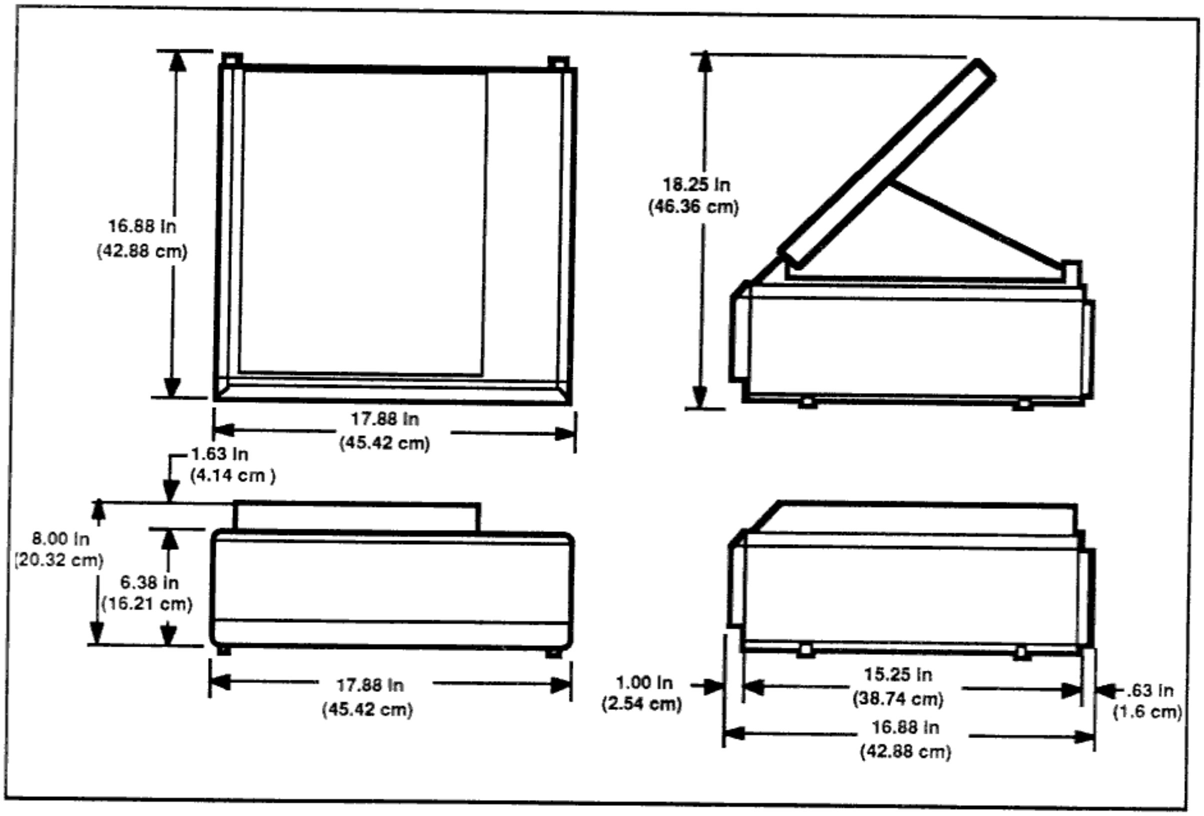


Figure B-2. Physical dimensions of mainframe with flat-panel display in closed position.

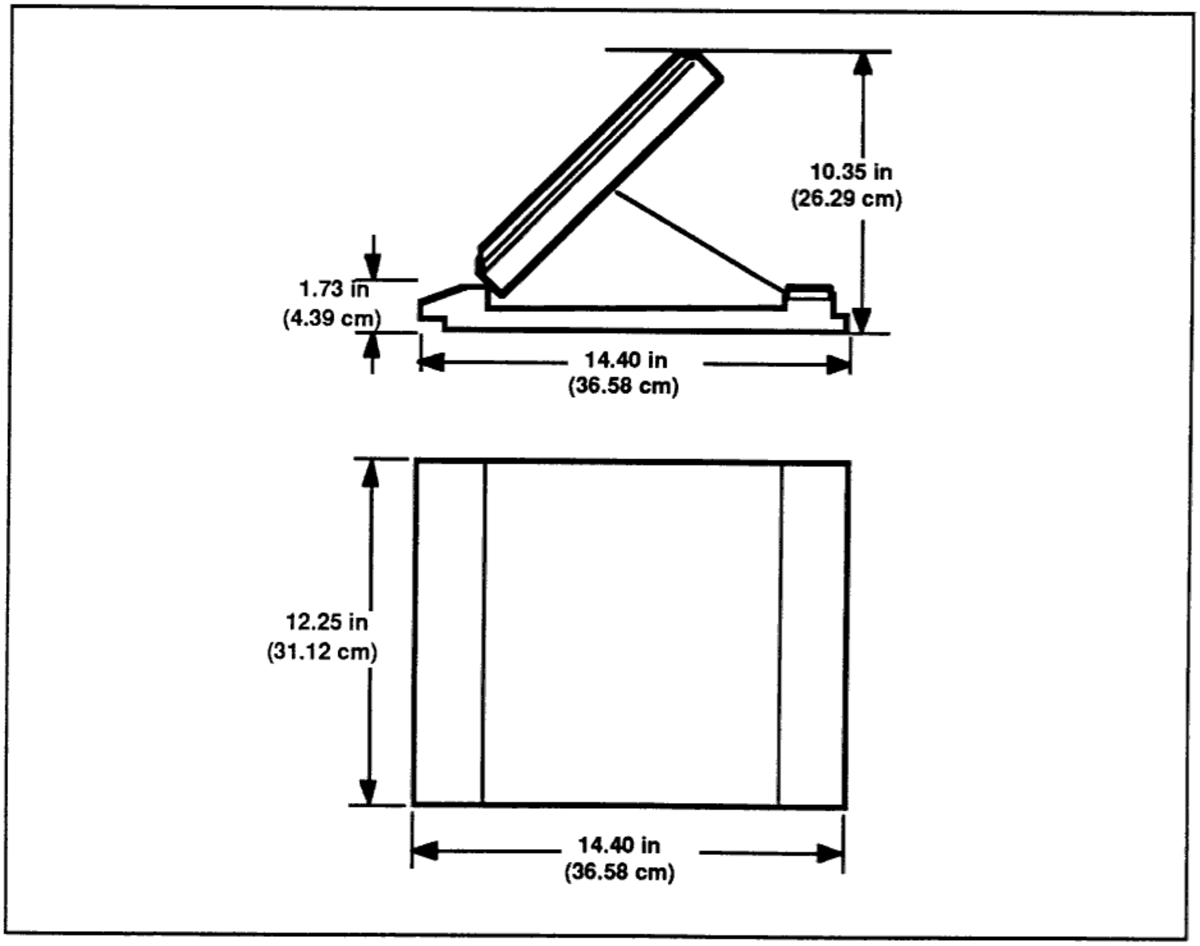


Figure B-3. Physical dimensions of mainframe with flat-panel display in open position.

Table B-2
ENVIRONMENTAL SPECIFICATIONS

Characteristic	Description
Temperature	
operating	+10° C min. +40° C max.
non-operating	-20° C min. +50° C max.
Humidity	
max wet bulb	29° C
operating	20% min. 80% max.
non-operating (relative humidity)	10% min. 95% max. (non-condensing)
Altitude	
operating	15,000 ft. (4.5 km) (decrease operating temperature 1 degree C for each 1000 ft. above 5000 ft.)
non-operating	50,000 ft. (15 km)
Vibration	
operating	0.015 inches p-p displacement @ 5-27 Hz 0.6 gs @ 28-55 Hz
non-operating	0.015 inches p-p displacement @ 5-55 Hz
Shock	
operating	3 gs @ 10 ms
non-operating	30 gs @ 11 ms
Electrostatic Discharge	No permanent damage from a discharge of 20 kV through a 1-kΩ resistor in series with a 500-pF capacitor.
Electromagnetic Susceptibility	RS01, RS02, RS03 CS01, CS02, CS06

Table B-3
SAFETY COMPLIANCE

Characteristic	Description
Safety	Complies with UL 1244, CSA 556B, IEC 348

Table B-4
RELIABILITY

Characteristic	Description
Mean Time Between Failures (MTBF)	2500 hrs. (calculated) (includes MPU board, display unit, power supply, floppy disk, hard disk, and keyboard)

Table B-5
INSTALLATION REQUIREMENTS

Characteristic	Description
MAINFRAME	
Heat Dissipation	
Typical Max. Load	1000 BTU/hr. 1700 BTU/hr.
Surge Current	27 A typical power at power on 30 A maximum
Cooling Clearance	6 inches on sides (The flat panel display requires 6 inches above when either opened or closed.)
COLOR MONITOR	
Heat Dissipation	510 BTU/hr.
Surge Current	
110 V	25 A peak max.
220 V	13 A peak max.
Cooling Clearance	Do not block (cover) any cooling vents on top, bottom, or sides. Maximum ambient temperature near the monitor should not exceed 40° C.
Distance from EMI sources	The monitor should be as far removed as possible from electromagnetic sources.

Table B-6
POWER SUPPLY PERFORMANCE REQUIREMENTS

Characteristic	Performance Requirement	Supplemental Information
Description		A 275 watt switching power supply with triple outputs for +5, -12, and +12 Vdc
AC Power Input		
Voltage	90-132 Vac 180-250 Vac	switch selectable switch selectable
Frequency	48-63 Hz	
Input Power		500 VA max.
Line Fuse	115/230 Vac	8 A Fast blow fuse
Holding Time		=> 60 ms (The time it takes the +5 V output to drop to 4.5 V after the POWER FAIL signal occurs.)
Turn-on Time		=< 200 ms (The time it takes the +5 V output to reach 4.5 V after application of the REMOTE ON signal.)
Thermal Shutdown		If fan stops, or if over-temperature condition in power supply, power supply shuts down to prevent failure of electrical modules
DC Power Output		
+5 Vdc		
Regulation	+5 Vdc +.05%/-2.5%	
Ripple	<100 mV p-p	Measured differently
Output Current	10 A max MPU Board	Foldback current limit between 8 and 10 A.

Table B-6 (CONT.)
POWER SUPPLY PERFORMANCE REQUIREMENTS

Characteristic	Performance Requirement	Supplemental Information
Max required current	30 A max each acquisition module	Foldback current limit between 25 and 30 A each Acquisition Module. Recovery from current limit requires recycling front panel POWER switch.
Over-voltage protection	+6 V +5%	Over-voltage condition shuts down supply.
+12 Vdc		
Regulation	12 V ±5%	
Ripple	100 mV p-p	
Output Current	5.6 A	
Current Limit		Protected by 7 A fuse
-12 Vdc		
Regulation	-12 V ±5%	
Ripple	100 mV p-p	
Output Current	4.0 A	
Current Limit		Protected by 7 A fuse

Table B-7
FLOPPY DISK FUNCTIONAL SPECIFICATIONS

Characteristic	Description
Description	Half-height, 3.5 inch, 1.0 MByte (unformatted), doublesided.
Unformatted Capacity	
Per Disk	1 MBytes
Per Surface	512 KBytes
Per Track	6.25 KBytes
Formatted Capacity	
Per Disk	720 KBytes
Per Track	4.096 KBytes
Per Sector	0.256 KBytes
Transfer Rate	250 Kbits/second
Access Time	
Track-to-track	3 ms max.
Average	100 ms max.
Settling Time	15 ms max.
Input Power	
DC Voltage	+5 V +5%
Input Current	0.32 A Typical (1.1 A max.)
Ripple	100 mV
Standby	9 mA

Table B-8
KEYBOARD PERFORMANCE SPECIFICATIONS

Characteristic	Performance Requirement	Supplemental Information
Description		QWERTY typing keyset with hex pad and function keys
Clock	19.2 KHz ±3%	
Serial Data Protocol	19.2 KBaud, synchronous	One start bit, eight data bits, one stop bit, no parity.
Repeat Key Lag	0.5 seconds	
Repeat Key Rate	10 per second	
QWERTY Key Codes	ASCII/North American	See Table B-10.
Function Key Codes		Hexadecimal. See Table B-11
Keypad Key Codes		Hexadecimal. See Table B-12
Input Power		
DC Voltage	+5 V ±5%	Regulation occurs within the keyboard circuitry.
DC Current	1 A max	

Table B-9
KEYBOARD KEY CODES

Key	Unshifted	Shifted	Control	Control-Shift	Caps Lock
BACKSPACE	08	08	08	08	08
TAB	09	D2	09	D2	09
RETURN	0D	0D	0D	0D	0D
ESC	1B	1B	1B	1B	1B
SPACE	20	20	20	20	20
'(apostrophe	27	22	98	99	9A
, (comma)	2C	3C	9B	9C	2C
- (dash)	2D	5F	9D	1F	2D
. (period)	2E	3E	9E	9F	2E
/	2F	3F	A0	A1	2F
0	30	29	A2	29	30
1	31	21	A7	A8	31
2	32	40	B1	00	32
3	33	23	B2	B3	33
4	34	24	B4	B5	34
5	35	25	B6	C5	35
6	36	5E	C6	1E	36
7	37	26	C7	26	37
8	38	2A	C8	2A	38
9	39	28	C9	28	39
;	3B	3A	CA	CB	CC
=	3D	2B	CD	CE	3D
[	5B	7B	CF	D0	D1
\	5C	60	F7	1C	5C
]	5D	7D	F8	1D	5D
A	61	41	01	01	41
B	62	42	02	02	42
C	63	43	03	03	43
D	64	44	04	04	44
E	65	45	05	05	45
F	66	46	06	06	46
G	67	47	07	07	47
H	68	48	08	08	48
I	69	49	09	09	49
J	6A	4A	0A	0A	4A
K	6B	4B	0B	0B	4B
L	6C	4C	0C	0C	4C
M	6D	4D	F9	FA	FB
N	6E	4E	0E	0E	4E
O	6F	4F	0F	0F	4F
P	70	50	10	10	50
Q	71	51	11	11	51
R	72	52	12	12	52
S	73	53	13	13	53
T	74	54	14	14	54
U	75	55	15	15	55
V	76	56	16	16	56
W	77	57	17	17	57
X	78	58	18	18	58
Y	79	59	19	19	59
Z	7A	5A	1A	1A	5A
|	7C	7E	FC	FD	7C
RUBOUT (DEL)	7F	7F	7F	7F	7F
PRINT	E9	E5	E9	E5	E9

Table B-10
FUNCTION KEY CODES

Key Label	Unshifted	Shifted	Control	Control-Shift
F8	90	F6	90	F6
F7	91	F5	91	F5
F6	92	F4	92	F4
F5	93	F3	93	F3
F4	94	F2	94	F2
F3	95	F1	95	F1
F2	96	F0	96	F0
F1	97	EF	97	EF
HELP NOTES	EE	ED	EE	ED
START/STOP	EC	E8	EC	E8
AUTO	EB	E7	EB	E7
CONT	EA	E6	EA	E6
PRINT SCREEN	E9	E5	E9	E5
NEXT	C4	BD	C4	BD
PREV	C3	BC	C3	BC
HOME	C2	BB	C2	BB
UP-ARROW	C1	BA	C1	BA
DOWN-ARROW	C0	B9	C0	B9
LEFT-ARROW	BF	B8	BF	B8
RIGHT-ARROW	BE	B7	BE	B7
SETUP	B0	AC	B0	AC
DSPL	AF	AB	AF	AB
EDIT	AE	AA	AE	AA
UTIL	AD	A9	AD	A9
SELECT UP-ARROW	A6	A4	A6	A4
SELECT DOWN-ARROW	A5	A3	A5	A3

Table B-11
KEYPAD KEY CODES (HEX)

Key Label	Unshifted	Shifted	Control	Control-Shift
0	80	D3	80	D3
1	81	D4	81	D4
2	82	D5	82	D5
3	83	D6	83	D6
4	84	D7	84	D7
5	85	D8	85	D8
6	86	D9	86	D9
7	87	DA	87	DA
8	88	DB	88	DB
9	89	DC	89	DC
A	8A	DD	8A	DD
B	8B	DE	8B	DE
C	8C	DF	8C	DF
D	8D	E0	8D	E0
E	8E	E1	8E	E1
F	8F	E2	8F	E2
X	E3	E4	E3	E4
HELP NOTES	EE	ED	EE	ED

Table B-12
HARD DISK FUNCTIONAL SPECIFICATIONS

Characteristic	Description
Description	Half-height, random access, 95 mm, rigid media disk drive using Winchester® technology.
Unformatted Capacity	20 MByte
Transfer Rate	5.0 Mbits/second
Access Time	
Average Latency	8.33 ms
Seek Time	
Single Track	15 ms
Average	68 ms
Maximum	152 ms
Data Reliability	
Recoverable Error	1 in 10^{10} bits read
Permanent Error	1 in 10^{12} bits read (not recoverable in 16 seeks)
Seek Error	1 in 5 X 10^{6} seeks
Power Requirements	
+12 V Input	+12 V ±5%
Current	0.70 A typical (0.85 A max.)
Surge	2.0 A max during initial 5 seconds 1.5 A typical during initial 12 seconds
+5 V Input	+5V ±5%
Current	0.55 A typical (0.65 A max.)

Table B-13
FLAT-PANEL DISPLAY FUNCTIONAL SPECIFICATIONS

Characteristic	Description
Active Area	4.8 X 7.68 inches
Pixel Size	0.0087 X 0.0087 inches
Pixel Matrix	640 X 400 pixels
Viewing Angle	>/=120%
Contrast Ratio	5:1 min.: 15:1 max.
Scan Rate	24,000 lines per second
Brightness	70 cd/sq. meter (typical)
Half-life	50,000 hours
Input Power	+12 Vdc ±5%

Table B-14
MPU ELECTRICAL CHARACTERISTICS

Characteristic	Description
CPU	Motorola 68010
RAM	4 Mbytes*
ROM	32 Kbytes x 16
Battery (Calendar)	
Type	Lithium BR2325, 3V, 0.15AH
Life	1 to 5 years
Clock Calendar Oscillator	32.7876 kHz ±0.006%
Mass Storage	720 Kbyte (formatted) floppy disk 20 Mbyte hard disk
Acquisition Module Support	4 (2 on "Internal TekLink"; 2 on "External TekLink")
Communication Support	
RS-232C Port	DTE
	Asynchronous mode: Half duplex, full duplex
	Baud Rates: 50, 75, 110, 134.5, 150, 200, 300, 600, 1200, 1800, 4800, 7200, 9600, 19200
Driven Lines	TD, RTS, DTR
	Monitored Lines: RD, CTS, DSR, DCD, RI
Keyboard Port	19200 Baud, serial data
TekLink Port	12.5 MHz, serial data
1200-Series COMM Pack Port	COMM Packs Supported 1200C01 RS-232C 30C02 GPIB
Data Path	8 or 16 bits (Pack-dependent)
Address Space	128 Kbytes

* Older models have 2 Mbyte MPU

Table B-14 (cont.)
MPU ELECTRICAL CHARACTERISTICS

Characteristic	Description
Communication Support (Cont.)	
Display Port	Supports color or monochrome CRT or Flat-Panel Display
Display Controller	Supports EGA Color and monochrome CRTs and Flat-Panel Displays
Viewable Resolution	640 x 400 pixels
Scrolling	Horizontal and vertical smooth scrolling
Data Windows	2
Cursors	3 per data window
Character Font	8 x 10 pixels
Character Matrix	10 x 16 pixels
Screen Copying	Programmable "pixel-based" reading by CPU permits printing of screen images
Clock Calendar	
Programmable	Day, Month, Time
TRIG OUT	50 Ω source impedence
V-out high, open	3.8 V min.
V-out high, 50 Ω	1.9 V min.
V-out low	0.6 V max. @ 7 mA
Pulse Width	20 ns min.
TRIG IN	
Input Resistance	1 MΩ ±1%
Input Capacitance	37 pF ±5 pF
V-input max.	±20 V

Table B-14 (cont)
MPU ELECTRICAL CHARACTERISTICS

Characteristic	Description
X1 Probe and 50Ω Term Coax	
Input Threshold	1.4 V ±100 mV
Min. Pulse Amplitude	1.8 V high; 0.6 V low
Min. Pulse Width	30 ns
X10 Probe	
Input Threshold	1.4 V ±500 mV
Min. Pulse Amplitude	2.4 V high; 0.6 V low
Min. Pulse Width	30 ns
Min. Slew Rate	5 V/µs

Table B-15
MPU PERFORMANCE REQUIREMENTS

Characteristic	Performance Requirement	Supplemental Information
Master Clock	10 MHz +/- 0.01% accuracy	
TekLink clocks		
M_CLK; M_CLK/		
Frequency	50 MHz ±0.1%. Logic levels: +5 ECL referenced to TekLink supply	
Duty Cycle	50% ±0.1%	
S_CLK		
Frequency	12.5 MHz ±0.1%	
Duty Cycle	50% ±0.1%	

Appendix C: OPTIONS and ACCESSORIES

PRISM 3002C Mainframe with Color Monitor

STANDARD ACCESSORIES FOR PRISM 3002C

Description	Tektronix Part Number
Cable, mainframe-to-monitor, 6 ft.	174-1299-00
Cover, probe opening	337-3545-00
Disk, 3000 System Diagnostic	063-0165-xx
Disk, 3000 System Software	062-9892-xx
Disk, Graph Display Software	063-1318-xx
Manual, Read Me First	070-7967-xx
Manual, User's, 3002 System, with binder	070-7006-xx
Marker, Slot Identifier	334-8267-00
Panel, filler, display mounting (required for color monitor)	386-5664-00
Power cord (115 V North American)	161-0104-00

OPTIONAL ACCESSORIES FOR PRISM 3002C

Description	Tektronix Part Number
Bag, accessory	016-0707-01
Binder, PRISM 3000, for additional manuals	016-1051-00
Cable, coaxial , 50 Ω, 36-in.,(for trig in/out), u/w 011-0049-01	012-0482-00
Cable, modem, null, 60-inch	012-0530-00
Cable, RS-232, 2 meter	012-0815-00
Disk, floppy, 720-Kbyte, 31/2-inch	119-3136-xx
Manual, service, 3002 and 2510 Mainframes	070-7412-xx
Manual, service, MPU circuit board	070-7413-xx
Terminator, 50 Ω, (for trigger in BNC), u/w 012-0482-00	011-0049-01
Universal Euro, 220 V power cord	161-0104-06
United Kingdom, 240 V power cord	161-0104-07
Australia, 240 V power cord	161-0104-05
Swiss, 220 V power cord	161-0154-00
1200C01 RS-232 COMM pack	1200C01
30C02 GPIB COMM pack	30C02

PRISM 3002P Mainframe with Flat-Panel Display

STANDARD ACCESSORIES FOR PRISM 3002P

Description	Tektronix Part Number
Cable, mainframe to flat-panel display, 10-in.	174-0947-01
Cover, probe opening	337-3545-00
Disk, 3000 System Diagnostic	063-0165-xx
Disk, 3000 System Software	062-9892-xx
Disk, Graph Display Software	063-1318-xx
Manual, Read Me First	070-7967-xx
Manual, User's, 3002 System, with binder	070-7006-xx
Marker, Slot Identifier	334-8267-00
Power cord (115 V North American)	161-0104-00

OPTIONAL ACCESSORIES FOR PRISM 3002P

Description	Tektronix Part Number
Bag, accessory	016-0707-01
Bag, carrying, 3002P	016-0909-01
Binder, PRISM 3000, for additional manuals	016-1051-00
Cable, coaxial, 50 Ω, 36-in.,(for trig in/out), u/w 011-0049-01	012-0482-00
Cable, mainframe to flat-panel display, 6-ft.	174-1390-00
Cable, modem, null, 60-inch	012-0530-00
Cable, RS-232, 2 meter	012-0815-00
Case, transit, 3002P, with wheels	016-0994-00
Disk, floppy, 720-Kbyte, 31/2-inch	119-3136-xx
Manual, service, 3002 and 2510 Mainframes	070-7412-xx
Manual, service, MPU circuit board	070-7413-xx
Terminator 50 Ω (for trigger in BNC), u/w 012-0482-00	011-0049-01
Universal Euro, 220 V power cord	161-0104-06
United Kingdom, 240 V power cord	161-0104-07
Australia, 240 V power cord	161-0104-05
Swiss, 220 V power cord	161-0154-00
1200C01 RS-232 COMM pack	1200C01
30C02 GPIB COMM pack	30C02

PRISM 3002E Expansion Mainframe

STANDARD ACCESSORIES FOR PRISM 3002E

Description	Tektronix Part Number
Cable, TekLink, mainframe-to-mainframe, 4-ft.	174-1152-00
Cover, probe opening	337-3545-00
Manual, Read Me First	070-7967-xx
Instructions, Application Module and Expansion Mainframe Installation	070-7696-xx
Marker, Slot Identifier	334-8267-00
Panel, filler, display mounting (required for color monitor)	386-5664-00
Plate, mounting, mainframe	386-5792-00
Power cord (115 V North American)	161-0104-00

OPTIONAL ACCESSORIES FOR PRISM 3002E

Description	Tektronix Part Number
Manual, service, 3002 and 2510 Mainframes	070-7412-xx
Universal Euro, 220 V power cord	161-0104-06
United Kingdom, 240 V power cord	161-0104-07
Australia, 240 V power cord	161-0104-05
Swiss, 220 V power cord	161-0154-00

PRODUCTS SUPPORTED

The PRISM 3002 is compatible with the following products:

Application Modules

30HSM High Speed Acquisition Module
30MPM 8/16-Bit Microprocessor Analysis Module
30MPX 8/16/32-Bit Microprocessor Analysis Module
30DSM Digitizing Oscilloscope Module
32GPX 8/16/32-Bit Microprocessor Analysis Module

Prototype Debug Tool

30RP2/30RP1 General Purpose Prototype Debug Tool
30DD27/30DD31/30DD33 68000/68010/68020/68030 Prototype Debug Tool (30MPM/MPX only)
30DD09 80386DX/80386SX Prototype Debug Tool (30MPM/MPX only)

Performance Analysis

32PA Performance Analysis Software (32GPX)
30DA01 Performance Analysis Software (30MPM/MPX)

Microprocessor Disassemblers (32GPX)

32DM02 8085 Microprocessor Disassembly
32DM04 8086/8088/80C86/80C88 Microprocessor Disassembly
32DM06 80186/80188/80C186/80C188 Microprocessor Disassembly
32DM07 8031/8051 Microprocessor Disassembly
32DM08 80286/80C286 Microprocessor Disassembly
32DM09 80386DX Microprocessor Disassembly
32DM10 80386SX Microprocessor Disassembly
32DM12 80486DX/486DX2/486SX/487SX Microprocessor Disassembly
32DM24 6809/6809E Microprocessor Disassembly
32DM27 68000/68010/68HC000/68HC001/68EC000 Microprocessor Disassembly
32DM31 68020/68EC020 Microprocessor Disassembly
32DM33 68030/68EC030 Microprocessor Disassembly
32DM34 68040/68EC040/68LC040 Microprocessor Disassembly
32DM41 Z80 Microprocessor Disassembly
32DM91 68HC11 Microprocessor Disassembly
32DM92 68302 Microprocessor Disassembly
32DM93 68331/68332 Microprocessor Disassembly
32DM96 68HC16 Microprocessor Disassembly
32DM101 56000/1/2 Microprocessor Disassembly
32DM122 TMS32020/TMS320C25/C26 Microprocessor Disassembly

Microprocessor Disassemblers (30MPM/MPX)

30DM04 8086/8088 Microprocessor Disassembly
30DM06 80186/80188 Microprocessor Disassembly
30DM07 8031/51 Microprocessor Disassembly
30DM08 80286 Microprocessor Disassembly
30DM09A 80386 Microprocessor Disassembly
30DM10 80386SX Microprocessor Disassembly
30DM27 68000/68010 Microprocessor Disassembly
30DM31 68020 Microprocessor Disassembly
30DM33 68030 Microprocessor Disassembly
30DM41 Z80 Microprocessor Disassembly
30DM41F 20MHz Z80 Microprocessor Disassembly
30DM91 68HC11 Microprocessor Disassembly
30DM92 68302 Microprocessor Disassembly
30DM93 68331/68332 Microprocessor Disassembly
30DM993 CPU32 (68330/68331/68332/68340) Microprocessor Disassembly
30DM101 DSP56000/1 Microprocessor Disassembly

Appendix D: FILE FORMATS

INTRODUCTION

This document describes the general structure and contents of PRISM data files. Understanding the structures of PRISM data files will help you interpret and modify them when working in other computing environments.

There are several reasons you may want to understand the structure and content of PRISM data files. You may wish to:

- upload acquired data to the host or controller for comparison with simulator-predicted test results
- modify an acquisition data file, then download it to the PRISM as a reference memory for comparison to newly-acquired data
- upload and download symbol table files for disassemblers
- download a monitor program to the ROM emulation memory of the Prototype Debug Tool (PDT). See *Appendix D* of the *30RP2 / 30RP1 General Purpose PDT User Manual* for more information about PDT file transfer formats.

This document covers only acquisition and symbol table data files; it does not describe the contents of other types of PRISM files such as system and module setup files. When you want to create and modify setups for the PRISM, use the standard user interface to create menus and save them as setup files. Later, you can load these setups using commands listed in the PRISM user's manuals.

HOW THE PRISM 3000 BUILDS AND READS ACQUISITION DATA FILES

All PRISM application modules use a standard data file format. This format has been developed by Tektronix as a standard for new and future digital analysis instruments. The purpose of the standard data file format is to increase the portability and general-purpose utility of application programs that operate on instrument data files.

The format described in this section is a standard for data stored in acquisition memory (ACQMEM) and for reference memories (REFMEM) stored on PRISM disks.

When a PRISM module acquires data, it creates a memory header that contains information about the module and the acquisition. The PRISM uses the memory header when it displays that module's data and includes the header when it creates a file to store the module's data.

The acquisition-specific data in the header includes details of the module's operation. For example, it contains the time the module started running and the counter and timer values accumulated during operation (if any). Most importantly, it contains the details of how to read and interpret the actual data that the module acquired during operation.

Until a file is created to store the module's data, the data resides in the module's acquisition memory and the memory header resides in the PRISM mainframe's memory. When a data file is created, the memory header becomes part of the file and a standard file header is created. The memory header and the module's data are stored as a series of data records.

When the PRISM loads a data file, it transfers the memory header and the data into memory, discarding the standard file header. The memory header is used to interpret the sequence-oriented data records.

Figure D-1 shows an overview of a standard-format data file. Each file corresponds to only one application module. Each disk file consists of three basic parts: a file header, a memory header, and zero or more data vectors. The headers (consisting of many sub-parts) contain all non-vector-oriented information from the acquisition.

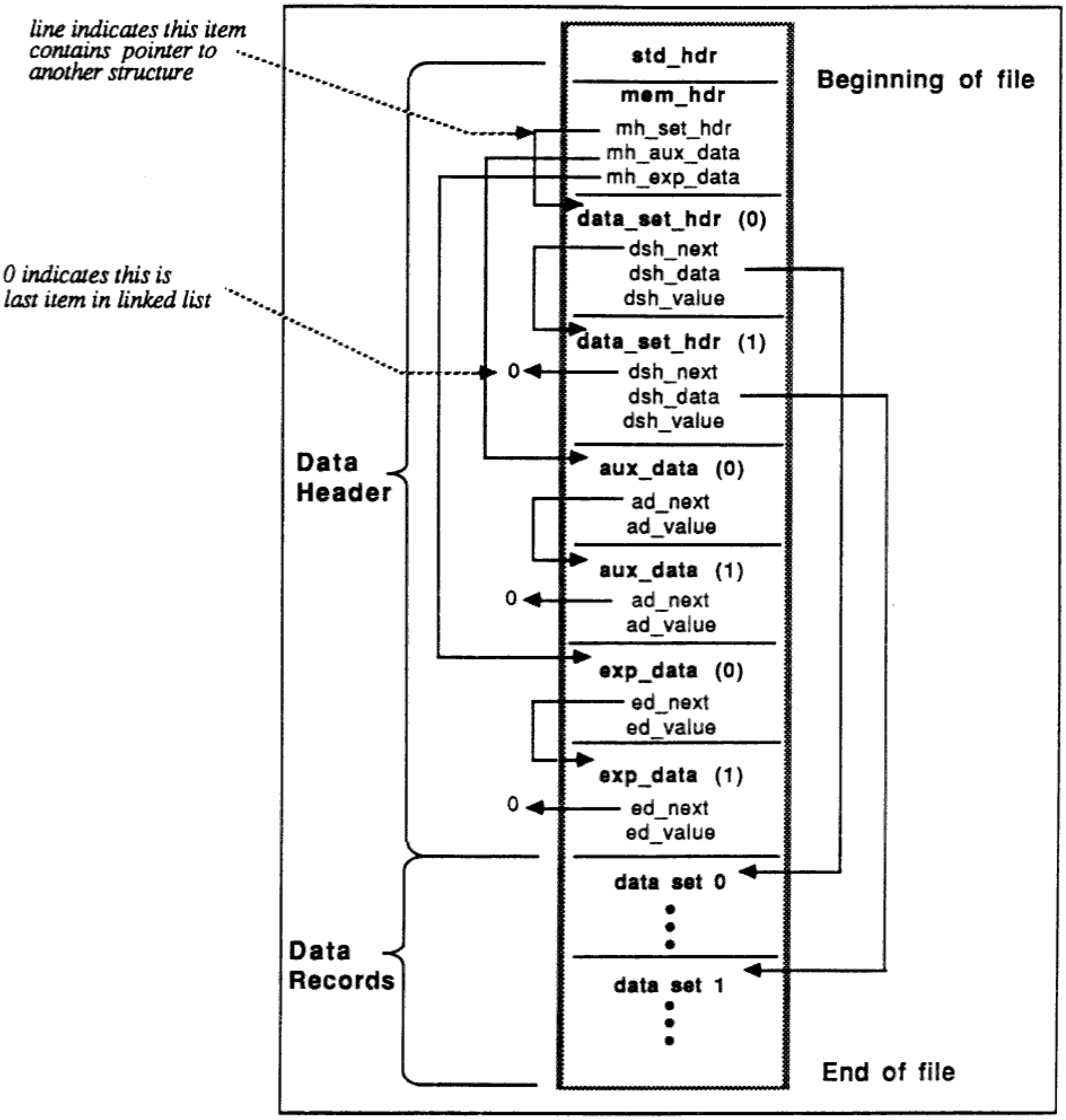


Figure D-1. Elements of a PRISM data file. This illustration shows an overview of a binary data file as it would appear when retrieved from the PRISM disk. This example file contains two data sets, two auxiliary data items, and two types of expansion data.

STANDARD FILE HEADER STRUCTURE

This section describes the standard file header format in terms of the "C" programming language's data structures; however, since the data structures are fully described, translation to other programming languages should be straightforward.

```
#ifndef _STD_HEADER
#define _STD_HEADER

/* include types.h as needed */
#ifndef  _TYPES
#include "types.h"
#endif

/* Used to build the std_header for every PRISM 3000 load-module. */



/*
 * A header of this form should be the first part of every PRISM 3000 file.
 * It is used by the file system in restoring (Copy: Disk->RAM) all
 * PRISM 3000 files.  Typically, the header is placed in the start
 * of a file via the fsave() call (see FS doc).  For load modules,
 * however, this is constructed.
 *
 */

#define FS_VALIDATION         0xA5A55A5A
#define FS_LOADER_NAME_SIZE    4
#define FS_UNIQUE_NAME_SIZE    4
#define FS_REQUIREMENTS_SIZE 100

/* if you change the size of this please also change STD_HEADER_SIZE */
struct std_header_type {
        ULONG validation;       /* init to "FS_VALIDATION" for idiot check */
        UWORD file_type ;       /* Type_qualifyer & Card identifier */
        CHAR loader_name[FS_LOADER_NAME_SIZE]; /* 3 char unique name + NUL */
        CHAR unique_name[FS_UNIQUE_NAME_SIZE]; /* 3 char unique name + NUL */
        CHAR requirements[FS_REQUIREMENTS_SIZE];
                                /* GA requirements string (may be null)    */
};
```

```
/* The size of std_header must be computed by hand for the Vax because
 * sizeof() in cc returns a different value than sizeof() for a 68k cross
 * compiler due to different amounts of padding.
 */
#ifdef VAX
#define STD_HEADER_SIZE 114
#else
#define STD_HEADER_SIZE sizeof(struct std_header_type)
#endif

#endif
```

Figure D-2a. Standard File Header format. See Figure D-2b for the included file types.h.

```
#ifndef _TYPES
#define _TYPES

/*
 * Summary:
 *       TYPE DEFINITIONS ACCORDING TO
 *          GREENHILLS AND OASIS USAGE.
 *
 * This file contains PRISM standard definitions for commonly
 * used types.  Use these and avoid problems with char and int.
 *
 */

/*
 * Include utility.h here so each file won't have to include it
 * separately.  Like this file, types.h, everyone needs it.
 */
#include     "utility.h"

typedef char  BYTE;               /* signed byte */
typedef short WORD;               /* signed word */
typedef int   LONG;               /* signed long */

typedef unsigned char  UBYTE;          /* unsigned ubyte */
typedef unsigned short UWORD;          /* unsigned uword */
typedef unsigned int   ULONG;          /* unsigned ulong */
typedef unsigned char  CHAR;           /* unsigned char  */

typedef unsigned *     ADDR;           /* unsigned address */
typedef unsigned char  BOOL;           /* boolean */
typedef unsigned char *STRING;         /* string pointer */
typedef      unsigned       BITS;      /* used for structure bitfields */
```

```
typedef float        FLOAT;       /* orthogonality */
typedef double            DOUBLE;            /* orthogonality */

typedef unsigned int   FD;        /* this type is used as a
                                   * return by the filesystem
                                   */
typedef unsigned short SIGNAL;          /* type of all SIGNALs */

typedef unsigned int   XID;              /* eXchange IDentifier */
typedef unsigned int   PID;              /* Process IDentifier  */

#endif
```

Figure D-2b. Type definitions for the Standard File Header format.

MEMORY HEADER STRUCTURE

The memory header's data structures contain key information on the organization of the acquisition data or symbol definition records that follow the header. This section presents the basic data structures that make up a standard format memory header.

Header Data Types and Environment Considerations

Several data types are defined for the standard-format memory header. This section describes the header format in terms of the "C" programming language's data structures; however, since the data structures are fully described, translation to other programming languages should be straightforward.

The PRISM organizes data bytes and bits as follows.

- The most-significant bytes of 16- and 32-bit data are in even-numbered byte locations; the least-significant bytes are in odd-numbered locations.
- The most-significant bytes are stored closer to the beginning of a file than least-significant bytes.
- Bits within a byte are numbered 0 through 7, with 0 being the least-sigificant and 7 the most-significant bit.

If your system organizes its data storage differently, you can create software routines to rearrange certain types of data contained in the file header.

If you plan to interpret or edit PRISM data files in a non-68010 computing environment, you must select equivalent data types to represent all file header entries. You will want to consider certain data characteristics when operating on data files in another environment. The most obvious of these characteristics is the size of each data element. All data file headers are specified as one of three basic data types: UBYTE, UWORD, and ULONG (meaning unsigned 8-, 16-, and 32-bit entities, respectively).

Figures D-3 and D-4 show how standard format memory header structures are declared.

```
#ifndef _ACQUISITION
#define _ACQUISITION

#ifndef _TYPES
#include        "types.h"
#endif


/*
 * Associated Constants
 */

/* Version Numbers */
#define VER_1_86        0          /* initial version of file format */

/* Field Descriptors */
#define MAXMODNAME      22            /* null terminated module name */
#define MAXDSNAME       22      /* null terminated timestamp set name */
#define MAXFIELDS       15  /* up to 15 pre-defined fields per record */
#define FIELD_VAR       15  /* field 15 is variable (not pre-defined) */
#define FIELD_TS        3          /* field 3 reserved for timestamp */
#define FIELD_GLITCH    2         /* field 2 reserved for glitch data */
#define FIELD_CHANNEL   1        /* field 1 reserved for channel data */
#define FIELD_ALL       0          /* field 0 contains entire record */

/* Trigger Types */
#define TT_NONE         0                                /* no trigger */
#define TT_UNKNOWN      1                /* trigger position is unknown */
#define TT_SEQUENCE     2 /* trigger position specified as sequence # */
#define TT_TIMESTAMP    3  /* trigger position specified as timestamp */

/* Channel Data Formats */
#define DF_STANDARD     0             /* standard data representation */
#define DF_GL_TS        1 /* 2 bit/sample data w/glitch and timestamp */
```

```
/* Auxiliary Data Types */
#define AD_RAW          0                     /* aux_data type = raw */
#define AD_COUNTER      1                 /* aux_data type = counter */
#define AD_PSTIMER      2                /* aux_data type = ps timer */
#define AD_NSTIMER      3                /* aux_data type = ns timer */
#define AD_USTIMER      4                /* aux_data type = us timer */
#define AD_MSTIMER      5                /* aux_data type = ms timer */
#define AD_SECTIMER     6           /* aux_data type = seconds timer */
#define AD_STRING       7                  /* aux_data type = string */
#define AD_TAB          8                     /* aux_data type = tab */
#define AD_NEWLINE      9                 /* aux_data type = newline */

/* Data directions */
#define OLDER     ((BOOL) 1)      /* indicates older direction or data */
#define YOUNGER   ((BOOL) 0)    /* indicates younger direction or data */

/* trigger status states */
#define         PRE_TRIG        0
#define         POST_TRIG       1
#define         TSS_OFF         2
#define         COMPLETE        3
#define         SLOW CLOCK      4
```

Figure D-3. Constants used in a PRISM memory header. This is a sample file that shows how header file constants are declared in "C." The numeric values replace the symbolic names immediately before compilation. Text enclosed by slashes and asterisks (for example, /* text */) are comments that describe what the value represents. See Figure D-2b for the included file "types.h."

```
/*
 * Acquisition related data
 */

        struct  acquisition_block {
                struct  ts_type    Max_TS_Value;
                struct  ts_type    Min_TS_Value;
                struct  ts_type    Trigger_TS_Value;
                ULONG     Max_Loc_Value;
                ULONG     Min_Loc_Value;
        };

        struct  mod_status {
                UBYTE   acq_status;
                UBYTE   mem_fill;
                UBYTE   trig_level;
                BOOL    valid[3];
        };

        struct  tss_struct {
```

```
                UBYTE   module;
                UBYTE   tss_id;
                CHAR    name[11];
                struct  mod_status      status;
        };



/*
 * Auxiliary data
 */

        struct  aux_data {
                ULONG   ad_size;
                ULONG   ad_next;
                UWORD   ad_type;
                UBYTE   ad_value[1];
        };
/*
 * Expansion data
 */

        struct  exp_data {
                ULONG   ed_size;
                ULONG   ed_next;
                UWORD   ed_type;
                UBYTE   ed_value[1];
        };


/*
 * Acquisition Memory Header
 */

        struct  mem_hdr {
                UWORD   mh_version;
                UWORD   mh_mod_type;
                ULONG   mh_size;
                ULONG   mh_set_hdr;
                ULONG   mh_aux_data;
                ULONG   mh_exp_data;
                UWORD   mh_set_qty;
                UWORD   mh_aux_qty;
                UWORD   mh_exp_qty;
                UWORD   mh_trig_type;
                struct  ts_type mh_trig_pos;
                UBYTE   mh_start_time[26];
                UBYTE   mh_name[MAXMODNAME];
```

```
        };


/*
 * Acquisition Data Field Definition
 */

        struct  acq_field {
                UWORD   dsh_first_byte;
                UWORD   dsh_field_width;
                UBYTE   dsh_field_pad;
                UBYTE   dsh_field_bits;
        };


/*
 * Timestamp Set Header
 */

        struct data_set_hdr {
                ULONG   dsh_size;
                ULONG   dsh_next;
                ULONG   dsh_data;
                ULONG   dsh_first_rec;
                ULONG   dsh_records;
                ULONG   dsh_ts_tick;
                struct  ts_type dsh_period;
                UBYTE   dsh_format;
                UBYTE   dsh_samples;
                UWORD   dsh_trig_type;
                struct  ts_type dsh_trig_pos;
                struct  ts_type dsh_start_time;
                struct  acq_field       dsh_fields[MAXFIELDS];
                UBYTE   dsh_name[MAXDSNAME];
                ULONG   dsh_grouping;
                UBYTE   dsh_value[1];
        };


#endif
```

Figure D-4. PRISM memory header. This illustration shows the "C" declarations of the data file's four header structures.

The following paragraphs describe the data structure shown in Figure D-4.

Mem_hdr

The mem_hdr data structure contains summary information about the data contained in the file. Its main function is to identify the file and provide enough information to allow an application program to navigate through the rest of the header. It also includes general information that applies to all data sets.

mh_version. The version number refers to the format of the data file. If the data file format must be modified later, this number identifies the standard to which a file conforms.

mh_mod_type. Identifies the type of module from which data was acquired. This value specifies the format of the module-specific portions of the header. Values 0-99 are reserved for the PRISM systems, and values 100–655635 are reserved for future Tektronix logic analyzer modules.

mh_size. Gives the total size, in bytes, of the entire file header (including mem_hdr, all data_set_hdr's, aux_data, and exp_data).

mh_set_hdr. Offset equal to the number of bytes from the beginning of mem_hdr to the beginning of the first data_set_hdr.

mh_aux_data. Offset equal to the number of bytes from the beginning of mem_hdr to the beginning of the first aux_data entry.

mh_exp_data. Offset equal to the number of bytes from the beginning of mem_hdr to the beginning of the first exp_data entry.

mh_set_qty. Tells how many elements are in the data _set_hdr linked list. It is provided here as a convenience, since it is also possible to determine this value by stepping through the list.

mh_aux_qty. Tells how many elements are in the aux_data linked list. It is provided here as a convenience, since it is also possible to determine this value by stepping through the list.

mh_exp_qty. Tells how many elements are in the exp_data linked list. It is provided here as a convenience, since it is also possible to determine this value by stepping through the list.

mh_trig_type. Determines how the trigger position is specified in mh_trig_pos, and whether or not a trigger actually exists. The following are possible values:

- TT_NONE - No trigger is present in the data
- TT_UNKNOWN - A trigger can be present in the data, but its position is unknown

- TT_SEQUENCE -A trigger is present in the data and its sequence number is contained in mh_trig_pos
- TT_TIMESTAMP - A trigger is present in the data and its timestamp value is contained in mh_trig_pos

mh_trig_pos. Specifies the location of a global instrument trigger, if one exists. For current PRISM module types, this value is the same as dsh_trig_pos. The value can represent either a sequence number (as used by current PRISM module types) or a timestamp value. The value of mh_trig_type value specifies which.

mh_start_time. Specifies the date and time the data was created. Note that this is not necessarily the same as the time that the data file was created. This value is used by the PRISM to determine if the data in two separate data files can be time-correlated. If the data creation time (time of acquisition start) is not the same, then the data can't be correlated. The value is stored as a 26-element, null (0) terminated string in the following format:

```
Sun Sep 16 01:03:52 1986\n\0
```

mh_name. Null (0) terminated string containing the module name. The module name can be assigned by the user and therefore cannot be assumed to be unique.

Data_Set_hdr

The data_set_hdr header structure contains the non-sequence-oriented data that occurs once per data set and is set-specific. It also contains an offset value indicating where in the analyzer data file the actual data records begin. The non-sample-oriented data includes, for example, the number of records in the data set and details of the formats of those records. Data-set-specific data (such as channel grouping and channel names) follows at the end of the structure.

Storage of data set headers is implemented as a linked list with each data_set_hdr containing an offset to the next. The offset in the last data set header is null (0) to signify the end of the list.

dsh_size. Total size, in bytes, of this data set header including the set-specific data at the end of the structure.

dsh_next. Offset equal to the number of bytes from the beginning of mem_hdr to the next data set header.

dsh_data. Offset equal to the number of bytes from the beginning of mem_hdr to the beginning of the data records for this data set.

dsh_first_rec. Sequence number of the first record in the data set. Records are numbered from 0 through n - 1, where *n* is the total number of records. Record 0 is the oldest record in the set.

dsh_records. Total number of records in the data set. The sum of this number plus dsh_first_rec minus one equals the sequence number of the last record in this data set.

dsh_ts_tick. Timestamp values are stored as a count in field 3 (the timestamp field), where the count represents the number of ticks of the timestamp clock since time 0. This value gives the tick rate of the timestamp clock in picoseconds. Multiplying this value by the count in the timestamp field gives the actual elapsed time in picoseconds from t0 (the first acquired sample) to the sample containing the timestamp.

dsh_period. Records the period (time interval), in picoseconds, of the internal clock used for acquisition or pattern generation. A dsh_period of zero indicates that the acquisition or pattern generation module was clocked synchronously (that is, using an external clock derived from one or more signals originating outside the PRISM).

dsh_format. Special data formats are provided to accommodate a variety of data types. The two formats currently defined are DF_STANDARD and DF_GL_TS. DF_STANDARD is used for standard data with one bit per sample, each bit indicating whether the particular channel is a logic one or logic zero. DF_GL_TS uses two bits per sample and is interpreted as shown in Table D-1.

Table D-1
DF_GL_TS DATA FORMAT CODES

Value	State
00	logic 0
01	logic 1
10	glitch
11	tristate

The dsh_format value applies only to the data part of a record (dsh_field[1]), as opposed to the timestamp, status, or other special-purpose parts.

Generally, the contents of a data set record are arranged to optimize 16-bit data transfers using a 68000. This means that the data is stored with the most-significant bits of the data in the byte of the record that is nearest the beginning of the file (the byte with the lowest address when the record is read into memory).

If the contents of a field are not wide enough to completely fill all bytes of a record, the data is usually extended on the most-significant end; however, the dsh_field_bits value in the nested dsh_field descriptor array provides for the possibility of pad bits on the least-significant end. Some record formats include an extension byte to keep separate data regions of the record aligned on word (even address) boundaries.

dsh_sample. Indicates the number of samples (or pattern-generator vectors) worth of channel data contained in a single record. A value of 1 is standard and indicates that one sample of channel data is contained in the record. Note that "one sample of channel data" indicates the data acquired (or output, in the case of a pattern generator) by a *set* of channels in one sample, rather than by a single channel. If dsh_sample is greater than 1 then data for that many samples (vectors) is packed into the single record.

Data is packed into as few bytes as possible, with all channels from one sample being placed together and with the data from the newest sample being placed in the location nearest the beginning of the data file.

The dsh_sample value applies only to the data part of a record (dsh_field[1]), as opposed to the timestamp, status, or other special-purpose parts.

Figures D-5 through D-7 illustrate some hypothetical combinations of dsh_format, dsh_samples, and number of data channels.

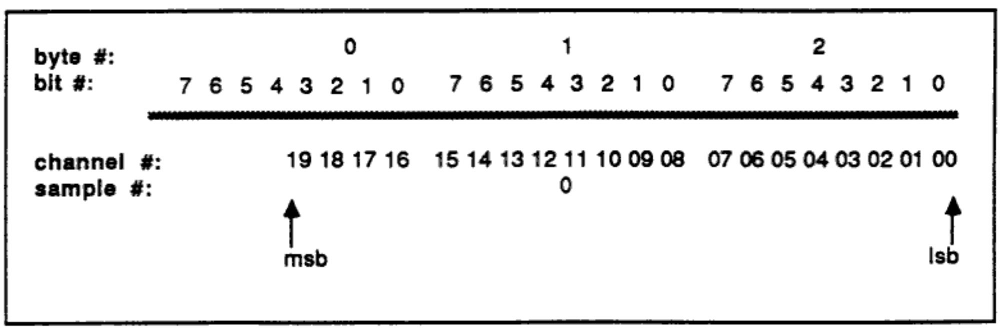


Figure D-5. Twenty channels, dsh_samples = 1, dsh_format = DF_STANDARD.

Figure D-6 illustrates how data would be stored for a four-channel data set with dsh_format = DF_STANDARD and dsh_samples = 5.

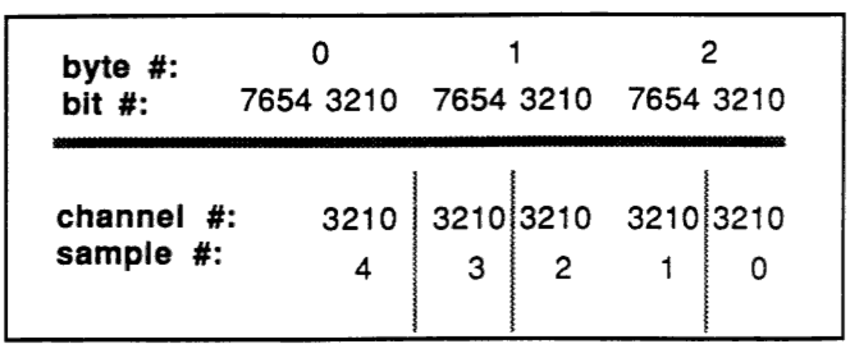


Figure D-6. Four channels, dsh_samples = 5, dsh_format = DS_STANDARD. Extension bits are placed in the high-order bits of the byte containing the last sample.

The example in Figure D-7 illustrates a slightly more complicated scenario with a three-channel data set, a data format with two bits of data per channel, and three samples per record.

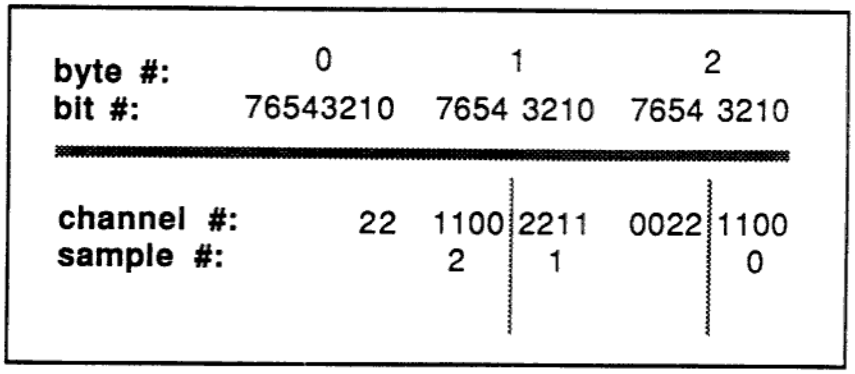


Figure D-7. Three channels, dsh_samples = 3, dsh_format = DF_GL_TS.

Note that all current PRISM modules use a dsh_sample value of 1 and a dsh_format value of 0 (DF_STANDARD); the examples above illustrate the potential use of these fields in future Tektronix products.

dsh_trig_type. Specifies how the trigger position is specified in dsh_trig_pos, and whether or not a trigger exists for this data set. The following are the possible dsh_trig_type values:

- TT_NONE - No trigger can be present in the data.
- TT_UNKNOWN - A trigger can be present in the data, but its position is unknown.
- TT_SEQUENCE - A trigger is present in the data and its sequence number is contained in dsh_trig_pos.
- TT_TIMESTAMP - A trigger is present in the data and its timestamp value is contained in dsh_tri_pos.

dsh_trig_pos. Specifies the location of the trigger for this data set, if it exists. For current PRISM module types, this value is the same as the mh_trig_pos specified in the mem_hdr. The value can represent either a sequence number, as used by current PRISM module types, or a timestamp value. The dsh_trig_type value specifies which.

dsh_start_time. Contains the delta start time of this data set in picoseconds since t0. For all current PRISM module types, which have only one data set, this value is zero.

dsh_field (Nested Field Descriptor Array). As shown in the declarations listing in Figure D-8, an array of field descriptor structures is nested within each data_set_hdr structure. These nested structures are called dsh_field structures, and they serve to describe the size and organization of the data set's data records.

The descriptor array consists of MAXFIELDS (which equals 15) dsh_field structures, each of which contains the following elements: dsh_first_byte, dsh_field_width, dsh_field_pad, and dsh_field_bits. The first dsh_field structure in the array, dsh_field[0], describes the size and organization of field 0 for every record in the data set; the second, dsh_field[1], describes field 1, and so on through dsh_field[14].

Each record in a particular data set is composed of fields, where each field is some subset of the entire record (up to and including a field that contains the entire record). The reason for characterizing records this way is to provide flexibility in data access. Applications that don't require the entire record can use just that subset of the record needed by accessing a particular field. The field definitions are customized for each module type to provide subsets of the data record appropriate for various applications. For additional details of the composition and organization of data records, refer to the *Data Records* discussion earlier in this document.

Each of the 14 dsh_field structures contains the following elements:

- **dsh_first_byte**. Contains the number of the record byte that is the first byte of the field. The bytes in a record are numbered from 0 through n - 1, where byte 0 is the first byte of the record and *n* is the total number of bytes. The first byte of a record (byte 0) is the one nearest the beginning of the file.
- **dsh_field_width**. Contains the width of the field in bytes. The value of dsh_field_width for field 0 gives the width of the entire record since field 0 always corresponds to the entire record. A field can have zero width. This is convenient for modules that have optional fields. When the module is configured to acquire glitches, it indicates a non-zero width for field two. When glitch acquisition is disabled, the glitch field width is set to zero. That way, other field descriptors that occur after the glitch field descriptor can remain in their same relative positions within the field descriptor array regardless of whether or not glitches are enabled. Unused or undefined fields always have a dsh_field_width of zero. A field width of zero for field 1, 2, or 3 is used to indicate that channel, glitch, or timestamp data, respectively, does not exist for that module.
- **dsh_field_pad**. Channel, glitch, and timestamp data is assigned to fields 1, 2, and 3, respectively. In some cases, the data does not occupy its entire field; the dsh_field_pad value specifies the number of pad bits between the least-significant bit of the data and the least-significant bit of the field. Pad bits are counted starting at the least-significant bit of the field and counting towards the most-significant bit. The pad value can be greater than 8, which would mean that more than one byte of pad exists. For fields other than 1, 2, and 3, the value of dsh_field_pad depends on the specific module type.

- **dsh_field_bits.** Tells how many bits wide the actual channel, glitch, or timestamp data is. It should be used in conjunction with dsh_field pad to extract the specific data of interest from a field. For fields other than 1, 2, and 3, the value of dsh_field_bits depends on the specific module type.

dsh_name. A null (0) terminated string containing the name of this data set. For PRISM modules, this string will be the default module name.

dsh_grouping. Offset equal to the number of bytes from the beginning of dsh_value for their data_set_hdr to the beginning of the channel grouping information which is contained somewhere within dsh_value. Note that this offset is referenced to the beginning of dsh_value rather than to the beginning of mem_hdr, as are all other offsets in the data file header. This is because the channel grouping data is contained within this data_set_hdr and will move if the data_set_hdr is moved. Referencing the offset to an element of the data_set_hdr therefore avoids the necessity of updating the dsh_grouping offset value if the data_set_hdr is moved.

dsh_value. The remaining contents of the data_set_hdr depend on the module type. The data structure for the data_set_header indicates that dsh_value is defined as a single character. However, this is just a placeholder. In fact, dsh_value can be as large as is required by the particular module to which the header applies. The true size of the dsh_value can be determined by subtracting the size of the remainder of the data set_hdr from the value of dsh_size.

AUX_data

The auxiliary data region of a standard format data file holds the module-specific information that occurs once per data file and applies to all data sets (that is, the data which does not directly correspond to particular acquisition samples, pattern generator vectors, or data sets). For example, in a 30MPX data file, the auxiliary data would include counter/timer values.

Auxiliary data is stored as a linked list where each element in the list has the standard ad_next, ad_size, and ad_type values and contains a type-specific ad_value. A null (0) value of ad_next indicates the end of aux_data.

ad_size. Gives the total size, in bytes, of this aux_data header structure, including the ad_size, ad_next, ad_type, and ad_value fields. The size of the ad_value field varies with the value of ad_type.

ad_next. Gives the number of bytes from the beginning of mem_hdr to the beginning of the next aux_data entry. A null value (0) for ad_next indicates the end of the aux_data region.

ad_type. Specifies the type of this auxiliary data value. The currently defined types include: counter, five types of timer (one each for ps, ns, ~s, ms, and s), string, raw, tab, and newline. The raw data type is used for unprocessed data which doesn't correspond to any of the other predefined types.

Since the order in which auxiliary data is stored is not specified, an application can't count on a particular type of auxiliary data appearing in a particular location in the linked list. Consequently, it must search the list, examining the ad_type fields for each entry to find the particular data it is seeking.

ad_value. A placeholder for the actual auxiliary data. The actual size and content of the auxiliary data is dependent on the value of ad_type.

Exp_data

The expansion data structure provides a location for an application to add data to a standard-format data file. A typical example of this is user-defined labels attached to specific sequence numbers in an acquisition. Another use might be to store display setup information (such as whether the data was last displayed in state or timing format and the order of groups and channels on the screen) so that it appears in the same format when re-displayed. If the data is too large to place in the analyzer data file itself, it can be stored in a separate file, and the name of that file can be stored in the expansion data structure.

Expansion data is stored as a linked list where each element in the list has the standard ed_next, ed_size, and ed_type values and contains a module-type-specific ed_value. A null (0) ed_next value indicates the end of exp_data.

ed_size. The size, in bytes, of this exp_data element which includes the size of ed_size, ed_next, ed_type, and ed_value fields. The size of the ed_value field varies with the value of ed_type.

ed_next. Number of bytes from the beginning of mem_hdr to the beginning of the next exp_data entry. A null value (zero) for ed_next indicates the end of the exp_data region.

ed_type. Specifies the type of expansion data value. An application uses a unique value of ed_type for each different type of expansion data it creates. For example, user labels would be one type of expansion data and display setup would be another. Since the order in which expansion data is stored is not specified, an application can't count on a particular type of expansion data appearing in a particular location in the linked list. Consequently, it must search the list, examining the ed_type fields for each entry to find the particular data it is seeking.

Values of ed_type from 0 to 99 are reserved for applications developed on the PRISM 3000 Series. Values from 100 through 65535 are reserved for future products. This prevents independent developers from using the same value of ed_type for different applications.

ed_value. The ed_value shown in the header structure is a placeholder for the actual expansion data. The actual size and content of the expansion data is dependent on the value of ed_type.

DATA RECORDS

The data part of a standard-format data file consists of one or more record arrays Each array is called a data set. Each record in a data set contains all data for one cycle of the acquisition clock.

As shown in Figure D-8, the data records in each data set are stored in sequential order, with the record of the first acquisition sample or first stimulus vector stored nearest to the beginning of the file. Records are numbered 0 through n-1, where *n* is the number of records in the array, and record 0 is the earliest acquisition sample and is located nearest the beginning of the file.

All records in a given data set have the same size and structure, but records in different data sets can be different from one another.

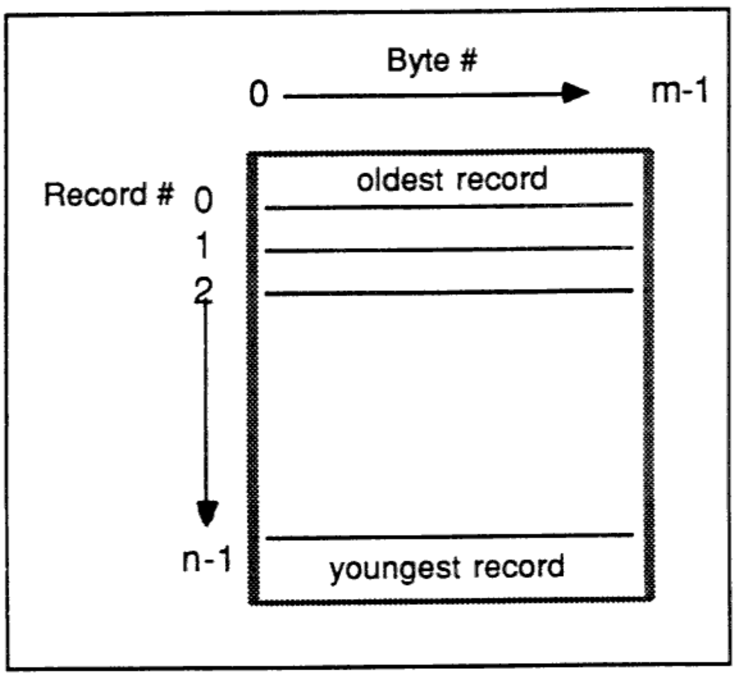


Figure D-8. Data record array.

The exact composition of a record varies from one module type to another, but it typically includes such items as raw data bits (each indicating a logic one or zero on one acquisition or pattern generator channel), timestamp or correlation information, and other module-specific kinds of data.

A record always consists of an integral number of bytes numbered 0 through m – 1 for each record, where *m* is the total number of bytes in the record. Byte 0 of a record is the byte nearest the beginning of the data file.

Logical Groups

Each record is composed of logical groups of information. For example, a record may contain several logical groups such as data, glitch, status, timestamp, state, events, and actions. The size, order, and significance of the logical information groups comprising a record differ according to the module type.

Because most application programs are concerned with only a subset of the data contained in each record, the records are split into fields. Each field contains one or more of the record's logical groups. By using field descriptors in a file's header, an application can improve the efficiency of its data retrieval by accessing only the information it needs.

Fields

Data records are divided into as many as 15 fields, where each field is some subset of the full record. Fields 0, 1, 2, and 3 are used for the following special purposes:

- field 0 exists for records of all module types and always includes the entire record
- field 1 always corresponds to the field that contains channel data
- field 2 always corresponds to the field that contains glitch data
- field 3 always corresponds to the field that contains timestamp data

Fields generally correspond to one or more logical groups within the record.

A typical 30MPM Timing Section acquisition data record is shown in Figure D-9. A typical 30MPX Timing Section acquisition data record is shown in Figure D-10.

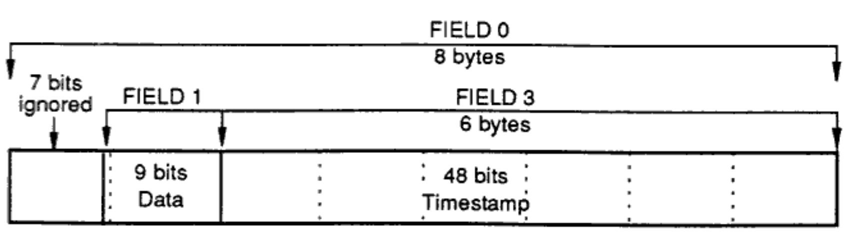


Figure D-9. Typical 30MPM Timing Section acquisition data record.

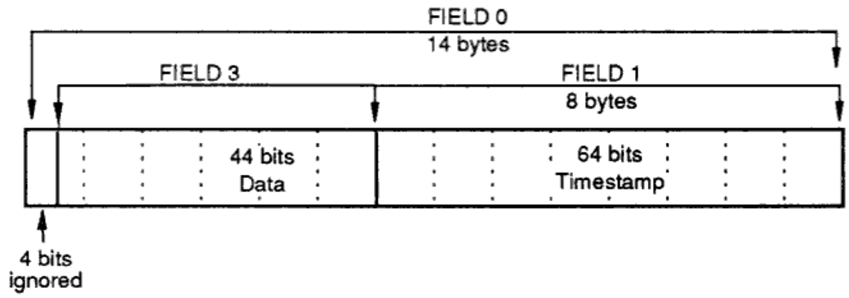


Figure D-10. Typical 30MPX Timing Section acquisition data record.

In Figures D-9 and D-10, field 1 encompasses two logical groups which are generally used together by display applications. Field 3 contains the timestamp and clock-latch bits that are used by the PRISM to correlate data acquired simultaneously by multiple modules.

Note that field 2 is not defined for 30MPM Timing Section modules, because these modules don't acquire glitch data. In fact, a 30MPM Timing Section data file header does provide a field descriptor for field 2; it indicates a field width of zero, meaning that there is no glitch data.

Field Boundaries and Padding

A data file's header contains an array of field descriptors for each set of data records. Each field descriptor corresponds to one data record field. The descriptor contains the number of the first byte in the field and the width of the field in bytes. Descriptors number bytes in relation to the complete record, with byte 0 of the record corresponding to the byte at the lowest address and with byte n-1 corresponding to the last byte in a record n bytes wide.

As mentioned previously, fields 0, 1, 2, and 3 are reserved for special purposes. The special data types in fields 1, 2, and 3 may not always occupy their entire fields. For this reason, the field descriptors provide two parameters for each field called dsh_field_pad and dsh_field_bits. These parameters precisely specify the location of the data within a field. The field pad value tells how many bits are between the LSB (least significant bit) of the data and the LSB of the field; the field bits value tells how many bits wide the actual data is. These two parameters allow creation of generic data-handling routines that can handle files from a variety of module types. Details of the header and of field descriptor arrays are provided later in this document.

Note that the meanings of the pad and bits values for fields other than 1, 2, and 3 are module-specific. Details of specific modules' data headers and records are provided at the end of this document.

SYMBOL DEFINITION FILES

The format of symbol table definition files differs somewhat from other PRISM files. The symbols for each module are stored in a separate file. Each file has a standard binary header consisting of 114 bytes (See *Standard File Header Structure* earlier in this section). Following the header is an ASCII decimal number indicating the number of groups in the file. Figure D-11 shows the format for a symbol definition file and Figure D-12 is an example of an actual symbol definition file.

Symbol table definition files are identified by the "msy" file name extension. Filename extensions are not displayed in directory listings on the PRISM; however, when viewed on another system, symbol file names should be of the form: <filename>.msy.

Each channel group for which symbols are being defined is stored in an individual record within the symbol definition file. Each group record has its own ASCII header. The format of symbol definition files is shown in Figure D-11.

```
<File Header>
number-of groups                 # comment
group1-name                      # comment
number-ofchannels-for-group1     # comment
<PATTERN>         <RADIX>        <RADIX>
number-of-symbols-for-group1     # comment
symbol1-name       pattern1
symbol2-name       pattern2
        |
        |
        |
symbolN-name       patternN
group2-name                       # comment
number-of-channels-for-group2     # comment
<PATTERN>          <RADIX>        <RADIX>
number-of-symbols-for-group2      # comment
symbol1-name        pattern1
symbol2-name        pattern2
        |
        |
        |
symbolN-name        patternN


RANGE START
group3-name                     GROUP NAME
base-offset                     BASE OFFSET
number-of-symbols-for-group3    NUMBER OF SYMBOLS
value-of-radix                  RADIX VALUE
symbol1-name                    Lower bounds1     Upper bounds
symbol2-name                    Lower bounds2     Upper bounds2
        |
        |
        |
symbolN-name                    Lower boundsN     Upper boundsN
```

Figure D-11. Format for creating or modifying PRISM 3000 symbol definition files.

Lines may be up to 80 columns wide and are delimited by an ASCII carriage return and line feed. All lines start immediately following the carriage return and line feed. The group name and symbol name must start from the first column of the line. Group names should have a maximum of 8 characters and the symbol name should have a maximum of nine characters. A symbol name may contain spaces. There may also be space and tab characters between the symbol name and the pattern. In the pattern field, an X indicates a don't care. Patterns may be all don't care characters.

Following the <PATTERN> field are two <RADIX> fields. The first specifies an input radix and the second specifies an output radix. Since PRISM symbols only use the input radix, you should enter the same radix in both fields. (The output radix field is present to ensure file compatibility with other Tektronix instruments.) The valid radixes are BINARY, HEXADECIMAL, and OCTAL. Both the pattern and the radix must be entered as upper case characters. See Figure D-12.

The number-of-group must be in decimal and must match the number of the groups that follow it. The number-of-symbol also must be decimal and must match the number of symbols that follow it. The number-of-channels must also be in decimal.

Each line with valid information can have a comment following it. All text between a pound sign (#) symbol and the end of the line will be considered a comment. If you need a blank line the first column of the line should be a pound sign (#).

```
<<<114 bytes of binary header>>>

4                                   # Number of Groups
clk-chan                            # Group Name
4                                   # Number of channels in the group
<PATTERN>             <BINARY>      <BINARY>
3                                   # Number of symbols in the group
clk 0                 0001
clk 1                 0010
clk 2                 0100
Cntl                                # Group Name
15                                  # Number of channels in the group
<PATTERN>             <BINARY>      <BINARY>
13                                  # Number of symbols in the group
Autovect              XXXXX11101XXXXX
Invld DMA             XXXXXXXXXX011XX
DMA                   XXXXXXXXXX0XXXX
Reset                 X0XXXXXXXXXXXXX
CPU Space             XXXXX111XXXXXXX
User Data             XXXXX001XXXXXXX
User Prog             XXXXX010XXXXXXX
Sup Data              XXXXX100XXXXXXX
Sup Prog              XXXXX110XXXXXXX
Progrm Sp             XXXXXX10XXXXXXX
Read                  XXXXXXXXX1X00XX
Read Any              XXXXXXXXX1XXXXX
Write                 XXXXXXXXX0X00XX
Addr                                # Group Name
```

```
24                                  # Number of channels in the group
<PATTERN>               <HEXADECIMAL>     <HEXADECIMAL>
2                                   # Number of symbols in the group
sub_start               0FE023
sub_end                 0FFE00
Data                                # Group Name
16                                  # Number of channels in the group
<PATTERN>               <HEXADECIMAL>     <HEXADECIMAL>
2                                   # Number of symbols in the group
all_ones                1111
all_twos                2222


RANGE START
Address             GROUP NAME
00001234            BASE OFFSET
4                   NUMBER OF SYMBOLS
00000008                  RADIX VALUE
$A_state_header$code            00000000    ffffffff
$A_state_headers$var            00000000    0000006b
expand1                         0000006c    00000087
expand2                         00000444    000004a1
```

Figure D-12. Sample of a symbol definition file. This file was created with the Symbol Definition menu on a PRISM system, then transferred to another system to produce the code listing shown.

The file shown in Figure D-12 defines symbol tables for four channel groups:

- The clk-chan group has three symbols defined in binary, clk 0, clk 1, and clk 2.
- The Cntl group has thirteen symbols defined in binary, Autovect through Addr.
- The Addr group has two symbols defined in hexadecimal, sub_start and sub_end.
- The Data group has two symbols defined in hexadecimal, all_ones and all_twos.

GLOSSARY

30MPM A 64-channel logic analysis application module for PRISM mainframes.

30MPX A 96-channel logic analysis application module for PRISM mainframes.

32GPX An 80-channel logic analysis application module for PRISM mainframes.

30RP2/30RP1 PRISM probes used with PDT to access the ROM in the user's system under test.

Acqmem or Acquisition Memory The RAM in which data acquired by an application module is stored.

Acquisition The act of (or means by which) a logic analyzer captures data from a system under test. Data may or may not be stored in memory. Use the setup menu of the appropriate application module to specify whether data is stored or not.

Acquisition Clock The clock that determines the rate at which the instrument samples data. The clock can be internal to the instrument (asynchronous) or an external (synchronous) signal from the system under test.

Acquisition Cycle A complete data acquisition sequence including start, trigger, search, capture, and stop phases.

Acquisition Trigger The first trigger event stored by any module during the acquisition.

Action Any activity that can be performed by the logic analyzer.

Address A number or expression that designates a specific location in a storage or memory device.

Aliasing The condition that occurs when data is sampled at a slower rate than the rate at which the data changes. When this happens, misleading data is displayed because the analyzer misses the changes in data that occurred between sample points.

Application Module An electronic circuit board that, when installed in a mainframe, implements specified tasks.

Application Module Frame A mechanical mount for application modules in the PRISM 3002 Series mainframes.

Application Software Software packages designed specifically to aid in certain tasks.

Arm To establish the necessary conditions to permit the system to trigger when and if the trigger criteria are met.

ASCII Acronym for American Standard Code for Information Interchange; an eight-bit code representing characters and control functions.

Assembler The program that converts the assembly language mnemonics and symbolic addresses into machine code.

Assembly Language A mnemonic programming language that replaces the numeric instructions of machine language. Assembly languages are specific to a given microprocessor chip.

Assert To cause a signal or line to change from its logic false state to its logic true state.

Asynchronous Acquisition An acquisition that is made using a clock rate and signal generated internally by the logic analyzer. Such a signal is asynchronous to the system under test. The sampling rate should be considerably faster than the clock rate of the system under test to avoid aliasing.

Asynchronous Clock A clock signal generated by the logic analyzer that can be used to make acquisitions that are not synchronized to the system under test.

Baud Rate The number of bits per second transmitted on a communications channel.

Board An individual circuit board which occupies a single slot in the mainframe.

Bus Form A composite timing trace, consisting of all traces within a given channel group.

Byte A sequence of adjacent binary digits, usually eight bits, operated as a unit. The smallest addressable unit of main storage in a computer system.

C A high-level programming language.

Callout A visual pointer (typically a number) indicating a particular component, area, or field in an illustration. A callout is usually associated with some explanatory text that follows.

Card See Board.

Channel An input signal line over which data is acquired.

Channel Group A user-defined group of channels that are used to define trigger conditions and to display data.

Channel Mask A logic device that allows you to select certain channels to be included, or not included, in a comparison.

Clock See Sample Clock.

Clock Cycle A clock sequence that includes both high- and low-going transitions.

Clock Qualification The process of filtering out irrelevant data by combining an acquisition clock with one or more bus signals.

Clock Qualifier An external signal that acts as a gate for the acquisition clock. When the external signal is false, the acquisition clock is not allowed to load acquired data into the acquisition memory. (See also Acquisition Memory.)

Comm Pack A circuit board and mechanical enclosure that plugs into the Comm Pack port to enable the mainframe to communicate with external devices. Each pack provides a different communications protocol.

Command A user instruction entered as text from the keyboard.

Condition A user-defined event that the analyzer can recognize.

Correlation The act of indicating how interdependent events captured by different acquisition modules relate to each other in time. Specifically, that records when events occurred in relation to each other.

Counter A circuit or device that records the number of times some specified event occurs.

Cursor A marker representing a specific location on the terminal screen. The PRISM uses two types of cursors: a Data Cursor and a Field Cursor. See *Data Cursor* and *Field Cursor.*

Cycle See *Acquisition Cycle* or *Clock Cycle*.

Data Correlation See Correlation.

Data Cursor A cursor used to mark a memory location in data display menus. The data cursor becomes active once a display menu (for instance, a State Table or Timing Diagram) is opened.

Data Sample A single acquisition made during one clock cycle.

Debugger A program or device that allows the user to observe the program flow and the results of the program's operation in a step-by-step mode. A debugger may be used to change data or instructions and alter registers.

Delay The time interval between the receipt of an input signal and the generation of an output response.

Demultiplex or Demux To identify and separate multiplexed signals (for instance, signals from a microprocessor). To separate information that occurs on the same line at different times.

Demux Clocking A process in which two separate, synchronous clock sources are used to store two sets of data.

Deskew Removing or minimizing time delay or offset between signals with respect to each other.

Disassembler A software program that decodes microprocessor machine language into assembly language mnemonic instructions and symbolic addresses.

Disk Format The distribution and arrangement of data elements on a disk of magnetic recording media. See *Formatting a Disk.*

Display Menu A menu in the Display menu group. These menus display data in formats pertinent to specific applications such as timing, performance analysis, or PDT.

Domain Indicator A field in data display menus that shows the area of memory being displayed.

Don't Care A symbol (X) used in place of a numeric character to indicate that the value of a channel or character is ignored.

Download 1. To capture and store data in a local file from a communications channel. 2. The process of transferring data from a remote host to the logic analyzer.

Duplex A transmission mode in which one set of lines transmits data in both directions. See also *Half Duplex* and *Full Duplex*.

EBCDIC An acronym for Extended Binary Coded Decimal Interchange Code, an eight-bit character code made up of four zone bits and four numeric bits.

Edge A signal transition from low to high, or from high to low.

Edge Triggering Triggering on a low-to-high or a high-to-low transition instead of triggering on a high or low logic state.

Edit Menu A menu in the Edit menu group. These menus are used to define symbolic names (mnemonics) for channel group values.

EPROM Eraseable Programmable Read Only Memory.

Event Any combination of high and low signals across a channel group. See *Condition*.

Event Measurement A performance analysis term. A determination of the number of iterations or the duration of specific software events. Event measurement can also provide comparative data on the duration of separate events. See *Single Event Measurement*.

Expansion Mainframe A special type of mainframe used to expand a system by providing slots for additional application modules.

Expansion N An application module slot in an expansion mainframe. N is the slot number.

External Clock A clock external to the logic analyzer and usually synchronous with the system under test. Used in synchronous data acquisition. See also *Internal Clock*.

External Clocking A clock mode in which input logic signals are sampled in phase-relation to the system under test's operation. The representation of the signals is stored in memory by what is commonly called the external (or synchronous) clock (i.e., a signal obtained externally to the logic analyzer).

External Trigger In/Out A pair of connectors on the back of the PRISM that allows communication with other instruments.

FasTrak A Tektronix single-board computer based upon the 68010 microprocessor used for training and testing.

Field A screen display region containing values that can be selected or modified. Fields appear in reverse video.

Field Cursor A cursor used to move from field to field, and to move through selections once you've entered a field. See also *Cursor*.

File A collection of data or program instructions that are stored together on disk and accessed by a single name.

File Header Information at the beginning of a file that contains information about the file. The PRISM operating system needs the type information in the header in order to use the file.

Fill-in Field A display field that has no list of choices. Instead, you indicate your selection by typing a string of characters into the field.

Flying Leadset An optional probe adapter leadset that permits each line to be connected individually to the system under test.

Formatting a Disk To process a disk by placing recording tracks and certain data on it in order that files may be stored and retrieved from it by specific software systems. Formatting is the process of physically preparing a disk to accept information. Sometimes referred to as initializing a disk.

Full Duplex A transmission mode in which data is sent in both directions at the same time.

Function Key A key on a keyboard that may be used to generate a predetermined signal or data sequence for function control. As a group, the function keys are a row of keys on the keyboard whose function depends on which menu is active.

Glitch A signal that makes a transition through the logic threshold voltage two or more times between successive sample clock cycles. Signals that are faster than the sampling rate, such as noise spikes or pulse ringing, can be captured by the logic analyzer as glitches.

GPX See *32GPX.*

Graph Menu A menu in the Display menu group. This menu displays data in a plot format. The horizontal axis represents acquisition memory locations and the vertical axis represents channel group values.

Graticule A line of tic marks along the bottom of the timing diagram that shows how many samples are being displayed on the screen. Each tic mark represents one time unit.

Half Duplex A transmission mode in which data is sent in both directions by the same signal lines, but in only one direction at a time.

Handshaking An exchange of predetermined characters or signals between receiving and transmitting equipment to assure connection and synchronization.

Hard Disk Drive A high capacity magnetic disk storage drive generally permanently installed in a system.

Header See *File Header.*

Hold Time The time interval after a clock edge for which a signal must remain unchanged to be considered stable and valid.

Host A computer or system that provides application program direct support functions.

Hosted See *Remote Host.*

Initialize See *Formatting a Disk.*

Input Radix The radix that must be used to enter channel group or mask values in menu fields. See also *Radix* and *Output Radix.*

Instrument Setup The current set of operating parameters defined in the instrument's menus. These parameters specify such things as timebase formats, sampling rates, channel groups, conditions, reference and update memories.

Internal Clock A clock internal to the logic analyzer used in asynchronous or transitional data acquisition.

Internal Clocking A clock mode in which input logic signals are sampled independent of the system under test. The representation of the signals is stored in memory by what is commonly called the internal (or asynchronous) clock.

Internal N An application module slot inside the mainframe (as opposed to a module in an expansion mainframe). N is the slot number.

Linked Cursors The provision for coupling two cursors, each in a separate pane of a split screen, so that they both scroll at the same time.

Load The process of writing data or application software into RAM. See also *Upload* and *Download.*

Local Control When the instrument is being controlled from the keyboard, it is said to be under local control. This is the opposite of being under remote control.

Logic Analyzer An instrument, useful in both hardware and software analysis, used to acquire logic signals in real time with respect to a trigger event and to represent those signals in various ways.

Machine Language The actual binary instructions that a microprocessor executes.

Main Module See *MPU Board.*

Mainframe 1. A mechanical cabinet providing power, cooling, and CPU resources to modules. The mainframe also houses I/O connectors and drives for both hard and floppy disks. 2. The part of a system that controls the interpretation and execution of instructions.

Mask A method of omitting data acquired by certain channels from the acquisition or data display.

Menu A screen display that offers selectable or scrollable choices.

Microprocessor Disassembly Software that mnemonically disassembles data acquired from specific microprocessors.

Module An individual functioning acquisition unit.

Module Setup All the menu selections made in an application module's Setup menus or any application associated with a particular module.

Monitor 1. A program that accesses and controls the operation of the various other programs available. 2. A video display device.

MPM See *30MPM.*

MPU Board A circuit board permanently resident in a PRISM mainframes (except expansion mainframes). The MPU board is located below the application module frame and provides the PRISM computing resources.

MPX See *30MPX.*

Notes Online user documentation that explains the functions and selections associated with menu fields. Also referred to as Help Notes.

Output Radix The radix used to display data or print data. See also *Radix* and *Input Radix.*

Pane When the display window is split horizontally into two sections, each displaying a different menu, the sections are called panes. See also *Window.*

Parameter A test variable that is given a value for a specific purpose or process.

Parity A method of checking for errors in transmitted data that are caused by signal noise. There are two types of parity checking: even and odd.

PDT Prototype Debug Tool. Tektronix's name for a software development tool based upon ROM emulation.

Performance Analysis Application software used to evaluate and optimize the performance characteristics of a system under test. Using the graphic displays generated by performance analysis you can determine such things as overall system activity, the number of times a routine executes, and the amount of time the system spends in various defined regions.

Post-fill A requirement that a logic analyzer continue to acquire data after the trigger until a pre-determined number of samples has been taken. For example, when the trigger position is programmed to occur in the center of memory, a logic analyzer will take enough data samples after the trigger to fill one-half of the acquisition memory.

Post-fill Data Data acquired and stored after the trigger event has occurred.

Post-processing Any type of acquisition (or reference) memory analysis that occurs after—rather than during—the acquisition.

Pre-fill Data stored before the trigger event in memory. A logic analyzer fills a pre-determined number of acquisition memory sequences with new data before accepting a trigger. For example, with the trigger programmed to occur in the center of memory, one-half of the memory must be filled before the trigger. See *Trigger Position.*

Probe An input device, constructed as a separate unit, that transmits the input signal from the circuit under test to the logic analyzer.

Probe ID Text or numbers that identify a specific probe. Some PRISM probes have a button that, when pushed, causes the Probe ID to appear on the screen.

Program Flow Control The process of branching or jumping to/from subroutines or other various sections of code.

Protocol A set of procedures that control how data is transmitted between devices.

Qualification See *Storage Qualification* or *Clock Qualifier.*

Qualifier See *Clock Qualifier* or *Storage Qualification.*

Radix The alphanumeric base in which data is expressed or displayed. For example, the PRISM lets you display data in hexadecimal, binary, octal, decimal, symbol and EBCDIC radixes. ASCII representation is also considered a radix and most logic analyzers allow you to display data in ASCII. You can display and define condition words and channel masks in hexadecimal, octal and binary radixes. Also called the base. See also *Input Radix* and *Output Radix.*

RAM Random Access Memory. Used to describe read/write memory.

Range A performance analysis term. A range of channel group values that can be formed by defining a low-bound value and a high-bound value. When you sample using distribution ranges, the counter for a range is incremented by one each time the measurement of an event falls into that range.

Range Recognizer Circuitry that compares incoming data values to see if they fall within a defined range of channel group values. See also *Word Recognizer*.

Real Time 1. The performance of an analytical operation during the time that the process occurs. 2. Having to do with the actual time during which physical events take place.

Refmem or Reference Memory Previously stored data. Comparing a Refmem to a new Acqmem is a common troubleshooting technique.

Remote Control A system configuration in which commands are issued using a communication link from another (remote) computer system. Commands can be issued one at a time from a command line on the remote system or from command files on that system.

Remote Host A system configuration in which a mainframe is controlled via a communications link from a remote computer system. Also see *Host.*

Reset Line An output signal line from the PDT via the 30RP2/30RP1. Intended to be used primarily to reset the system under test from the PDT menu. The specific function is user selectable.

Resolution 1. The minimum detectable interval between data signal transitions. 2. The minimum observable interval between samples in a data display.

Restore An operation that lets you move files from a floppy or hard disk to memory. You can restore data acquisitions and acquisition module setups. See *Save* and *Load*.

ROM Read only memory. Memory that contains data that cannot be altered or erased by the system microprocessor.

ROM Emulation A technique for temporarily substituting read/write memory for read only memory.

ROM Probe Adapter One of several available devices for adapting a 30RP2/30RP1 to a specific ROM configuration.

RP2/RP1 See *30RP2 / 30RP1*.

RS-232C An electronics industry serial-interface standard. PRISM mainframes provide one or more RS-232C ports for communication with other devices.

Sample Clock A signal that establishes the rate of data sampling.

Sampling Rate The frequency at which data is logged into the logic analyzer.

Save An operation that lets you move files from memory to a floppy or hard disk. You can save data acquisitions and acquisition module setups. See *Restore* and *Load*.

Scroll A method of positioning a data display too lengthy to be contained on the screen in its entirety. Scrolling is controlled with the SELECT knob.

Select Field A screen field that allows you to make a selection.

Setup Menu A menu in the Setup menu group. Setup menus are used to control how an application module acquires data.

Setup The current set of operating parameters defined in the PRISM menus. These parameters specify such things as timebase formats, sampling rates, channel groups, conditions, reference and acquisition memories. See also *Instrument Setup* and *Module Setup*.

Setup Time Length of time an input signal must be present before the clock edge to be considered stable and valid.

Signal A line that allows application modules to signal each other at specific times during a data acquisition.

Single Event Measurement A performance analysis term. This feature allows you to make timing measurements of events or to count the occurrences of events. You can split Single Event Measurement into ranges (by time or by count) for statistical analysis.

Skew The relative time difference between input channels, specified in terms of one edge relative to another; the misrepresentation of data caused by parallel channels with different propagation delays. See *Deskew*.

Slot The mechanical support and electrical connector that allows application modules to be installed inside a mainframe. Internal slots are those inside the mainframe. Expansion slots are those in an expansion mainframe.

Stand-alone In PRISM terms, a self-contained system, rather than a remote host configuration in which the PRISM 3000 acts as a peripheral to a host computer. See also *Remote Host*.

Start/Stop Bits In asynchronous data communications, the bits that are added to the front and rear of a transmitted character to permit the receiving system to correctly interpret the data packet.

State A step or level in the trigger specification program.

State Display or State Table Tabular representation of logic states of input data channels.

State Overview In performance analysis, an overall view of system performance that displays activity levels that fall within defined ranges (typically address ranges).

State Table See *State Display*.

Stop Line An output signal from the PDT via the 30RP2/30RP1 that is intended to be used to interrupt the system under test. The specific function is user selectable. The Stop line can be toggled manually from the PDT menu or automatically during acquisition.

Storage Qualification The process of establishing conditions that must be met before incoming data is stored in memory.

Storage Qualifier A preset condition that must be met before the system will store the acquired data.

SUT System under test.

Symbol Radix A radix selection that uses the symbolic name defined in an Edit menu in place of actual channel group values. The symbol radix can be used to input word recognizer values or for data display.

Synchronous Acquisition An acquisition mode in which data is acquired based on a clock signal generated outside the logic analyzer, usually the clock in the system under test. The external clock is usually synchronous to the system under test and may or may not be periodic.

Synchronous Clock A clock signal generated by the system under test that is used to synchronize acquisitions.

TekLink A Tektronix proprietary bus for interconnecting application modules.

Threshold A pre-selected voltage to which input signals are compared. Voltages above the threshold are logic true (1) and voltages below the threshold are logic low (0).

Timebase Source of a stable timing frequency that can be used to control data acquisitions.

Timer A circuit or device that measures the duration of an event or the time elapsed between events.

Timestamp A timestamp is a clock value stored along with data on each acquisition cycle. Timestamps record how long after the start of an acquisition each sample occurred.

Timestamp, Absolute Displays the duration of each sample event

Timestamp, Relative Displays the time elapsed between the acquisition trigger and the data sample event.

Timestamp Set All data acquired with the same timestamp during an acquisition is referred to as a timestamp set.

Timing Display or Timing Diagram Graphic representation of data states and timing relationships as a digitized waveform.

Transparent Mode Utilizing the PRISM as a terminal to talk to a computer using the Remote Control Utility menu.

Trigger An event or condition that leads to the end of an acquisition cycle. When started, a logic analyzer continuously acquires data from a system under test until the trigger occurs. After triggering, the logic analyzer continues to acquire data until the post-fill requirement is met. See *Pre-fill* and *Post-fill.*

Trigger Event A circuit condition that causes an application module to trigger when it occurs.

Trigger Position The location of the trigger event in memory. When the analyzer acquires data, it fills the pre-trigger memory, continually overwriting that data with newly sampled information. When the analyzer finds the trigger event, it positions that event at the location you specified, then fills the rest of memory with post-trigger data.

Trigger Specification Program The highest level of triggering control. A trigger specification program is comprised of one or more States.

Tristate A logic device output that is in a high impedance or open circuit condition permitting another part of the circuit to determine if the level will be high or low.

Upload The process of writing data from the instrument to a host system. See also *Load* and *Download*.

Utility Menu A menu in the Utility menu group. These menus provide status information and control port parameters, RAM operations, and disk operations.

Window The part of a menu or data display that is shown on the screen at one time. See also *Pane*.

Word A group of characters occupying one memory location. A word is treated as an entity by the control or arithmetic unit of a system under test. Can be an instruction or data value.

Word Recognizer Circuitry that compares acquired data to a defined channel group value. See also *Range Recognizer*.

X The symbol (X) used in place of a numeric character to indicate that the value of a channel or character is ignored. Also referred to as the Don't Care character.

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