

# **User Manual**



## **Basic Operations of Microprocessor Support Packages on a DAS<sup>®</sup> or TLA 500 Series Logic Analyzer**

**070-9365-02**

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Tektronix, Inc., P.O. Box 1000, Wilsonville, OR 97070–1000

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# General Safety Summary

The support product instruction manual contains the *General Safety Summary* for your support product probe adapter.

*Only qualified personnel should perform service procedures.*

# Preface: DAS or TLA 500 Series Documentation

The DAS (Digital Analysis System) documentation package provides the information necessary to install, operate, maintain, and service the DAS NT, DAS XP, and TLA 500 Series Logic Analyzers. The documentation consists of the following manuals:

- The *DAS System User Manual* or *TLA 500 Series Logic Analyzer User Manual*, the main reference manuals for the DAS or TLA 500 systems, that provides an overview of the operating system, basic installation information, a tutorial for new users, and information for system-level menus.
- A series of other module user manuals that provide detailed information on the data acquisition modules, and pattern generation modules available for use with the logic analyzers. Consult the individual manuals for information on the Setup and Display menus for each module.
- An *LA-OffLine User Manual* that describes how to transfer, display, and analyze data (acquired on a DAS logic analyzer) from a personal computer or a workstation.
- A series of bus, microprocessor, microcontroller, data communications, and digital signal processor support product instruction manuals that describe the various support products available with the DAS or TLA 500 systems.
- A technician's reference manual that provides service information for qualified service technician to isolate problems to the module level.
- A series of software user manuals that accompany the various software support products.

## About This Manual Set

This user manual is part of a two-manual set for operating various support products, such as for microprocessors, buses, microcontrollers, and digital signal processors, on a DAS or TLA 500 logic analyzer. If you are not familiar with operating support products on the DAS or TLA 500, you may need to use this manual with the instruction manual specific to your product to operate that product.

An instruction manual is included with each support product. That manual contains specific information about the support product. If you are already familiar with operating various support products on a DAS or TLA 500, you probably only need to use the instruction manual to operate your product.



The two manuals contain references to each other. You can find references to specific topics in the Table of Contents (such as *Requirements and Restrictions*) or, in the Index if the topic does not appear in the Table of Contents.

This manual is based on the assumption that you are familiar with how to operate the system software for the DAS, and TLA 500 Series logic analyzers, and the 92A96 application. Therefore, details about the system software, the 92A96 application, and how to move through the menu structures are not provided. An overview of some of those functions is provided so that you do not need to consult another manual.

This manual provides detailed information on how to do the following tasks:

- Install and load a support application
- Set up the logic analyzer to acquire data from the system under test
- Acquire and view data
- Use a support product for general purpose analysis
- Maintain the probe adapter

## Manual Conventions

This manual uses the following conventions:

- The term disassembler refers to the application that disassembles bus cycles into instruction mnemonics and cycle types.
- The term SUT (system under test) refers to the microprocessor-based system from which data is being acquired.
- The term DAS or TLA 500 refers to the DAS/NT, DAS/XP, and 92XTerm system and modules, and to the TLA 510 and TLA 520 systems unless otherwise noted; a Tektronix Logic Analyzer (TLA) operates identically to a DAS.
- The term 92A96 refers to all versions of the 92A96, 92C96, and subsequent DAS or TLA 500 modules unless otherwise noted.
- The term acquisition probe refers to clock and channel acquisition probes.
- The name of the microprocessor from which you intend to acquire data appears in fields and file names you need to select to operate the support product. In this manual, the term P54C is used as an example. All menu and data displays in this manual are from the P54C demonstration reference memory file.
- A tilde (~), a pound sign (#), or an asterisk (\*) following a signal name are symbols that can be used to indicate an active low signal. The support product instruction manual tells you which symbol that product uses.

## Contacting Tektronix

Product Support	<p>For application-oriented questions about a Tektronix measurement product, call toll free in North America: 1-800-TEK-WIDE (1-800-835-9433 ext. 2400) 6:00 a.m. – 5:00 p.m. Pacific time</p> <p>Or, contact us by e-mail: tm_app_supp@tek.com</p> <p>For product support outside of North America, contact your local Tektronix distributor or sales office.</p>
Service Support	<p>Contact your local Tektronix distributor or sales office. Or, visit our web site for a listing of worldwide service locations.</p> <p><a href="http://www.tek.com">http://www.tek.com</a></p>
For other information	<p>In North America: 1-800-TEK-WIDE (1-800-835-9433) An operator will direct your call.</p>
To write us	<p>Tektronix, Inc. P.O. Box 1000 Wilsonville, OR 97070-1000</p>

# Getting Started

This chapter provides basic information on the following topics:

- Various support packages for microprocessors, buses, microcontrollers, and digital signal processors
- DAS or TLA 500 configuration
- General microprocessor-based system requirements
- How to install and load the support software
- How to connect clock and channel probes to the High-Density 192-Channel Probe, if the probe adapter requires one

Remember that the information in this chapter is general to the operations and functions of microprocessor support packages on a DAS or TLA 500 logic analyzer. Any differences in operation or function of a specific support will be detailed in the 92DM support instruction manual.

## General Support Package Description

Support packages consist of software on a floppy disk, an optional probe adapter, this manual, and a support-specific instruction manual. The software includes setup files, at least one demonstration reference memory, symbol tables, and a disassembler program.

Information on how to select and install LA-OffLine microprocessor support software on a personal computer or workstation is included in your *LA-OffLine User Manual*.

A demonstration reference memory is provided so you can see an example of disassembled instruction mnemonics and bus cycle types. The reference memory is automatically installed on the DAS or TLA 500 when you install the software. Directions for viewing this file are on page 39.

To use a 92DM support product efficiently, you need to have the following:

- Knowledge of your DAS or TLA 500 configuration and its operation
- Knowledge of your system with which you are using this support package
- This manual
- The 92DM support instruction manual

- The *TLA 500 Series Logic Analyzer User Manual* or *DAS System User Manual*, Tektronix, Inc.
- The *92A96 & 92C96 Acquisition Module User Manual*, Tektronix, Inc., or any other appropriate acquisition module
- The *LA-OffLine User Manual*, Tektronix, Inc. (if you want to display and disassemble acquired data on your personal computer or workstation using LA-OffLine)
- LA-LINK (if you want to download symbols from your high-level development system)

## Accessories

The *Replaceable Parts List* chapter in the 92DM support instruction manual contains information on accessories available for your support package, if any.

## Options

The *Replaceable Parts List* chapter in the 92DM support instruction manual contains information on Options available for your support, if any, and how to order them.

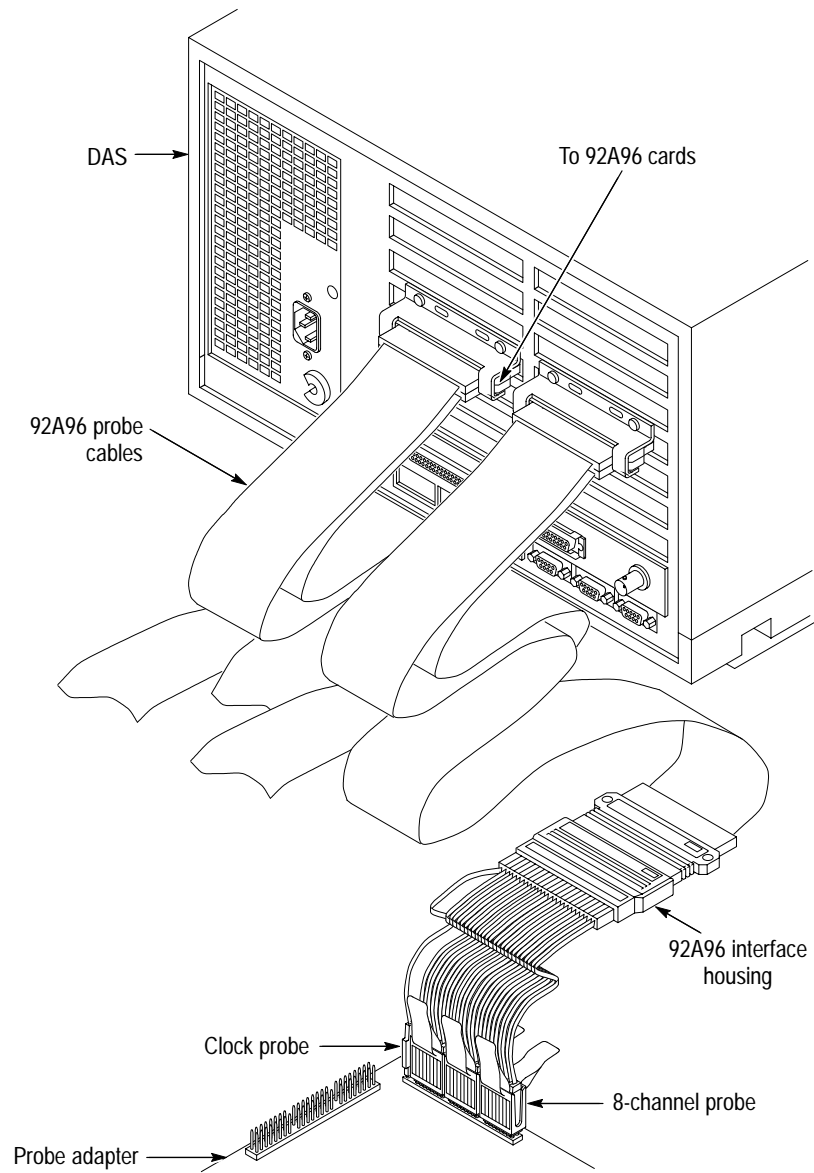
## Specifications

The 92DM support instruction manual contains the electrical, environmental, mechanical, and channel assignment specifications for your support package.

## Logic Analyzer Configuration

92DM support packages require that your DAS be equipped with one, two, or three modules and four, eight or twelve standard acquisition probes. The TLA 500 allows a two module maximum.

Figure 1–1 shows an overview of a DAS with one acquisition module connected to a typical probe adapter.



**Figure 1-1: DAS connected to a typical probe adapter**

Figure 1–2 shows an overview of a DAS with one acquisition module connected to a low-profile probe adapter and a high-density probe.

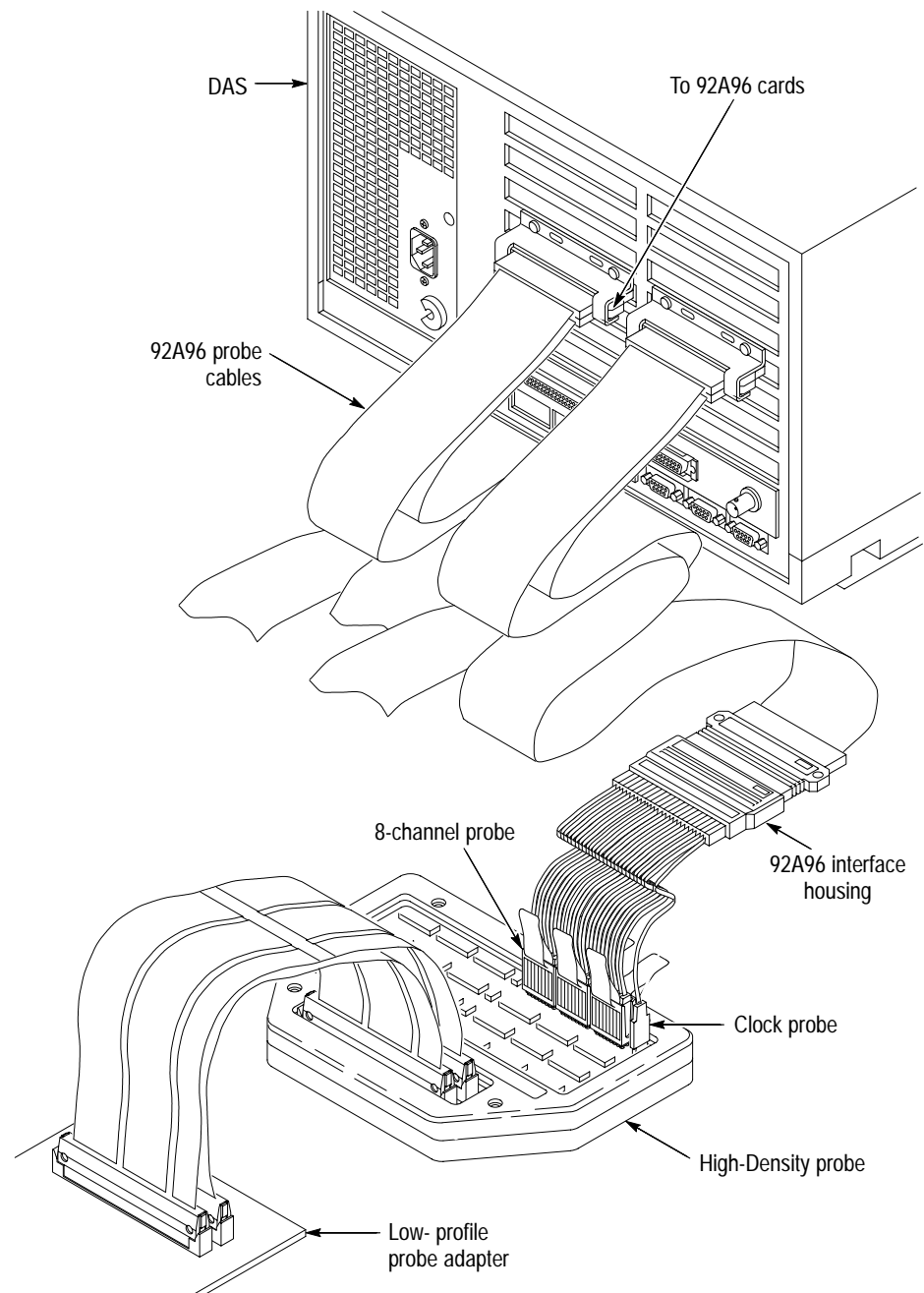


Figure 1–2: DAS connected to a probe adapter with a high-density probe

## Requirements and Restrictions

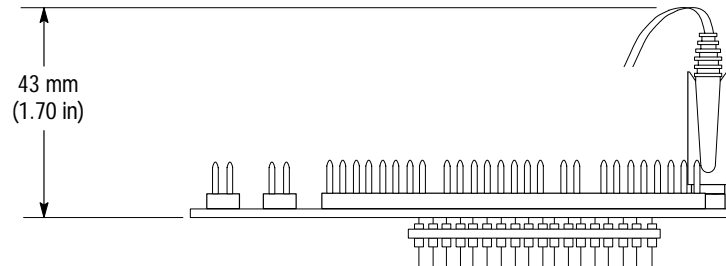
You should review the following topics in your 92DM support instruction manual as they pertain to your SUT:

- Electrical, environmental, mechanical, and channel assignment specifications in the *Specifications* chapter
- Requirements and restrictions in the *Getting Started* chapter

You should also review the following descriptions of general requirements and restrictions of supports.

**Probe Adapter Clearance.** Your SUT must have a minimum amount of clear space surrounding the microprocessor to accommodate the probe adapter. The support instruction manual contains the dimensions of the probe adapter.

**Acquisition Probe Clearance.** Figure 1–3 shows the vertical dimension of an acquisition probe connected to a probe adapter.



**Figure 1–3: Vertical dimension of acquisition probes connected to a probe adapter**

**Probe Adapter Loading.** Any electrical connection to your system adds an additional AC and DC load. Each probe adapter is carefully designed to add a minimum load to your system. However, this additional load might affect the operation of the microprocessor in systems with extremely tight timing margins. The *Specifications* chapter in the support instruction manual contains complete specifications on how the probe adapter affects your system, if at all.

**SUT and Probe Adapter Cooling.** You must be sure to retain the original level of cooling for your microprocessor-based system after you install a probe adapter. To maintain the required operating temperature, you might need to provide additional cooling for the system and probe adapter.

## Configuring the Logic Analyzer

There are two types of configurations for 92A96 modules: a single module (96 channels) or a variable-width module (192 or 288 channels).

Most support packages require only one type of configuration. However, some could require two single modules, or a mixture of a single and variable-width modules.

### **96-Channel Module**

When there are two or three 96-channel modules in adjacent slots, they are automatically formed into a variable-width module by the DAS or TLA 500 system software at power up.

If the support package requires just one module from a variable-width module, you must reconfigure the DAS or TLA 500 in the System Configuration (Sys Config) menu prior to selecting the support in the Configuration menu. Refer to the discussion of the System Configuration menu in the system user manual for details on how to reconfigure variable-width modules.

Refer also to your acquisition module user manual for additional information about connecting acquisition module probe cables, and positioning and installing modules in the DAS or TLA 500 logic analyzer.

### **192- or 288-Channel Variable-Width Module**

To acquire data from some microprocessors, two or three modules might be required. In most cases, the modules need to be configured into a variable-width module, either 192 or 288 channels wide.

When using a variable-width module, all modules must be positioned in adjacent DAS or TLA 500 slots in a single mainframe. You cannot use slots 1 or 8 when creating a variable-width module. The modules do not need to have the same memory depth.

Check the System Configuration menu to see if the module is defined correctly. Figure 1–4 shows how the Sys Config menu looks when two modules are combined into one variable-width module.



When two modules are combined, the module in the higher-numbered slot is referred to as the HI module; the module in the lower-numbered slot is referred to as the LO module. Probe connections on the probe adapter board are labeled to identify which module and which channel probe connects to them. For example, HI\_A0 indicates the A0 probe section from the HI module.

Clock pins on the probe adapter do not have the HI/LO designation; they are just labeled CK0, CK1, CK2, and CK3. Each pair of clock pins connect to the same signal on the probe adapter. The clock probes from both modules must connect to the appropriate clock pins for Custom clocking to function properly.

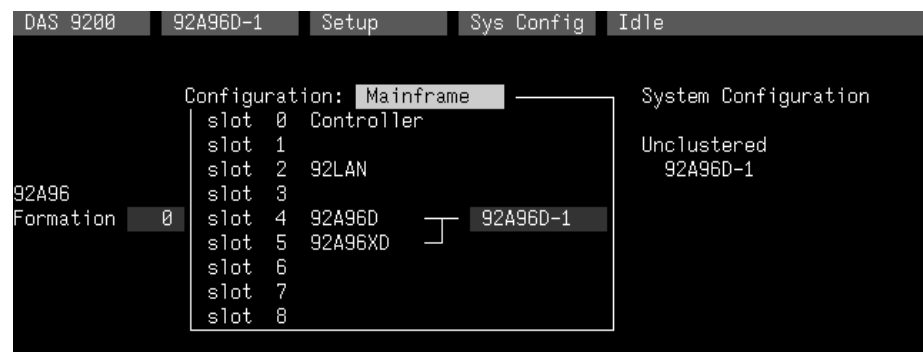


Figure 1–4: Sys Config menu with a variable-width module defined

Refer to your module user manual for information about variable-width modules, and for additional information about connecting acquisition module probe cables, and positioning and installing modules in the DAS or TLA 500.

### Slot Number Labels

In a system with many modules, it is easier to identify which modules are connected to the probe adapter if slot number labels are applied to the probe interface housings and DAS or TLA 500 mainframe. Figure 1–5 shows where to apply slot number labels.

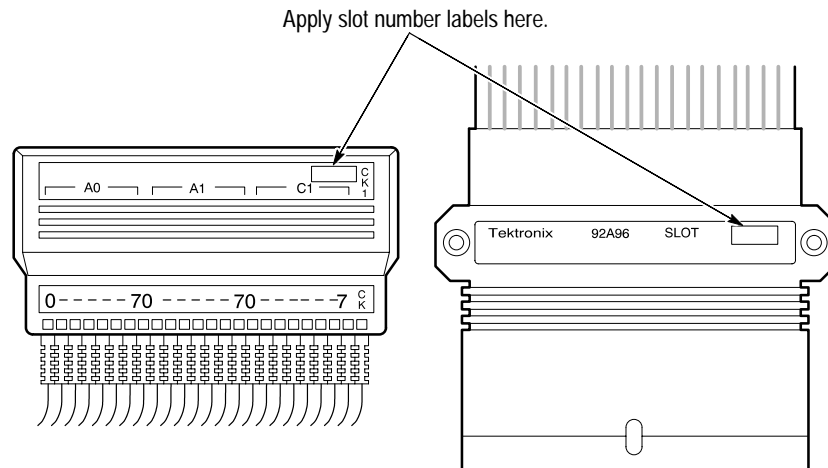


Figure 1-5: Applying slot number labels

## Installing the Software

One floppy disk is included with the support for installing the software on a DAS or TLA 500 logic analyzer. The amount of disk free space required after installation is shown on the label of the floppy disk. During installation, you will need approximately twice that amount of disk space.

To install the software onto a DAS or TLA 500 logic analyzer, follow these steps:

1. Power on the DAS or TLA 500 system.
2. Insert the 92DM support disk for the DAS or TLA 500 logic analyzer into the floppy drive.
3. Press the **Select Menu** key, and select the **Disk Services** menu.
4. Select **Install Application** in the Operation field of the menu.
5. Press **F8: EXECUTE OPERATION**, and follow the on-screen prompts.

---

**NOTE.** After each install operation, a message appears on the screen informing you the operation succeeded or failed. If the message tells you the operation failed, you might need to remove software or files from the hard disk and try installing again.

---

If there is inadequate disk free space available on the hard disk, you must use the Remove Application or Delete File function of the Disk Services menu to free up enough disk space to install the software.

For information on installing the LA-OffLine microprocessor support software on your workstation, refer to the *LA-OffLine User Manual*.

## Disk Drive Upgrade

If your DAS/TLA does not have a 3.5 inch floppy disk drive, you should contact your Tektronix sales representative for information on how to upgrade the drive.

## Loading the Software

To load the software, follow these steps:

1. Press the **Menu Select** key, select the appropriate module, select its **Configuration** menu, and press **Return**.
2. Select **XXX Support**, where XXX represents the name of your support package, for example the P54C, in the Software Support field.

---

**NOTE.** After each load operation, a message appears on the screen informing you the operation succeeded or failed. If the message tells you the operation failed, you might need to remove software or files from the hard disk and try loading again.

---

When you load the software, the Channel, Clock, and Trigger menus are automatically set up to acquire data from your microprocessor-based system. You can change the setups in the Clock and Trigger menus as needed. For information on what can be changed in the Channel menu, refer to *Channel Group Definitions* on page 12.

## Configuring a Probe Adapter

There might be jumpers or switches on the probe adapter. The 92DM support instruction manual contains information on how to configure the probe adapter under *Configuring the Probe Adapter* in the *Getting Started* chapter.

## Connecting a 192-Channel High-Density Probe to a Probe Adapter

Some support packages require a 196-Channel High-Density Probe in addition to the probe adapter.

Before you connect to the system under test (SUT), you must connect the standard probes to the module card. Your SUT must also have a minimum amount of clear space surrounding the microprocessor to accommodate the probe adapter. Refer to the *Specifications* chapter in the 92DM support instruction manual for the required clearances.

To connect the acquisition probes to the high-density probe, follow these steps:

1. Connect the probe adapter to the SUT as described in the support instruction manual up to the step that describes how to connect the clock and channel probes.
2. Connect the clock and channel probes to the high-density probe as shown in Figure 1–6. Match the channel groups and numbers on the interface housing to the corresponding pins on the high-density probe. Match the ground pins on the probes to the corresponding pins on the probe adapter.

Be sure to check the support instruction manual for any special connections that need to be made on the high-density probe.

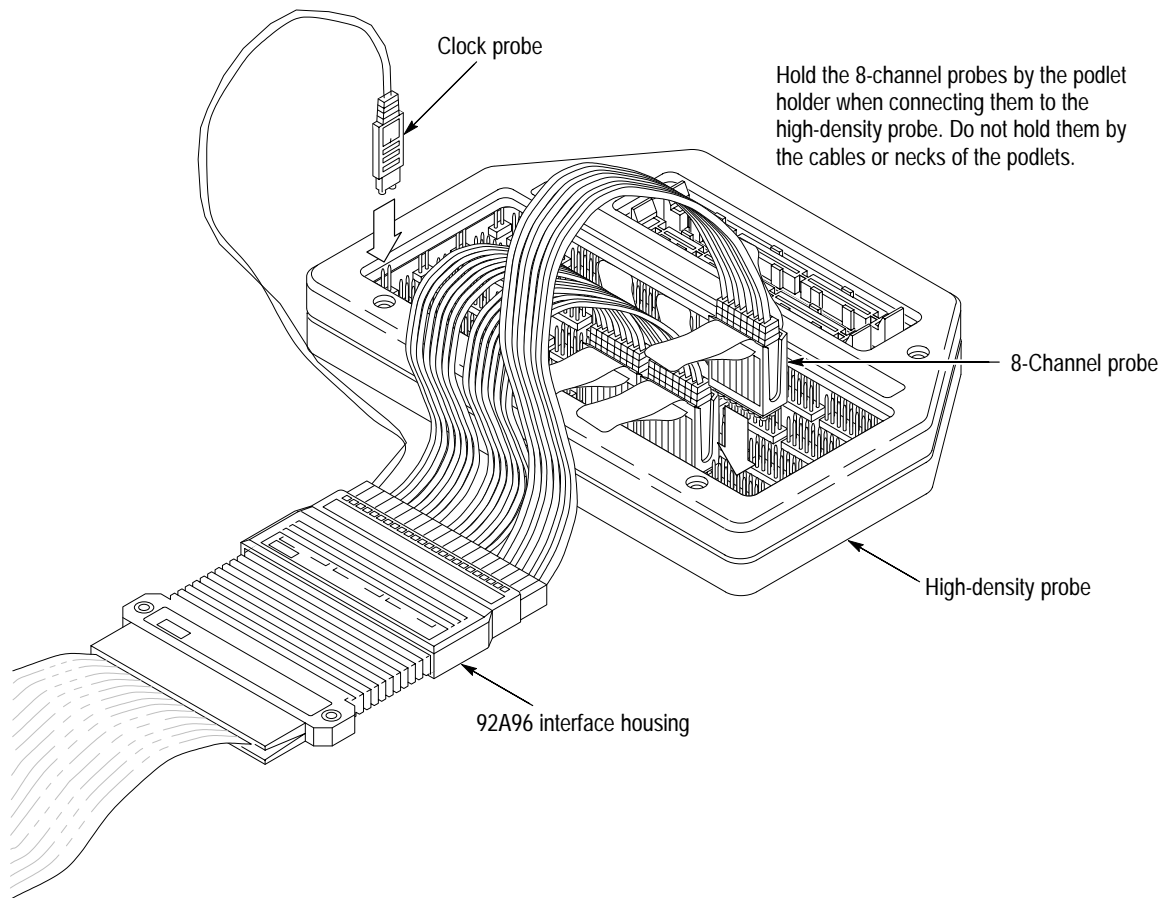


Figure 1-6: Connecting acquisition probes to a high-density probe

3. Connect the high-density cables from the probe adapter to the high-density probe as shown in the 92DM support instruction manual.

# Application Setup

This section provides general information on the setup of the software.

Remember that the information in this section is general to the features and controls of any microprocessor support on a DAS or TLA 500 logic analyzer. Differences in features and controls of a specific support will be given in the instruction manual for that product.

Before you acquire and disassemble data, you need to load the software and specify setups for clocking, triggering, and using symbols. The software provides default values for each of these setup controls, but you can change them as needed.

## Channel Group Definitions

Each support setup contains channel group definitions. Most supports have channel groups defined for the Address, Data, and Control signals, and additional groups defined for other microprocessor signals.

The channel groups cannot be changed nor can the channels be reused in another group; however, you can define and display additional groups. If you want to know which signal is in which group, refer to the channel assignment tables in the *Specifications* chapter of the support instruction manual. Channel assignments are also shown in the 92A96 Channel setup menu.

## Changes that Affect Disassembly

You can change part of the default setups for the module. If you change the threshold voltage or display polarity, the disassembled data will be affected.

## Custom Clocking

You can use the Clock menu to set clocking choices to control data sampling. Each support offers a microprocessor-specific clocking selection called Custom. This clocking choice is the default selection whenever you select XXX Support in the 92A96 Configuration menu, where XXX represents the name of your support, for example the P54C.

Disassembly will not be correct with the Internal or External clocking modes. Descriptions of using these other clock selections with microprocessor supports can be found in the next chapter under *General Purpose Analysis*.

## Symbols

Symbols can be used to represent a specific channel group value (pattern) or a range of channel group values defined by upper and lower bounds (range).

You can use symbol tables to display channel group information symbolically in the State and Disassembly menus, to control triggering, and to conduct data searches. The disassembler provides at least one symbol table file, normally for the Control channel group that replaces specific Control channel group values.

Refer to *Triggering* on page 35, and *Symbolic Display of Channel Groups* on page 20 for more information on using and displaying symbolic values. Refer also to *Disassembly Search Definition Overlay* on page 21 for information on how to use symbol table values for data searches.

Your support instruction manual shows the supplied symbol table files and lists the predefined symbols in each file.

## Triggering

All the Trigger menu selections available for use with your module are also available for use with disassembly. Refer to your module user manual for a list and description of these selections.

If the support displays exception cycle types, these exception cycle types are computed and cannot be used to control triggering.

You can use the Home key to quickly clear the word recognizer field of any channel group with a symbolic radix. To clear a word recognizer, open the field, press the Home key, and close the field. The first entry on the list is blank.

The DAS or TLA 500 makes it possible to cross-trigger with other modules or to an external instrument. You might want to consider sending or receiving a signal to or from another module, or to the Sync Out SMB connector on the module. You should refer to your *DAS or TLA 500 System User Manual* for an in-depth description of defining and using signals, and to specific module user manuals for a description of using the Sync Out SMB connector.

# Display Menus

This section provides general information on features and controls of the Disassembly menu. Also included in this section is a brief description of the State and Timing menus.

Remember that the information in this section is general to the features and controls of any support on a DAS or TLA 500 logic analyzer. Differences in features and controls of a specific support will be given in the instruction manual for that product.

If you have any problems acquiring data, refer to *Appendix A: Error Messages and Disassembly Problems*.

## Disassembly Menu

Acquired data is disassembled into cycle types and instruction mnemonics. Data can be viewed in the Disassembly menu in four display formats. All the formats have the following characteristics:

- The default display format typically shows the Address, Data, and Control channel group values for each sample of acquired data.
- Gaps in the acquired data, caused by data qualification specified in the Trigger menu, are indicated by a gray background behind the Address and Data groups.
- You can add data marks to sequences or use the Mark Opcode function to correct disassembled data that is misinterpreted.
- The disassembler displays special characters and strings in the instruction mnemonics to indicate significant events, such as an illegal instruction, or an instruction that was manually changed to a program fetch with the Mark Cycle function. The instruction manual lists and describes these special characters and strings.

The Disassembly Format Definition overlay offers optional selections to modify the way disassembled data displays.

The Disassembly Search Definition overlay allows you to define search criteria to locate specific data. The overlay can also be used to scroll through data based on specific types of instructions.



**Display Formats** The four display formats for disassembled data are: Hardware, Software, Control Flow, and Subroutine.

**Hardware Display Format.** In Hardware display format, the disassembler displays certain cycle type labels in parentheses. Your support instruction manual contains a table that lists the cycle type labels and gives a brief definition of the bus cycle that the label represents.

Figure 1–7 shows an example of the Hardware display. The figure uses data from the P54C reference memory file.

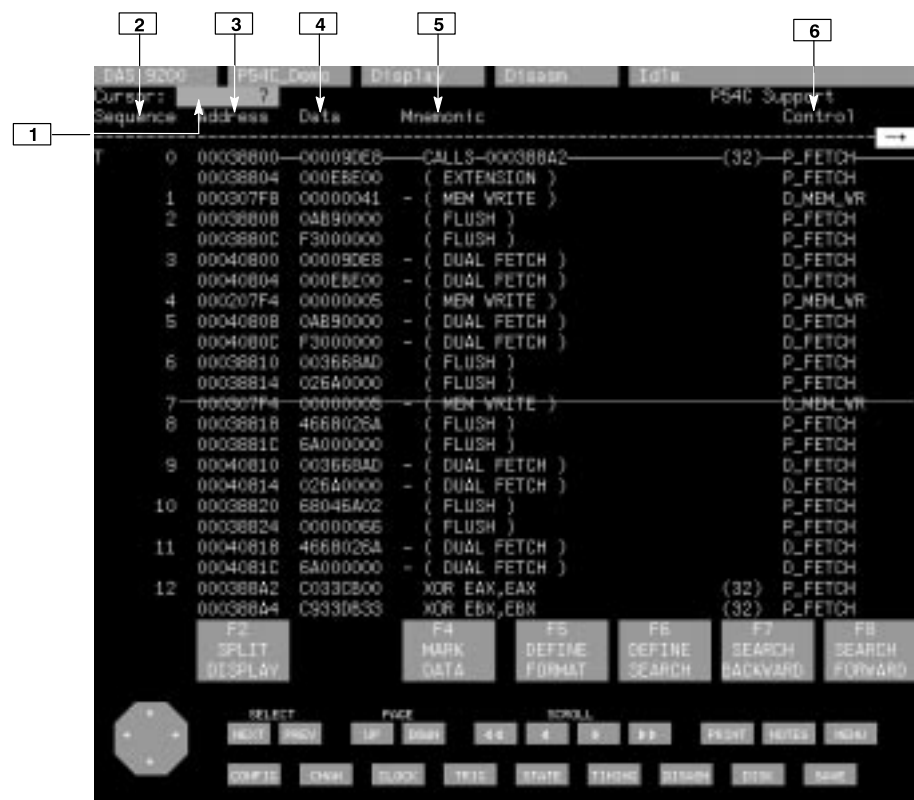


Figure 1–7: Hardware display

- 1 **Cursor.** Shows the DAS or TLA 500 sequence number on which the cursor is positioned.
- 2 **Sequence Column.** Lists DAS or TLA 500 memory locations for the acquired data.
- 3 **Address Group.** Lists data from channels connected to the Address bus.
- 4 **Data Group.** Lists data from channels connected to the Data bus.

**5 Mnemonic Column.** Lists the instructions that have been disassembled.

**6 Control Group.** Lists data from channels connected to microprocessor signals assigned to the Control channel group.

**F2: SPLIT DISPLAY.** Accesses the Split Display Definition overlay. Refer to the module user manual for information on this overlay.

**F4: MARK DATA.** Use this key to add data marks or to mark cycles. Refer to the module user manual for information on data marks. Refer to the next chapter for a description on how to mark cycles.

**F5: DEFINE FORMAT.** Use this key to access the Disassembly Format Definition overlay, described later in this section.

**F6: DEFINE SEARCH.** Use this key to access the Disassembly Search Definition overlay, described later in this section.

**F7: SEARCH BACKWARD.** Use this key to search backward through acquired data for a sample matching the current search definition. The search starts with the sample before the cursor. If the search is successful, the data cursor moves to the sample that matches the search values.

**F8: SEARCH FORWARD.** Use this key to search forward through acquired data for a sample matching the current search definition. The search starts with the sample after the cursor. If the search is successful, the data cursor moves to the sample that matches the search values.

**Software Display Format.** In general, the Software display format shows only executed instructions. The display is designed to resemble assembly language listings.

Your support instruction manual contains details about other information displayed or not displayed, such as special cycles, read extensions, data reads and writes, flushed cycles, and other cycle types.

**Control Flow Display Format.** In general, the Control Flow display format shows any instruction that changes the flow of control, such as the following types of instructions:

- Branch instructions that cause an address break; branches not taken are not displayed
- Conditional jumps actually taken
- Exception cycles

If a conditional jump branches to an address that is reached sequentially, it might be impossible to determine if the branch was taken or not. In this case, the branch would not be displayed in the Control Flow display, and no flushing would be

done. Unconditional branches are always displayed whether or not the destination address is seen on the bus (although no flushing will be done).

Your support instruction manual contains a list of specific instructions that generate a change in the flow of control in the microprocessor.

**Subroutine Display Format.** In general, the Subroutine display format shows only the first fetch of subroutine call and return instructions. It will display conditional subroutine calls if they are considered to be taken.

Your support instruction manual contains a list of specific instructions that generate a subroutine call or return instruction in the microprocessor.

## Mark Cycle

Occasionally you might want to change the way the disassembler interprets a cycle type. Marking cycles synchronizes the disassembler.

The disassembler might lose track at the start of an acquisition if there is not enough history or when a flush occurs that the disassembler misinterprets as an instruction. The Mark Cycle function identifies an opcode (or other cycle type) and lets you synchronize the disassembly if the software has lost track.

Function key F4: MARK DATA provides the Mark Cycle function that allows you to change the interpretation of a cycle type. You can use the Mark Cycle function, to select a cycle and change it to another type of opcode or cycle.

The support instruction manual contains information on the types of opcodes or other cycles you can change a misinterpreted cycle to, and a list of Mark Cycle selections.

---

**NOTE.** *The Mark Cycle function is not needed for all microprocessor supports. Your support might not have a list of Mark Cycle selections.*

---

## Disassembly Format Definition Overlay

You can use the Disassembly Format Definition overlay to make optional display selections for the Disassembly menu to help you analyze your data. To access the overlay from the Disassembly menu, press **F5: DEFINE FORMAT**.

You can use this overlay to change the way data appears across all disassembly display formats. All support softwares contain the following display options:

- Choose the display format (mode) in which the Disassembly menu displays disassembled data
- Display and define the format of the timestamp

- Highlight various types of disassembled cycles
- Choose to disassemble across gaps
- Change the position of any channel group in the display
- Change the radix for any channel group
- Choose which symbol tables are to be used when channel groups are displayed symbolically

Figure 1–8 shows the fields common to all Disassembly Format Definition overlays.

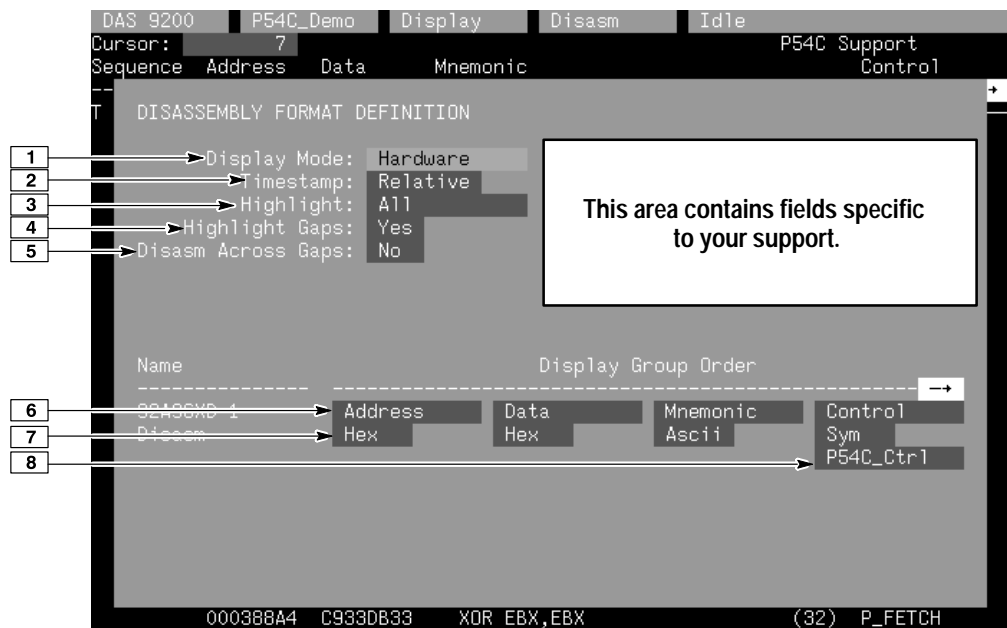


Figure 1–8: Disassembly Format Definition overlay

- 1 **Display Mode.** You can select Hardware, Software, Control Flow, or Subroutine format.
- 2 **Timestamp.** You can display the timestamp as an Absolute, Relative, or Delta value. You can also set the timestamp display to Off.

Timestamp values show the amount of time that has elapsed between data samples. An Absolute timestamp shows the amount of time elapsed between when the acquisition was started (after pressing F1: START) and each subsequent data sample. A Relative timestamp shows the amount of time elapsed between successive samples. A Delta timestamp shows the amount of time elapsed between the sample with the delta user mark and each

previous or subsequent data sample. If there is no delta mark, the timestamp is relative to sequence 0.

- 3 Highlight.** You can highlight Instructions, Control Flow, or Subroutines. With highlighting on, only the selected type of samples are shown as white text with a black background; all other samples are shown as gray text with a black background. You can also set the highlighting to All.
- 4 Highlight Gaps.** You can choose to highlight or not to highlight gaps. Gaps are caused by qualifying data storage in the Trigger menu and are indicated by a gray background behind the address and data values.
- 5 Disasm Across Gaps.** You can choose to continue or not to continue to disassemble data across gaps. Disassembling data across gaps causes the disassembler to disassemble data as if no gap existed. Disassembled data will be invalid if the last sample before the gap does not logically match the sample immediately following the gap.
- 6 Group Name.** You can specify the name of the group that displays in the column in which the cursor is positioned. When you move a group, the group is inserted in the new column position and removed from its old position. Remaining groups will move one column position to the left or right as appropriate.
- 7 Group Radix.** You can select the radix in which each group displays. The radix selections for most groups are Binary, Octal, Hexadecimal, Symbol, and Off. The only selections for the Data group are Hexadecimal or Off. The only selections for the Mnemonics group are ASCII or Off. You should only select the symbolic radix when a symbol table is available for that group. The timestamp value always displays in decimal.
- 8 Symbol Table.** You can specify a symbol table to use for each group where symbolic is the selected radix.

**F1: ESCAPE & CANCEL.** Closes the overlay and discards any changes you have made since entering it.

**F5: RESTORE FORMAT.** Displays a list of saved disassembly formats for the current module or cluster setup. Use the cursor keys to select the desired format to restore, and press the Open/Close key.

**F6: SAVE FORMAT.** Saves the current selections for the Disassembly Format Definition overlay in a file on disk. You can enter a file name up to ten characters long.

**F7: DELETE FORMAT.** Displays a list of saved disassembly format files for the current module or cluster setup. Use the cursor keys to select the desired format to delete, and press the Open/Close key. You cannot delete the Default format.

**F8: EXIT & SAVE.** Exits the overlay and executes or saves any changes made.

**Exception Vectors**

Some disassemblers can display microprocessor exception vectors.

Exception vector tables can be fixed or relocated. When they can be relocated, the disassembler initially places a default value for the location of the exception vector table. You can change the value using the Disassembly Format Definition overlay by entering the starting address in the appropriate field (or fields). The field provides the disassembler with the offset address. You need to enter a hexadecimal value corresponding to the offset of the base address of the exception table.

If needed, there will be an exception vector table size field in the Disassembly Format Definition overlay that lets you specify a hexadecimal size for the table.

The support instruction manual contains information on the fields associated with displaying exception vectors. The manual also contains a table(s) that lists displayed exception vectors.

Exception cycle types are computed and cannot be used to control triggering. When the microprocessor processes an exception, the disassembler displays the type of exception, if known.

**Symbolic Display of Channel Groups**

Channel groups, such as Address, can be displayed as range symbolic values in the Disassembly menu similar to the way the Control group can be displayed as pattern symbolic values in the Disassembly and State menus.

If you create a range symbol table for the Address channel group, you can then change the radix of the Address group in the Disassembly menu using the Disassembly Format Definition overlay. For the Address group, if an address appears in the operand field of a mnemonic, it will also be displayed symbolically.

You can use the Symbol Editor menu to create symbol tables in which symbols are assigned to various pattern or range values.

Figure 1–9 shows the Address channel group displayed symbolically. The symbol table file used in this example is called XXX\_Demo, where XXX could represent the name of your support. This figure uses the P54C\_Demo symbol table file.

Refmem	P54C_Demo	Display	Disasm	P54C Support
Sequence	Address	Data	Mnemonic	Con
T 0	P_MAIN	00009DE8	CALLS-P_CLRREGS	(32) P_F
	P_MAIN+4	000EBE00	( EXTENSION )	P_F
2	P_MAIN+8	0AB90000	( FLUSH )	P_F
	P_MAIN+C	F3000000	( FLUSH )	P_F
4	000207F4	00000005	( MEM WRITE )	P_M
6	P_MAIN+10	003668AD	( FLUSH )	P_F
	P_MAIN+14	026A0000	( FLUSH )	P_F
8	P_MAIN+18	4668026A	( FLUSH )	P_F
	P_MAIN+1C	6A000000	( FLUSH )	P_F
10	P_MAIN+20	68046A02	( FLUSH )	P_F
	P_MAIN+24	00000066	( FLUSH )	P_F
12	P_CLRREGS	C033CB00	XOR EAX,EAX	(32) P_F
	P_CLRREGS+2	C933DB33	XOR EBX,EBX	(32) P_F
	P_CLRREGS+4	C933DB33	XOR ECX,ECX	(32) P_F
14	P_CLRREGS+6	ED33D233	XOR EDX,EDX	(32) P_F
	P_CLRREGS+8	ED33D233	XOR EBP,EBP	(32) P_F
	P_CLRREGS+A	FF33F633	XOR ESI,ESI	(32) P_F
	P_CLRREGS+C	FF33F633	XOR EDI,EDI	(32) P_F
16	P_CLRREGS+E	ABFFE1C3	RETS	(32) P_F
	000388B4	B6EFFFFE	( FLUSH )	P_F
18	000388B8	FFB7D7FA	( FLUSH )	P_F
	000388BC	FFFFFFDF	( FLUSH )	P_F
20	000207F4	00000005	( MEM READ )	P_M

Figure 1-9: Address channel group displayed symbolically

## Disassembly Search Definition Overlay

You can use the Disassembly Search Definition overlay to define specific data values to locate in the acquired data. You can set up the module to search for specific text or numeric values, a numeric value that is inside or outside a range of values, or to exclude a group from the search. You can also use this overlay to control scrolling in the Disassembly menu.

---

**NOTE.** If a channel group is not displayed, it will be excluded in the search. To make a channel group visible, access the Disassembly Format Definition overlay, and change the display radix of the group to Bin, Oct, Dec, Hex, or Sym. A display radix of ASCII will default to Hex as the search radix.

---

The module logically ANDs all values and selections defined in the Disassembly Search Definition overlay when a search is conducted.

When a match is found for the search value, the cursor moves to that sample. If a match is not found, the cursor does not move, and a message appears that says the value was not found.

Table 1–1 shows the search variables available for each type of group.

**Table 1–1: Search variables available by group type**

Group type	Comparison type	Radix	Value	Offset*
Channel	Equal, Not Eq	Hex, Bin, Oct, Dec, Sym (Pattern, Range)	=	yes
	In, Not In	Hex, Bin, Oct, Dec, Sym (Range)	≥, ≤, =	none
	Ignore	none	none	none
Mnemonic	Text, Not Text	Whole String, Substring, Word	=	none
	Ignore	none	none	none

\* Only available in Equal or Not Equal searches when SYM is the search radix and a range symbol table is selected.

When searching for data in a clustered-module setup in the Disassembly menu, the searches are conducted only for the master module. You can define any one of the modules to be the master module.

**Search Type** You can choose which type of acquired data to search through: Disassembly, Acquisition, or Both.

**Disassembly Search Type.** The Disassembly search type allows radix choices as described in Table 1–1 for all visible channel groups, and the Mnemonic group. The search algorithm only looks through disassembled data.

**Acquisition Search Type.** The Acquisition search type allows a subset of radix choices for all visible channel groups. The Mnemonic group is excluded and is not visible. The search algorithm only looks through state data. The comparison type specified in the Mode field applies to all visible groups.

It is much faster to search through state data than disassembled data if you can determine a suitable value on which to search.

**Both Search Type.** The Both search type is a combination of the Disassembly search and Acquisition search types. Searches are usually faster when data is first filtered with the Acquisition search algorithm. This is the basis for the Both selection.

When searching through both types of data, the algorithms are applied in the following sequence:

1. The acquisition search looks for a value that matches the state data for all defined channel group values.



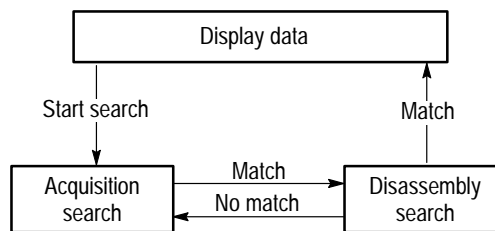
2. If the acquisition search finds a match in state data, the disassembly search checks for values that match the disassembled data for all defined channel groups and mnemonic group values on that line.

If the disassembly search finds a match, the cursor moves to that line.

3. If the disassembly search does not find a match, the acquisition search looks for another match in state data as described in step 1.

If no match is found in the acquired state or disassembled data, the cursor does not move, and a message appears that says the value was not found.

Figure 1–10 shows the interaction of the acquisition and disassembly searches when Both is selected.



**Figure 1–10: Interaction of acquisition and disassembly searches with Both selected**

Figure 1–11 on page 29 shows an example of the Disassembly Search Definition overlay with a search defined for Both search types.

## Search Mode

The selection in the Mode field applies only to the channel group values defined in an acquisition type search. The search mode defines how state data is compared to the acquisition search values: Equal, Not Equal, or Ignore. (The disassembly type search contains individual Mode fields for each visible channel group and the mnemonic group.)

**Equal Search Mode.** The search looks for values that match the visible channel group values defined.

**Not Eq Search Mode.** The search looks for values that do not match the visible channel group values defined.

**Ignore Search Mode.** You can exclude all visible channel groups from the search. Existing channel group values are replaced with X's (don't cares). To retrieve the previous values, make another selection in the Mode field and the values existing when Ignore was selected will reappear.

**Radices** The search radix varies with each type of comparison. Available search radices are: numeric and symbolic. With a symbolic radix, you can use a pattern or range symbol table to define the search value.

**Numeric Radix.** For numeric radices in Eq or Not Equal searches, you can enter numeric digits allowed for the radix or Xs (don't cares) for each bit position. For example, in a binary radix, you can enter zeroes, ones, or Xs.

In Equal or Not Eq searches, if you use Don't Cares (Xs) in the search value and change the radix, a \$ (dollar sign) replaces those characters that cannot be displayed in the new radix. For example, if you select a binary search radix, enter 01XX as the search value, and then change the radix to octal, the search value will be displayed as 0\$. If you change the radix to hexadecimal, the value will be displayed as a \$.

Even though part of the search value appears as a \$, the search program will try to find a sample that matches the characters that are defined.

**Symbolic Radix with a Pattern Symbol Table.** If an Equal or Not Eq search is used with a pattern symbol table, a list of symbols and their associated numeric values appear when you open the value field. The search program looks for the numeric value of the symbol, no matter what the display radix for the group is set to in the Disassembly menu.

If the search radix is numeric (Bin, Oct, Dec, or Hex), you can enter a numeric value, and change the search radix to Sym. If there is a matching value in the symbol table, the symbol name appears. If there is not a matching value, a default symbol of all \$\$\$\$ is assigned to the numeric value entered. If you open the value field, the \$\$\$\$ symbol appears in the list.

As soon as you select a symbol defined in the symbol table, the default symbol is removed from the list. If the value of the default symbol is changed to another numeric value not defined in the symbol table, the numeric value of the default symbol, \$\$\$\$ , is overwritten.

Pattern symbol tables are not selectable for In or Not In searches.

**Symbolic Radix with a Range Symbol Table.** If an Equal or Not Eq search is used with a range symbol table, the search program looks for a value matching the lower bound of the range plus the offset.

You can also enter an offset value in the + field below the search value field which will be added to the low bound of the range. When entering an offset, you need to use the same radix used in the symbol table. A letter to the right of the Offset value indicates the radix as follows: h for hexadecimal, o for octal, b for binary, or t for decimal. Only valid numeric values in the correct radix can be entered; Don't Cares are not allowed.

If you change the search radix to a numeric radix such as hexadecimal, the entire value, low bound and offset, is converted. When you change the radix back to symbolic, and a symbol is not defined for that value, the value is placed in the offset field and the default range symbol is placed in the value field. The value field will appear blank.

The numeric value for the default symbol is the entire range for the number of bits in the channel group. In binary, the lower bound would contain all zeroes and the upper bound all ones. Therefore, if the default range symbol is selected, the search program will match any value in the group.

Only range symbol tables can be used with In or Not In searches. There is no offset field.

## Comparison Types

You can define several types of data comparisons in the Disassembly Search Definition overlay: Equal, Not Equal, In Range, Not In Range, Text, Not Text, and Ignore.

**Equal Comparison.** You can search for a specific numeric value in any visible channel group. The Equal search comparison causes the software to search for a value that matches the pattern entered in the = field.

**Not Eq Comparison.** You can search for any value other than a specific numeric value in any visible channel group. The Not Eq search comparison causes the software to search for a pattern that does not match the value entered in the = field.

**In Comparison.** You can search for any value inside a range of numeric values for any visible channel group. The In search comparison causes the software to search for a value that is equal to or between the values entered in the  $\geq$  and  $\leq$  fields. Don't Care characters (Xs) are not allowed in this type of search.

**Not In Comparison.** You can search for any value not inside a range of numeric values for any visible channel group. The Not In search comparison causes the software to search for a value that is outside the values entered in the  $\geq$  and  $\leq$  fields. Don't Care characters (Xs) are not allowed in this type of search.

**Text Comparison.** You can search for a specific text string in the Mnemonic group. When you select Text, the selections in the Radix field are: Whole String, Substring, and Word.

---

**NOTE.** Text searches are always case sensitive.

---

You can use special characters in the value field (=). Table 1–2 shows the special characters available.

**Table 1–2: Special characters available in a Text search**

Character	Translation
?	Matches any single character
*	Matches zero or more characters
~	Matches one or more “delimiter” (see the following paragraphs)
<space>	Matches one or more spaces
\<space>	Matches one space
\?	Matches the question mark character
\*	Matches the asterisk character
\~	Matches the tilde character
\\	Matches the backslash character

You can use the tilde (~) special character in the search value to search for most non-alphanumeric characters except the underscore character. The tilde will also match the beginning and the end of string.

In any text search, you can enter the tilde in the search value to match the delimiter characters. In a Word text search, the tilde is implicit before and after the search value, but you might want to enter an explicit tilde with the search value as well. The tilde matches delimiter characters as follows:

<space>	!	@	(	)
#	%	^	[	]
&	*	+	{	}
?	~	-	<	>
,	.	=	/	\
:	;	"		\$
' (open quote)		' (close quote)		

If you need to search only for a specific delimiter, you can enter it in the value field instead of using the tilde special character.

When matching a delimiter character against a text string, the beginning and end of string delimiter match does not consume a character from the string. For example, the string abc matches the pattern ~^abc~^.

The software can search for the following Text types:

- When Whole String is selected, the search program will try to match the search value to the entire mnemonic string.
- When Substring is selected, the search program will try to match the search value anywhere in the mnemonic string.
- When Word is selected, the search program will try to match the search value as a delimited block of characters anywhere in the Mnemonic group. In other words, the characters in the search pattern must all occur together in the mnemonic string with a delimiter on either side of the block.

Two examples of equivalent Text search definitions are as follows:

Substring: abc = Whole String: \*abc\*  
Word: abc = Substring: ~abc~

Keep the following characteristics in mind when entering text in the search value field for the Mnemonic group:

- A caret (^) appears beneath the field to mark the end of the text pattern; this allows you to enter spaces at the end of the value. When the caret displays below the right border of the value field, it indicates that the end of the string is scrolled out of the field and is not visible.
- Do not type in spaces (press the space bar) to delete characters in the string; you must use the Rubout key which is bound to the Shift/Backspace on most keyboards.
- When deleting characters, the character to the left of the text entry cursor (an underscore character) is removed; if the text entry cursor is positioned under the last character in the string, that character is removed.
- You can clear the entire field with the Shift/Space key.
- You can move the text entry cursor (a one character wide underline) inside the value field with the arrow keys, or with the mouse. To move the cursor with the mouse, position the pointer over the character you want the cursor to move to and click mouse button 1.
- You can move the text entry cursor to the beginning of the input string with the Home key. (This is the number 5 key on the keypad of many keyboards.)
- You can move the text entry cursor to the end of the input string with the Shift/Home key.
- Part of the search value string will scroll to the left (out of view) if you enter a string longer than the value field can display.

- An arrow on the left or right of the value field indicates that text is not in view on that end of the string.
- You can select to insert characters or overwrite them as the text entry mode. Use F3: SWITCH TO INSERT or F3: SWITCH TO OVERWRITE to toggle between the two modes. Figure 1–12 shows this function key.
- When you close the field, the text entry cursor, left and right arrows, and function key F3 disappear.

**Not Text Comparison.** You can search for a text string in the Mnemonic group other than the one specified as the search value. When you select Not Text, the selections in the Radix field are: Whole String, Substring, and Word. Refer to the description of Text search for information on how to define the Not Text search value.

**Ignore Comparison.** You can exclude any group displayed in the Disassembly menu from the search.

**Mnemonic Type** You can search for types of mnemonics displayed by the disassembler.

The module logically ANDs all values and selections, including the Mnemonic Type, defined in the Disassembly Search Definition overlay when a search is performed.

---

**NOTE.** *If you select a Mnemonic Type search while viewing data in the same display mode, and no other search values are defined for other groups, the search will stop on every sample in the display. To avoid this, enter more specific search values in other groups, or select a more restrictive Mnemonics Type.*

---

Table 1–3 shows the Mnemonic Type selections, suggested display formats in the Disassembly menu, and the resulting search action relative to the display format.

**Table 1–3: Mnemonic type search selections, display mode, and resulting search action**

Mnemonic type	Suggested display format	Resulting search action
Hardware	Hardware	Searches through samples displaying a cycle type label or any instruction
Software	Hardware	Searches through samples displaying the first fetch of an executed instruction
Control Flow	Hardware, Software	Searches through samples displaying an instruction that changed the flow of control
Subroutine	Hardware, Software, Control Flow	Searches through samples displaying the first fetch of a subroutine call or return instruction

**Load the Search Values from the Cursor**

You can load the value from an individual group or all groups on which the cursor is currently positioned in the Disassembly menu.

You can position the cursor on any search field for an individual group with a search mode other than Ignore and press F4: LOAD FROM CURSOR. The search program will copy in the search value for that group. If the search radix does not match the display radix, the value is converted to the search radix.

You can position the cursor in the Mnemonics Type field and press F4: LOAD FROM CURSOR. The search program will copy in the search values for all groups in the Disassembly Data area with valid search modes except Ignore.

You can position the cursor in the Mode field and press F4: LOAD FROM CURSOR. The search program will copy in the search values for all groups in the Acquisition Data area with valid search modes except Ignore.

If there is more than one display line for the sample being loaded, a pop up appears in which you can choose the line whose values will be loaded.

Figure 1–11 shows the Disassembly Search Definition overlay with Both as the selected type of search.

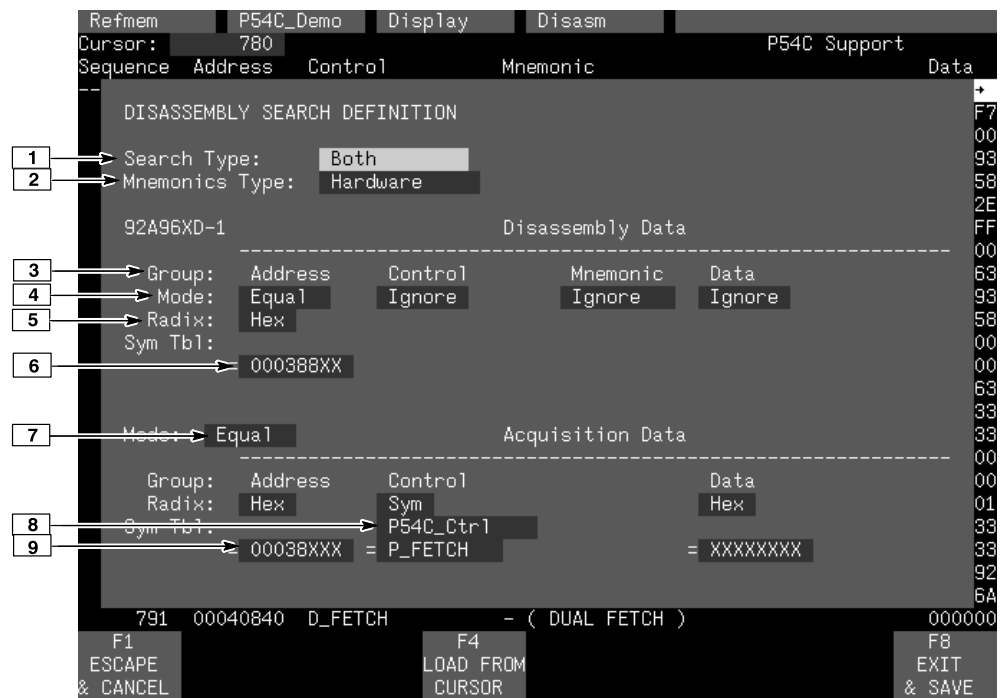


Figure 1–11: Disassembly Search Definition overlay with Both as the search type

- 1 **Search Type.** You can select Disassembly, Acquisition, or Both search methods.
  - 2 **Mnemonic Type.** You can select Hardware, Software, Control Flow, or Subroutine mnemonic types.
  - 3 **Group Name.** Shows the name of all the groups currently displayed in the Disassembly menu.
  - 4 **Mode.** You can select various search modes for a channel group or for the Mnemonic group. Table 1–1 shows the selections by group type.
  - 5 **Radix.** You can select various search radices for a channel group or for the Mnemonic group. Table 1–1 shows the selections by group type.
  - 6 **Value.** You can enter a numeric value, a pattern symbol, or a text string in the equals (=) field when using Equal, Not Eq, Text, and Not Text comparison types. Table 1–1 shows the selections by group type.
  - 7 **Mode.** Applies only to the channel group values defined in an acquisition type search. The search mode defines how state data is compared to the acquisition search values.
  - 8 **Sym Tbl.** You can specify a symbol table to use for each group if Sym (symbolic) is the search radix.
  - 9 **Value.** You can enter a numeric value when using Equal and Not Equal.
- F1: ESCAPE & CANCEL.** Closes the overlay and discards any changes you have made since entering it.
- F4: LOAD FROM CURSOR.** Loads the values from one group or all groups on which the cursor is currently positioned in the Disassembly menu.
- F8: EXIT & SAVE.** Exits the overlay and executes or saves any changes made.
- Figure 1–12 shows a Text search defined in the Mnemonic group.



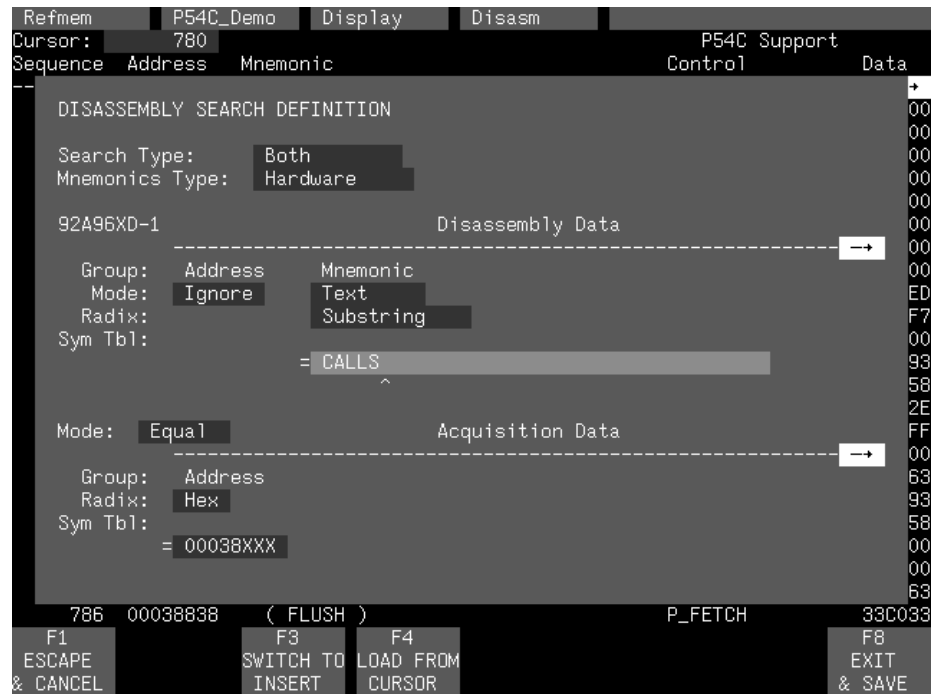


Figure 1-12: Text search in the Mnemonic group

**F3: SWITCH TO INSERT.** Changes the text entry mode to insert characters. When in Insert mode, this key is labeled F3: SWITCH TO OVERWRITE. You can use F3 to toggle between the Insert and Overwrite modes. The two text entry modes are only available when the Mnemonic search value field is open.

## Timing Menu

In the Timing menu, every channel is shown as a waveform, and groups of channels are shown as busforms.

A predefined Timing Format Definition overlay file, part of the microprocessor support, is available for you to use when viewing data in the Timing menu. The XXX\_96 file, where XXX represents the name of your support, for example the P54C\_96 file, is installed on the DAS or TLA 500 with the support software.

Many Timing Format Definition files place the important channel groups, such as Address and Data, first and display them as busforms containing bus values instead of as individual timing waveforms. These groups are generally followed by the microprocessor system clock and other important control signals displayed as individual waveforms.

The display order of the clock signal, channel groups shown as busforms, and other control signals will vary with each support. The support instruction manual

contains channel assignment tables in the *Specifications* chapter that list the individual channels and signal names to which they connect.

Figure 1–13 shows an example of a Timing Format Definition file for the P54C support. Your module user manual contains a detailed description of the Timing menu.

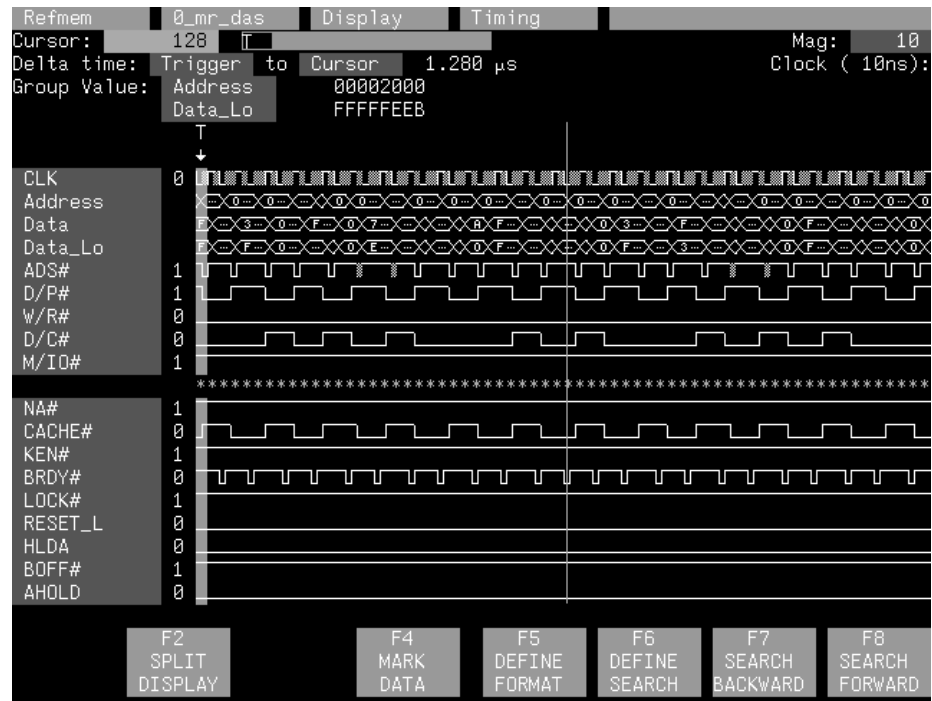


Figure 1–13: Timing data using the P54C\_96 Timing Format Definition file

## State Menu

The State menu shows acquired state data as numeric or symbolic values for each channel group in the selected radix. When you view data in the State menu, it will look different than the Disassembly menu because it uses the default channel grouping setup, and disassembly does not occur.

## Split Screen Display

There often is a need to view data in a split screen display with state data in one half and timing data in the other. Do not disconnect any of the module probe cables or interface housings if you are analyzing data in this manner. Instead, use any extra channels available from the module to make other connections to your microprocessor-based system.

The support instruction manual contains information on extra module channels. The channel assignment tables in the *Specifications* chapter also indicate which signals are not required for disassembly.

When viewing acquired data in a split-screen display with cursors locked, do not make selections in the active menu using the type-ahead method.

# Setting Up the Software

Before you acquire and disassemble data, you need to load the software and specify setups for clocking, triggering, and using symbols. The software provides default values for each of these setup controls, but you can change them as needed. You might need to perform the following tasks:

- Selecting the clock mode
- Copying and editing predefined symbol tables
- Triggering

## Clocking Mode

To select the clocking mode, follow these steps:

1. Press the **Select Menu** key.
2. Select the **Clock** menu for the module you want to use.
3. Move the cursor to a **Clocking Option** field (field names will vary) and make a selection.

Your support instruction manual contains clocking option field names and descriptions of what data will be acquired for each selection.

## Copying and Editing the Predefined Symbol Tables

You cannot directly edit any symbol tables supplied by the microprocessor support. But you can make a copy of a predefined symbol table and edit the copy for your specific use.

To create a new symbol table, follow these steps:

1. Select the **Symbol Editor** menu from the Menu Selection overlay.
2. Press **F2: FILE FUNCTIONS**.
3. Select **Open File** in the Function field, and press **Return**.
4. Select **New File** in the Edit Status field, and press **Return**.
5. Enter a new symbol table file name in the New File Name field.
6. Select **Pattern** or **Range** in the Table Type field to match the symbol table you are copying, and press **Return**.

7. Press **F5: EXECUTE FUNCTION**.
8. Select **Merge Files** in the Function field, and press **Return**.
9. Select the file to base your new symbol table on, for example the XXX\_Ctrl file (the Control group symbol table), where XXX represents the name of your support such as the P54C\_Demo file.
10. Press **F5: EXECUTE FUNCTION**.
11. Press **F8: EXIT & SAVE**.
12. Edit the file as desired keeping the following rules in mind:
  - If the new symbol has fewer don't cares than an existing symbol, it must be placed ahead of the existing symbol.
  - If the new symbol has more don't cares than an existing symbol, it must be placed after the existing symbol.
  - If the new symbol is only used for triggering and not for display, it must be placed after all RESERVED symbols. Symbols placed ahead of RESERVED symbols can be used for either triggering or display.
  - Do not duplicate symbol names.

Also refer to your system user manual for more information on editing the symbol table.
13. Select the **Channel** menu from the Menu Selection overlay.
14. Change the file name of the symbol table for the Control group (or whichever group's symbol table you are replacing) to the one that you specified in step 5.

## Triggering

When using symbolic values in the Trigger menu, you can only use pattern symbols. To use symbolic values in the trigger setup, follow these steps:

1. Press the **Select Menu** key and select the **Channel** menu.
2. Select **SYM** in the Radix field for the desired channel group, and select a pattern symbol table file in the field that appears under the Radix field.
3. Press the **Select Menu** key and select the **Trigger** menu.
4. When entering values for the channel group in the trigger specification, you can choose from the list of pattern symbols from the symbol table file selected in step 2.

# Acquiring and Viewing Disassembled Data

After the software setup is complete, you can acquire and view data disassembled in the Disassembly menu. This section describes the following tasks:

- Acquiring and viewing data
- Scrolling through data
- Marking cycles and removing marks
- Searching through data
- Splitting the display
- Printing data
- Viewing the reference memory file

## Acquiring Data

Once you load the support software, choose a clocking mode and specify the trigger, you are ready to acquire and disassemble data. Press the **F1: START** acquisition key to begin the acquisition. You can press the **F1: STOP** key at any time to stop the acquisition.

If you have any problems acquiring data, refer to *Appendix A: Error Messages and Disassembly Problems*.

## Viewing Disassembled Data

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**NOTE.** Support software selections in the Disassembly Format Definition overlay must be set correctly for your acquired data to be disassembled correctly. For a description of the support specific fields, refer to Changing How Data is Displayed in the support instruction manual.

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Disassembled data is displayed in the Disassembly menu in four different formats: Hardware, Software, Control Flow, and Subroutine. To select a format, follow these steps:

1. Press the **Select Menu** key and select the **Disasm** menu.
2. Press **F5: DEFINE FORMAT**.
3. Select the desired format in the **Display Mode** field.

4. Press **F8: EXIT & SAVE**.

## Scrolling Through Data

You can use the Disassembly Search Definition overlay to scroll through data based on types of instructions. To do this, follow these steps:

1. Select **Ignore** as the comparison type for all groups.
2. Select the format in the Mnemonics Type field that matches the type of instructions you want the cursor to scroll by, Hardware, Software, Control Flow, or Subroutine.
3. Press **F8: EXIT & SAVE**.
4. Use the **F8: SEARCH FORWARD** or **F7: SEARCH BACKWARD** keys to scroll through disassembled data.

## Marking Cycles

Occasionally you might want to change the way the disassembler interprets a cycle type. The Mark Opcode function synchronizes the disassembler.

To mark a cycle, follow these steps:

1. Place the cursor on the cycle to be marked.
2. Press **F4: MARK DATA**, select the cycle type you want associated with the current cycle, and press **Return**.

The marked cycle is indicated with a small **m** to the left of the sequence number. Several cycles before and after the mark can be interpreted differently due to the mark.

You can also choose to undo a mark. This causes the cycle, and any other cycles that might have changed when you initially marked the cycle, to revert to its original state at the time of the acquisition.

To undo a mark, follow these steps:

1. Place the cursor on the marked cycle.
2. Press **F4: MARK DATA**, select **Undo Mark**, and press **Return**.

Your support instruction manual contains the Mark Opcode selections, definitions of the selections, and a list of the combinations available.

## Removing Marks

The Disassembly menu does not let you remove data marks directly. To remove all data marks from the display menus, use **F2: REMOVE MARKS** in the State Format Definition or Timing Format Definition overlays.

## Searching Through Data

You can use the Disassembly Search Definition overlay to search for data values. To define a search through displayed disassembled data, follow these steps:

1. From the Disassembly menu, press **F5: DEFINE FORMAT** to check that the channel groups to be included in the search are visible.
2. Press **F8: EXIT & SAVE**.
3. Press **F6: DEFINE SEARCH** to access the Disassembly Search Definition overlay.
4. Select the search mode for each channel group included in the search, select the search radix, and enter the appropriate search value. You might be able to copy in the values by using the Load From Cursor function key.
5. Set the search mode for channel groups excluded from the search to **Ignore**.
6. Press **F8: EXIT & SAVE**.
7. Press **F8: SEARCH FORWARD** to search forward from the sequence following the cursor through the last sequence for data values as they are defined in the Disassembly Search Definition overlay.

Press **F7: SEARCH BACKWARD** to search backward from the sequence before the cursor through the first sequence for data values as they are defined in the Disassembly Search Definition overlay.

When executing a search, the progress of the search (which sequence number is being searched) displays in the upper right side of the screen. To abort a search, you can use the **Stop** key or the **Break** key (**F11** on most keyboards). When the Stop key or Break key is pressed, the search stops and the cursor remains on the sample from which the search started.

## Splitting the Display

You can split the display to view any two of the three display menus: Disassembly, State, or Timing. To split the display, follow these steps:

1. Press **F2: SPLIT DISPLAY** to use the split-screen display.



2. Press **F5: SPLIT HORIZ** to split the screen into two horizontal displays.
3. Press **F2: LOCK CURSOR**. A list of selections appears.
4. Select **lock cursors at the same sequence**, and press **Return**.
5. Press **F8: EXIT & SAVE** to display the menus in a split screen.
6. To change the active window, press **F3: SWITCH WINDOWS** to make the other menu active. The cursor and Cursor field are yellow in the active window.

When viewing acquired data in a split-screen display with cursors locked, do not make selections in the active menu using the type-ahead method.

## Printing Data

To print disassembled data, use the Disassembly Print overlay. To access this overlay, press the **Print** key from the Disassembly menu. The Disassembly Print overlay is exactly the same as the State Print overlay. Refer to your module user manual for a description of this overlay.

## Viewing the Demonstration Reference Memory

The software provides a demonstration reference memory file so you can see an example of how your microprocessor bus cycles and instruction mnemonics look when they are disassembled. A symbol table for the Address channel group is usually provided with the file so you can see an example of range symbols.

Viewing the reference memory is not a requirement for preparing the 92A96 Module for use. You can view the reference memory file without connecting the DAS or TLA 500 to your SUT.

To view the XXX\_Demo Refmem, follow these steps:

1. Press the **Select Menu** key and select the **XXX\_Demo** file from the Refmem column, where XXX represents the name of your support, for example the P54C\_Demo file.
2. Select the **Disasm** menu from the Display column and press **Return**.

You can change the format of the disassembled data from the Disassembly Format Definition overlay, which you can access through the Disassembly menu.

If there is not enough free space on the hard disk, you can delete the XXX\_Demo files (a reference memory file and a symbol table file for the Address group). They are not necessary to the operation of the software.

# General Purpose Analysis

You might need to perform general purpose (timing) analysis on your microprocessor-based system prior to, during, and after attempting to integrate your software with the system hardware. When performing hardware analysis, you might want to use the data acquisition module to acquire data with a finer resolution. When more data samples are taken in a given period of time, the resolution in the Timing menu increases, and you see signal activity that would otherwise be undetected.

This part of this chapter describes the following tasks:

- Clocking
- Triggering
- Acquiring and viewing data
- Searching through data
- Printing data

To acquire and display timing data, you need to change the clocking selection and trigger program, acquire data, and view it in the Timing menu. A predefined Timing Format Definition overlay file called XXX\_96, where XXX represents the name of your support, for example the P54C\_96 file, can be used to view microprocessor timing data. A description of this file and how to use it can be found later in this chapter.

The support instruction manual contains channel assignment tables in the *Specifications* chapter. Refer to those tables to see which channels are not required for disassembly. You can disconnect these channels to make other connections to your microprocessor-based system.

## Clocking

To change the data sampling rate, use the Clock menu. When using the 92A96 Module for timing analysis, you need to use the Internal or External clocking.

The Internal clock selection can sample data up to 100 MHz, which has a 10 ns resolution between samples. The External clock selection samples data on every active clock edge on the 92A96 clock inputs up to 100 MHz.

If your probe adapter has jumpers or switches, they might need to be in certain positions to acquire timing data. For information on jumpers or switches, refer to *Configuring the Probe Adapter* in the *Getting Started* chapter in your support instruction manual.

The default clocking mode is Custom when any specific support software is selected in the Support field of the 92A96 Configuration menu. You will need to change it to either Internal or External. Your module user manual contains an in-depth description of Internal and External clocking.

### **Custom Clocking**

Custom clocking only stores one data sample for each bus transaction, which can take one or more clock cycles. Custom clocking also time-aligns certain signals that otherwise would be skewed relative to the current bus transaction. This clocking selection is generally unproductive for timing analysis.

The support instruction manual contains a description of how Custom clocking is used with the probe adapter to acquire data.

### **Internal Clocking**

When you select Internal as the clocking mode, the 92A96 Module stores one data sample as often as every 10 ns (100 MHz). This clocking selection is commonly referred to as asynchronous.

Two typical uses of Internal clocking might be to verify that all microprocessor signals are transitioning as expected or to measure timing relationship between signal transitions.

It is possible to acquire asynchronous data at rates of 200 MHz and 400 MHz. The faster the 92A96 Module acquires data, the fewer channels it can acquire data on. A single 92A96 Module can acquire data on 24 channels at 400 MHz providing 2.5 ns resolution. Refer to your module user manual for information on sampling data at speeds faster than 100 MHz.

### **External Clocking**

When you select External as the clocking mode, the 92A96 Module acquires and stores data based on the clock channel up to 100 MHz. This clocking selection is commonly referred to as synchronous.

The module will sample data on every rising edge of the clock, if you select the rising edge of the clock probe connected to the system clock signal, and turn off the remaining three clocks. No data is acquired on the falling clock edge unless you select both edges.

If your SUT is running at 44 MHz or below, you might want to select both edges of the system clock signal as the clock channel. This clocking selection might actually yield more information than Internal clocking at 100 MHz (10 ns).

You can also use the three qualifier channels and the other three clock channels as qualifiers or clocks to further modify the clocking in of data from your microprocessor-based system.

The Clock Channel Assignments table in the *Specifications* chapter of the support instruction manual tells you which clock probe, Clk:0, Clk:1, Clk:2, or Clk:3, connects to the clock signal in your microprocessor-based system. The manual also tells you the names of the signals to which each of the clock probes connects.

## Triggering

All the Trigger menu selections available for use with the 92A96 Module are still available for use with timing analysis. Refer to your module user manual for a list and description of the selections.

## Acquiring Data

You can acquire data as described earlier in this chapter. If your probe adapter has jumpers or switches, they might need to be in certain positions to acquire timing data. For information on jumpers or switches, refer to *Configuring the Probe Adapter* in your support instruction manual.

## Viewing Data

General purpose analysis requires that you view data in the State or Timing menus.

### Timing Menu

In the Timing menu, every channel is shown as a waveform, and groups of channels are shown as busforms. A predefined Timing Format Definition overlay file, part of the microprocessor support, is available for you to use when viewing data in the Timing menu.

To select the supplied Timing Format Definition file, follow these steps:

1. Press the **Select Menu** key, select the **Timing** menu and press **F5: DEFINE FORMAT**.
2. Press **F5: RESTORE FORMAT**.
3. Select **XXX\_96**, where XXX represents the name of your support, for example the P54C\_96 file, and press the **Return** key.
4. Press **F8: EXIT & SAVE** to return to the Timing menu.

To view the group values of miscellaneous channel groups in the Timing menu, check the State Format Definition overlay and make sure those groups are visible (not Off).

If you change and replace the supplied Timing Format Definition file, be sure to rename the file. If you do not rename it, you will receive an error message saying the Timing Format Definition file failed to verify when you do a Verify Software (F5) in the Version menu.

**State Menu** In the State menu, all channel group values are shown based on the selected radix in the Channel menu or the State Format Definition overlay. When you view data in the State menu, it will look different than the Disassembly menu because it uses the default channel grouping setup, and disassembly does not occur.

If you want to display other channel groups (such as Misc), access the State Format Definition overlay and change the radix for the group from Off to Hex, Bin, or Oct. This overlay also allows you to add the Timestamp group (and change the radix) to the data display.

## Searching Through Data

To search through data, you can use either the Timing Search Definition overlay or the State Search Definition overlay. You can use these overlays and search through data as described in your module user manual.

To search on the group values of miscellaneous channel groups in the Timing menu, check the State Format Definition overlay and make sure those groups are visible (not Off). Channels in the Timing menu cannot be searched on unless they can also be displayed in the State menu.

## Printing Data

To print state data, you can use the State Table Print overlay. To access this overlay, press the Print key from the State menu.

To print timing data, you can use the Timing Print overlay. To access this overlay, press the Print key from the Timing menu.

For detailed information on the State Table Print overlay or the Timing Print overlay, refer to your module user manual.

# Appendix A: Error Messages and Disassembly Problems

This appendix describes error messages and disassembly problems that you might encounter while acquiring data.

## Module Error Messages

These error messages will appear in any menu when there are problems with acquiring data or satisfying the trigger program. The error messages are listed in alphabetical order; a description of the error message and the recommended solution follow the error message.

### Slow Clock

This message appears when the active clock channel (or channels) is not changing, is typically changing at 1 ms or slower intervals, or one of the clock qualifiers is held in the wrong state. Check for the following:

1. The microprocessor-based system is powered on and running. Be sure the system is not halted.
2. The support software is selected in the Support field in the appropriate 92A96 Configuration menu.
3. Custom is selected in the Clock menu.
4. The connections between the module and the probe adapter are correct.
  - The clock and 8-channel probe connections between the interface housings and probe adapter or high-density probe are correct (module name, clock, section names, and channel numbers match), are properly oriented (GND connects to ground), and are fully engaged.
  - The connections between the LO and HI cable on the probe adapter and high-density probe are correct.
  - The connections between the interface housings and module probe cables have matched color labels, matched slot numbers, and are properly keyed.
  - The connections between the module probe cables and probe connectors have matched color labels, matched slot numbers, and are properly keyed.
5. The orientation of pin A1 (or pin 1) on the microprocessor, the probe adapter, and SUT are correct.

6. No bent or missing pins on the microprocessor or on the probe adapter sockets.
7. The configuration of jumpers or switches on the probe adapter are correct. The support instruction manual contains information on jumpers and switches if there are any on your probe adapter.

### Waiting for Stop

This message appears when the trigger condition is satisfied and memory is full but the Manual Stop mode is selected in the Cluster Setup menu. To manually stop the DAS or TLA 500, press **F1: STOP**.

This message can also appear when other modules in the cluster have not filled their memories. Wait for the other modules to fill their memories. If the message does not disappear in a short time, press **F1: STOP**.

### Waiting for Stop-Store

This message appears when the trigger condition is satisfied but the amount of post-fill memory specified in the trigger position field is not yet filled. Press **F1: STOP** to view the acquired data, then check for the following:

1. The trigger program in the Trigger menu is correct.
2. The storage qualification in the Trigger menu is correct.
3. The microprocessor-based system or the module does not have an exception or fault. The system or acquisition module might have experienced a hardware or software exception or fault after the trigger condition was satisfied.

### Waiting for Trigger

This message appears when the trigger condition does not occur. Check for the following:

1. The microprocessor-based system is powered on and running. Be sure the system is not halted.
2. The trigger conditions are not being satisfied. The Module Monitor menu shows which state events are not occurring. Press **F1: STOP**, access the Trigger menu, and redefine the conditions for that state. Also refer to the description on *Triggering* on page 13.

## Disassembly Problems

There might be problems with disassembly for which no error messages are displayed. Some of these problems and their recommended solutions follow.

**Incorrect Data**

If the data acquired is obviously incorrect, check the following:

1. The support software is selected in the Support field in the appropriate 92A96 Configuration menu.
2. If the microprocessor has an internal instruction cache, you should disable it. The support instruction manual contains information on when and how to disable the instruction cache.
3. Custom is selected in the Clock menu.
4. The connections between the module and the probe adapter are correct.
  - The clock and 8-channel probe connections between the interface housings and probe adapter or high-density probe are correct (module name, clock, section names, and channel numbers match), are properly oriented (GND connects to ground), and are fully engaged.
  - The connections between the LO and HI cable on the probe adapter and high-density probe are correct.
  - The connections between the interface housings and module probe cables have matched color labels, matched slot numbers, and are properly keyed.
  - The connections between the module probe cables and probe connectors have matched color labels, matched slot numbers, and are properly keyed.
5. No bent or missing pins on the specific microprocessor or on either of the probe adapter sockets.
6. The configuration of jumpers or switches on the probe adapter are correct. The support instruction manual contains information on jumpers and switches if there are any on your probe adapter.

**Other Suggestions**

If the previous suggestions do not fix the problem with acquiring disassembled bus cycles or instruction mnemonics, try the following:

1. Reload the module setup, and select the support software in the Support field in the appropriate 92A96 Configuration menu to restore the DAS or TLA 500 to a known state.
2. Possible AC loading problems might be remedied by removing one or more of the protective sockets from the probe adapter. These sockets might add enough additional capacitance to your SUT to affect it. Refer to the *Maintenance* section for a description of how to remove sockets from the probe adapter. Not all probe adapters have protective sockets.



If the DAS or TLA 500 still is not acquiring data after trying these solutions, there might be a problem with your microprocessor-based system. Try performing hardware analysis on the system with your DAS or TLA 500 to ensure that the microprocessor signals are valid when the probe adapter samples them.

Refer to *General Purpose Analysis* on page 40 for information on data sampling rates using either the Internal or External clocking selections in the Clock menu. Also refer to *How Data is Acquired* in the support instruction manual to see when the disassembler, probe adapter, and module sample the various microprocessor signals.

## Appendix B: Maintenance

This section contains information on the following topics:

- Care and maintenance of probe adapters
- How to disconnect cables from the probe adapter or high-density probe
- How to disconnect clock and channel probes
- How to replace individual signal leads
- How to replace protective sockets
- How to replace a fuse

### Care and Maintenance

The probe adapter does not require scheduled or periodic maintenance. To maintain good electrical contact, keep the probe adapter free of dirt, dust, and contaminants. Also, ensure that any electrically conductive contaminants are removed.

Dirt and dust can usually be removed with a soft brush. For more extensive cleaning, use only a damp cloth. Abrasive cleaners and organic solvents should never be used.



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**CAUTION.** *The semiconductor devices contained on the probe adapter are susceptible to static-discharge damage. To prevent damage, service the probe adapter only in a static-free environment.*

*If the probe adapter is connected to your system, grasp the ground lug on the back of the DAS or TLA 500 mainframe to discharge your stored static electricity. If the probe adapter is not connected, touch any of the ground pins (row of square pins closest to the edge of the probe adapter circuit board labeled GND) to discharge stored static electricity from the probe adapter.*

*Always wear a grounding wrist strap, or similar device, while servicing the instrument.*

*Exercise care when soldering on a multilayer circuit board. Excessive heat can damage the through-hole plating or lift a run or pad and damage the board beyond repair. Do not apply heat for longer than three seconds. Do not apply heat consecutively to adjacent leads. Allow a moment for the board to cool between each operation.*

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If you must replace an electrical component on a circuit board, exercise extreme caution while unsoldering or soldering the new component. Use a pencil-type soldering iron of less than 18 watts and an approved unsoldering tool.

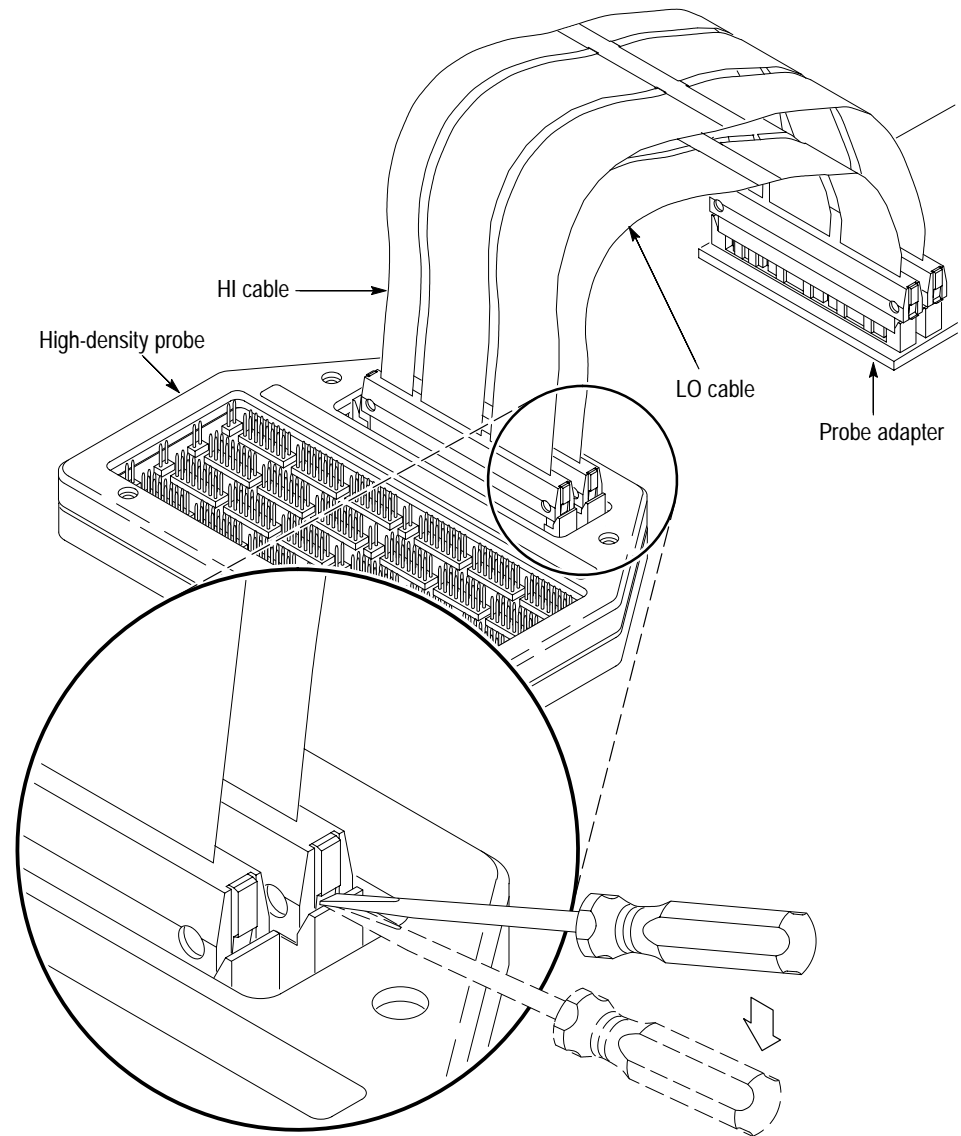
Ensure that the replacement is an equivalent part by comparing the description as shown in the *Replaceable Electrical Parts* chapter, if provided, in the support instruction manual.

## Disconnecting High-Density Cables

You might need to disconnect the high-density cables to use the high-density probe for other purposes. Once connected, the HI and LO cables are securely latched onto the cable connectors on the high-density probe and probe adapter.

To disconnect the cables from the high-density probe, follow these steps:

1. Insert a small flat screwdriver into one end of the connector next to the latch on the high-density probe end of the cable. Insert it deep enough to pry loose one end of the cable. Figure B–1 shows where to place the screwdriver.
2. Repeat step 1 on the other side of the cable connector.
3. Pull the cable out of the connector.
4. If there are two cables, repeat steps 1 through 3 for the second cable.



**Figure B-1: Disconnecting cables from a high-density probe**

You might want to disconnect the high-density cables from the probe adapter instead of the high-density probe. Be sure to provide support under the connector end of the probe adapter or remove the probe adapter from the SUT before disconnecting the cables. You can then use this same procedure to disconnect the cables.

## Disconnecting Probes

You might need to disconnect the clock and channel probes from the probe adapter to use them on another application, to connect individual podlets to other signals in your microprocessor system, or to replace defective clock or channel probes (podlets).

To disconnect the clock and channel probes from the probe adapter, refer to Figure B-2 and follow these steps:

1. Power off the SUT. It is not necessary to power off the DAS or TLA 500.

If available, you should use antistatic shipping material to support the probe adapter while disconnecting the clock and channel probes.



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**CAUTION.** *Pulling on the cables, or on the neck of the clock probe, or pinching the cables between the pull tabs can damage the probes. Always handle the probes by their bodies.*

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2. Firmly grasp the body of a clock probe and gently pull it off of the square pins.
3. Squeeze the pull tabs on the podlet holder together, be careful not to pinch any podlet cables between them.
4. Gently pull the channel probe off of the square pins.

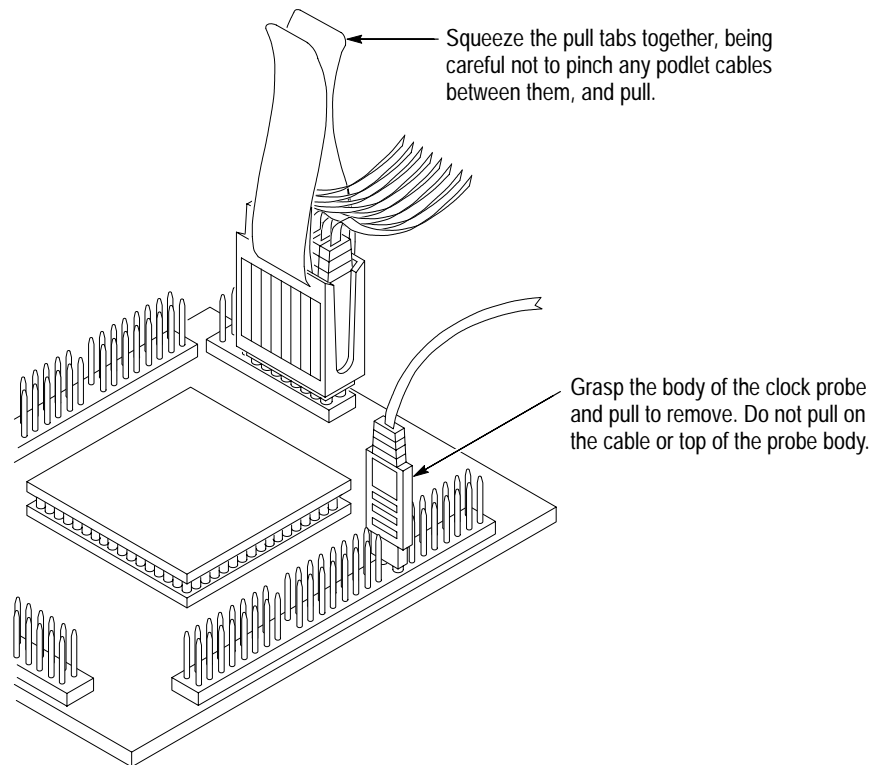


Figure B-2: Disconnecting clock and channel probes

## Replacing Probe Podlets

Each channel probe consists of 8 single-channel podlets ganged together in a podlet holder. You might need to remove these podlets from the channel probe to use for alternate connections to specific system signals.

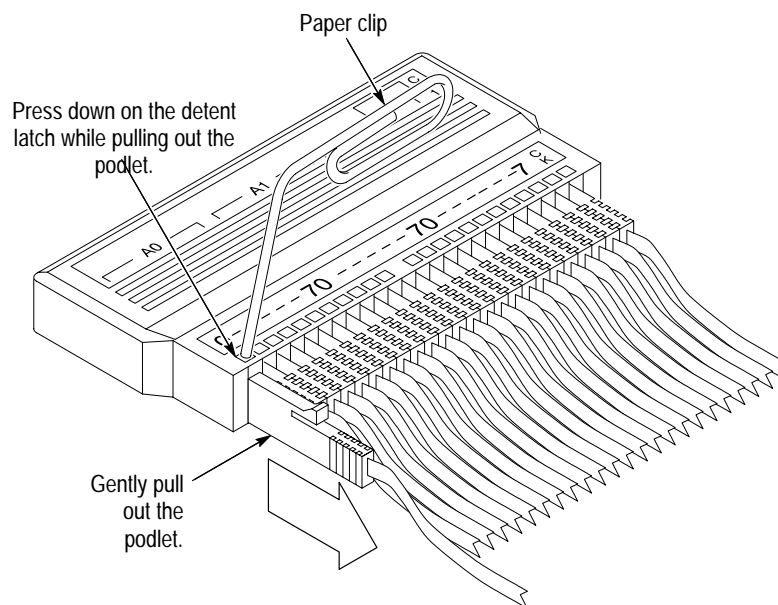
Refer to the discussions on *Alternate Microprocessor Connections* and *Channel Assignments* in the support instruction manual for information about which channels you can use to make alternate connections between the DAS or TLA 500 and system under test without disturbing the channel connections required by the disassembler.

You can also use these procedures to replace a defective clock probe or a defective podlet from a channel probe.

### Removing Probe Podlets from the Interface Housing

To remove a clock probe or a channel probe podlet from the interface housing, refer to Figure B–3 and follow these steps:

1. Power off the SUT. It is not necessary to power off the DAS or TLA 500.
2. Use a small pointed tool such as a ballpoint pen, pencil, or straightened paper clip to press down on the latch detent of the podlet through an opening on the interface housing.
3. Gently pull the podlet connector out of the housing with one hand while pressing down on the latch detent with the pointed tool.



**Figure B–3: Removing a probe podlet from the interface housing**

### Replacing a Clock Probe

To replace a clock probe, insert a new clock probe into the same clock channel position on the interface housing. Insert the clock probe into the interface housing with the detent latch oriented to the label side of the housing. Figure B–3 shows the correct orientation.

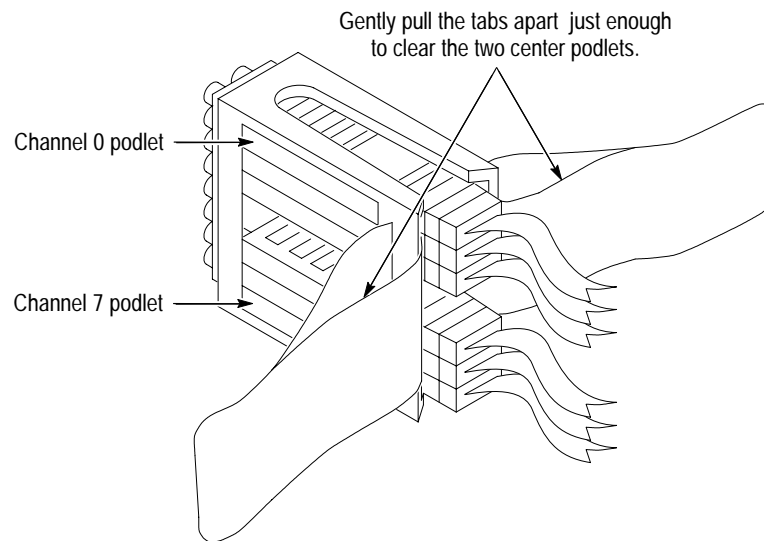
## Removing Probe Podlets from the Podlet Holder

To remove channel probe podlets from the podlet holder, refer to Figure B-4 and follow these steps:



**CAUTION.** Excessive pulling on the sides of the podlet holder can damage the holder. Spread the holder open wide enough to clear and remove the podlets.

1. To remove podlets from the podlet holder, grasp the plastic pull tab on each side of the podlet holder and gently spread the sides of the holder open just enough to clear a podlet.
2. Remove the middle two podlets from the podlet holder by pushing up on the metal pin receptacles.
3. Release the tabs on the podlet holder.
4. Remove the remaining podlets by turning and extracting each one at a time.



**Figure B-4: Ganging together channel probe podlets**

## Replacing Channel Probe Podlets

The channel podlets must retain the same channel order on both the interface housing and in the podlet holder. Be sure to replace the old podlet with a podlet of the same color. Table B-1 shows the color code and channel number of each podlet for a channel probe.



Table B-1: Podlet-to-channel color code

Podlet color	Channel
Black	0
Brown	1
Red	2
Orange	3
Yellow	4
Green	5
Blue	6
Violet	7

To replace a channel probe podlet, refer to Figure B-4 and follow these steps:

1. Insert the appropriately-colored podlet into the interface housing with the detent latch oriented to the label side of the housing.
2. If you are replacing a single podlet, orient the podlet connector marked GND towards the side of the podlet holder labeled GROUND.
3. Grasp the plastic pull tab on each side of the holder and gently spread the sides of the holder open just enough to clear the podlet.
4. Hold the podlet body with the other hand and place it in the holder in the correct channel order. Do not grasp and turn the podlet cable.
5. If you are re-gangging all the podlets of a channel probe, begin gangging the podlets together starting with either channel 0 or channel 7. Orient the podlet channel marked GND towards the side of the podlet holder labeled GROUND.



**CAUTION.** Avoid twisting the podlet cables between the interface housing and the podlet holder. To prevent damage to the podlets, keep the podlet cables parallel to each other when gangging them into the holder.

6. Hold the podlet body, turn the podlet body parallel to the sides of the holder, move it into the holder, and use your fingers to press it into place perpendicular to the sides of the holder. Be sure to gang the podlets in the correct channel order according to the channel label on the podlet holder and podlet color code, with all ground channels toward the Ground side of the holder. Do not place the podlet into the holder by grasping the podlet cable.
7. Continue placing the next two podlets, one at a time, in channel order, in the podlet holder. Orient all ground channels toward the Ground side of the holder.

8. The fourth podlet should be either channel 0 or 7, whichever one is not already placed in the holder. Place this podlet in the other end of the podlet holder and orient the ground channel correctly.
9. Continue placing the next two podlets, one at a time, in channel order, in the podlet holder. Continue orienting the ground channels correctly.



---

**CAUTION.** *Excessive pulling on the sides of the podlet holder can break the holder. Spread the holder open only wide enough to clear the podlet.*

---

10. Grasp the plastic pull tab on each side of the holder and gently spread the sides of the holder open just enough to clear a podlet.
11. Place the last pair of podlets (channels 3 and 4) in the podlet holder in proper channel order, orienting the ground channels to the Ground side of the holder.

## Replacing Protective Sockets

The probe adapter board might contain sockets designed to protect the probe adapter, and to make it easy to insert and remove a microprocessor. The socket on top of the probe adapter board is soldered and cannot be removed. The protective socket on the bottom of the probe adapter board can be removed.

### PGA Protective Sockets

You should not have to remove the replaceable protective socket on the probe adapter unless the pins on the socket are damaged. To remove a PGA protective socket, refer to Figure B-5 and follow these steps:

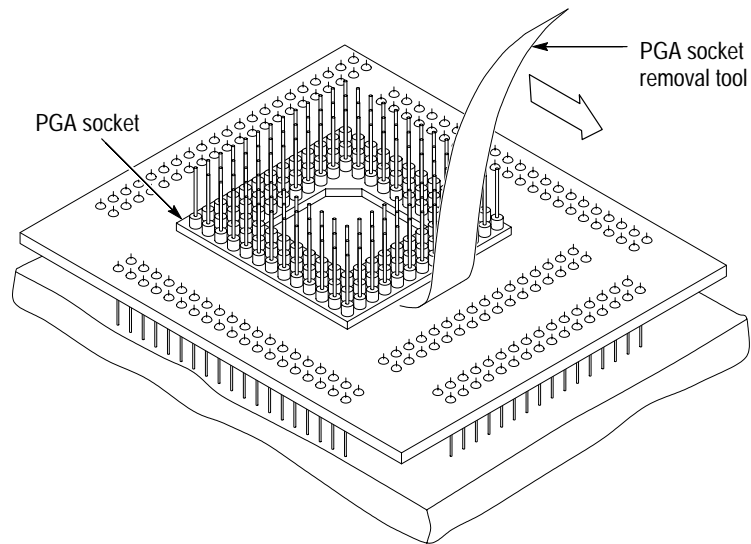
1. Place a proper (nonmetallic) socket removal tool between the socket and the probe adapter board. Figure B-5 shows an AMP PGA removal tool.



---

**CAUTION.** *Do not use a screwdriver to remove the protective socket from the probe adapter board. You can easily damage the etched runs on the board.*

---



**Figure B-5: Removing a PGA protective socket**

2. Push down on the handle of the tool until the socket begins to separate from the probe adapter board pins.



**CAUTION.** Do not completely pry off one side of the protective socket and then the other. Applying uneven pressure can damage the socket's pins. Do not use board components as leverage to remove the socket.

3. Perform step 2 on all sides of the socket. Use even pressure alternately on all sides until the socket is loose.
4. Remove the socket from the board.

To replace the PGA protective socket, follow these steps:

1. Spray an electrical contact lubricant on the probe adapter socket so the replacement socket can be easily inserted.
2. Check that the pins of the new socket are straight.
3. Place the socket on the pins of the probe adapter board aligning pin A1 with pin A1; make sure that all pins line up correctly.
4. Press the socket onto the board by applying equal pressure on two opposed sides of the socket.

## DIP Protective Sockets

You should not have to remove the replaceable protective socket on the probe adapter unless the pins on the socket are damaged. To remove the DIP protective socket, refer to Figure B–6 and follow these steps:



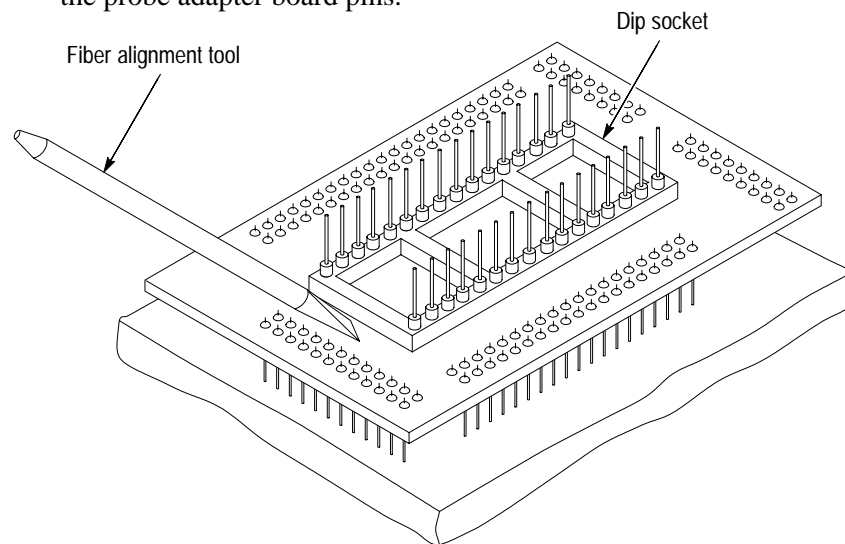
**CAUTION.** Do not use a screwdriver to remove the protective socket from the probe adapter board. You can easily damage the etched runs on the board.

1. Place a fiber alignment tool between the socket and the probe adapter board.



**CAUTION.** Do not completely pry off one side of the protective socket and then the other. Applying uneven pressure can damage the socket's pins. Do not use board components as leverage to remove the socket.

2. Press down on the handle of the tool until the socket begins to separate from the probe adapter board pins.



**Figure B–6: Removing a DIP protective socket**

3. Perform step 2 on all sides of the socket. Use even pressure alternately on all sides until the socket is loose.
4. Remove the socket from the board.

To replace the DIP protective socket, follow these steps:

1. Check that the pins on the new socket are straight.
2. Place the socket on the pins of the probe adapter board; make sure that all pins line up correctly.
3. Press the socket onto the board by applying equal pressure on two opposed sides of the socket.

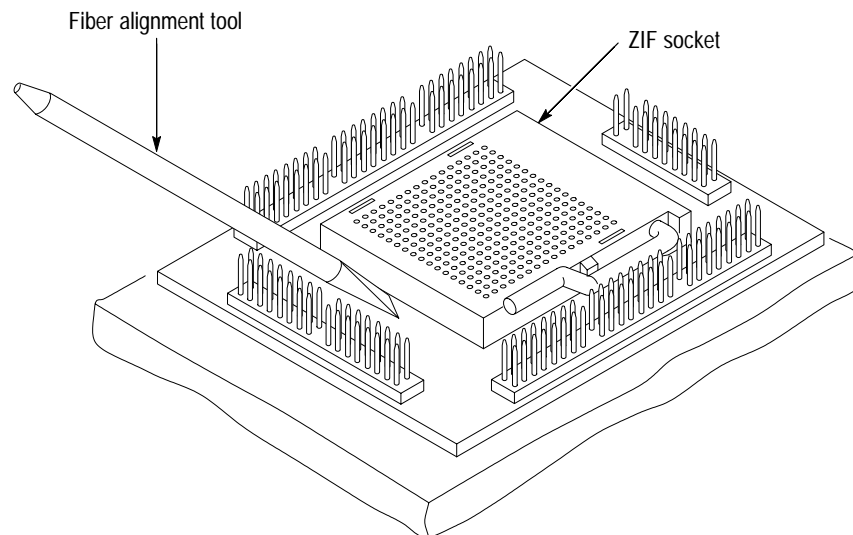
### ZIF Protective Sockets

You should not have to remove the ZIF socket on the probe adapter unless the pins on the socket are damaged. To remove the socket, refer to Figure B-7 and follow these steps:

1. Place a fiber alignment tool between the ZIF socket and the PGA socket on the probe adapter board as shown in Figure B-7.



**CAUTION.** Do not use a screwdriver to remove the protective socket from the probe adapter board. You can easily damage the etched runs on the board.



**Figure B-7: Removing a ZIF protective socket**

2. Press down on the handle of the tool until the socket begins to separate from the probe adapter board pins.



---

**CAUTION.** Do not completely pry off one side of the ZIF socket and then the other. Applying uneven pressure can damage the socket's pins. Do not use board components as leverage to remove the socket.

---

3. Perform step 2 on all sides of the socket. Use even pressure alternately on all sides until the socket is loose.
4. Remove the socket from the board.

To replace the ZIF socket, follow these steps:

1. Spray an electrical contact lubricant on the PGA socket on the probe adapter so the ZIF socket can be easily inserted.
2. Check that the pins of the new socket are straight.
3. Align pin A1 on the ZIF socket with pin A1 on the PGA socket; make sure all pins and corresponding pin holes line up correctly.
4. Press the ZIF socket onto the board by applying equal pressure on two opposed sides of the socket.

## Replacing the Fuse

If the probe adapter board contains a fuse and it opens, you can replace it with an equivalent part by comparing the description as shown in the *Replaceable Electrical Parts* or the *Replaceable Parts* chapter in the support instruction manual.

# Glossary

## **92A96**

The 96-channel, 8K memory, 100 MHz data acquisition module.

## **92A96D**

The 96-channel, 32K memory, 100 MHz data acquisition module.

## **92A96XD**

The 96-channel, 128K memory, 100 MHz data acquisition module.

## **92A96SD**

The 96-channel, 512K memory, 100 MHz data acquisition module.

## **92A96UD**

The 96-channel, 2M memory, 100 MHz data acquisition module.

## **92C96**

The configurable 96-channel, 8K memory, 100 MHz data acquisition module.  
This module can be easily upgraded for a memory depth of 32K, 128K or 512K.

## **92C96D**

The configurable 96-channel, 32K memory, 100 MHz data acquisition module.  
This module can be easily upgraded for a memory depth of 128K or 512K.

## **92C96SD**

The 96-channel, 512K memory, 100 MHz data acquisition module.

## **92C96XD**

The configurable 96-channel, 128K memory, 100 MHz data acquisition module.  
This module can be easily upgraded for a memory depth of 512K.

## **92S16**

The 16-channel, 50 MHz algorithmic pattern generator module. The 92S16 can be used as a stand-alone stimulation source or linked with a 92S32 module and a data acquisition module to provide a test system for debugging and verifying components, boards, and systems.

## **92S32**

The 32-channel, 50 MHz RAM-based sequential pattern generator module. The 92S32 can be used as a stand-alone stimulation source or linked with a 92S16 module and a data acquisition module to provide a test system for debugging and verifying components, boards, and systems.

**Acquisition**

The capturing of data from a system under test by a logic analyzer. Data is conditionally stored in acquisition memory in preparation for formatting by the user. (Data might be clocked into the logic analyzer, yet qualified out before it can be stored in acquisition memory.) You can use the Trigger menu of the acquisition module to specify whether or not data is stored.

**Acquisition Memory Sequence**

A single sample of acquired data to which a unique identification number is assigned. As data is acquired, each sample is assigned a consecutive sequence number.

**Algorithmic Pattern Generator**

A programmable pattern generator (like the 92S16) that provides storage for data vectors and control flow instructions. Algorithmic pattern generators can be programmed to branch, loop, and perform subroutine calls. By using internal registers and control flow instructions, algorithmic pattern generators can use a relatively small vector memory and still provide an unlimited number of vectors. The 92S16 algorithmic pattern generator can also perform conditional branches based on signals received from the SUT. This glossary includes an entry for the 92S16 module.

**Busform**

A symbolic display of a group of signals, such as an Address bus (the Address channel group), in the Timing menu containing bus values instead of individual timing waveforms.

**Cluster**

A group of modules started and stopped as a unit. You can use the system Configuration menu to create clusters.

**Channel Group**

Channels assigned to be a group. The group is named and acquired data displays in the State and Disassembly menus under a column bearing the name of the group.

**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.

**Correlation**

The tracking of independent events captured by different acquisition modules and indicating how they relate to each other in time. Specifically, the chronological interleaving of data from different acquisition modules into a single display. Shows real-time interactions between independently clocked circuits.



**Custom Clocking**

Each microprocessor support software offers a microprocessor-specific clocking mode called Custom. This clocking mode is the default selection whenever you select XXX Support in the 92A96 Configuration menu, where XXX represents the name of your support, for example P54C.

**Data Qualification**

The process of filtering out data that has been acquired but which you do not want to store in acquisition memory. This allows you to avoid filling up your module's acquisition memory with irrelevant data samples.

**Data Sample**

A data sample contains one bit for every channel. In asynchronous mode, data is sampled at a clock rate internal to the logic analyzer. In synchronous mode, data is sampled at a clock rate external to the logic analyzer, usually the clock rate of the system under test. In microprocessor-specific mode, the clocking state machine of the acquisition module generates one master sample for each bus cycle, no matter how many clock cycles are contained in the bus cycle.

**Demultiplex**

To identify and separate multiplexed signals (for example, Address and Data signals). To separate different signals sharing the same line and organize those signals into useful information.

**Disassembly Display Menu**

A display format for data acquired from a microprocessor or a data bus (for example, SCSI). A logic analyzer disassembles acquired data and displays it as bus cycle types and instruction mnemonics.

**Don't Care Character**

A symbol (X) used in place of a numeric character to indicate that the value of a channel or character is not to be considered.

**Edge**

A signal transition from low to high, or high to low.

**Glitch**

A signal that makes a transition through the threshold voltage two or more times between successive sample clocks. Signals that are faster than the sampling rate, such as noise spikes or pulse ringing, can be captured by a logic analyzer as glitches (only applicable to asynchronous acquisitions).

**Glitch Latch**

If the transition appears between samples, the logic analyzer samples the event and it is stored on the next clock. No special indicator is used to identify the glitch; it is displayed as normal data.

**Glitch Trigger**

Even though the logic analyzer can acquire a glitch, it does not provide a word recognizer specifically for glitches. If you can determine the value of the glitch latched as data, you can set up the logic analyzer to trigger on it.

**External Clock**

A clock external to the logic analyzer and usually synchronous with the system under test.

**Instruction**

A command fetched by a microprocessor; the most atomic part of executable code.

**Internal Clock**

A clock internal to the logic analyzer and asynchronous with the system under test. You can choose a clock rate from a range of selections.

**Microprocessor Support**

An optional microprocessor or bus support consisting of disassembler software and usually a probe adapter that allows the logic analyzer to acquire and disassemble data from a microprocessor- or bus-based system.

**Mnemonic**

The name of an executed instruction from a microprocessor (such as BR for Branch instruction) or for a bus cycle type that results from an instruction (such as MEM READ for a memory read cycle).

**Module**

A single acquisition module (96-channels) or a variable-width acquisition module (192- or 288-channels). Each type of module acts as a unit and gives you full use of all instrument functions.

**Multiplex**

Signals that share the same input or output lines, such as Address and Data signals.

**Numeric Radix**

A format that allows you to define the base of the numeric display of data. The base can be binary, octal, hexadecimal, decimal, or ACSII characters.

**Overlay**

A temporary display that partially covers the currently displayed menu; you can open an overlay by selecting a function key.

**Pattern Generator**

A module that outputs binary data at specified time intervals. The logic analyzer offers both 16- and 32-channel wide pattern generators. This glossary includes entries for the 92S16 and 92S32 modules.

**Podlet**

A circuit contained in a flexible lead and attached to a probe that provides square-pin connections to the system under test for one clock or data acquisition channel and a ground pin.

**Probe**

An input (acquisition) device, constructed as a separate unit. The device transmits the input signal from the system under test to the logic analyzer.

**Probe Adapter**

A microprocessor-specific piece of hardware that allows you to connect clock and channel acquisition probes to signals from a microprocessor in a system under test, for example, the P54C probe adapter.

**Protocol**

A set of characters at the beginning and end of a message that enables one machine (computer) to communicate with another.

**Sequential Pattern Generator**

A programmable pattern generator (such as the 92S32) that features a very deep vector memory and sequential operation. Data vectors entered into the top of memory will be output first, followed sequentially by each successive vector to the end of memory. This glossary includes an entry for the 92S32 module.

**Scrolling**

A method of positioning a portion of a data display too lengthy to be contained on the screen in its entirety.

**Split-screen**

A feature available in some display menus that lets you divide the screen display area into two data windows (split either horizontally or vertically). Each window has its own cursor and can display its own source of data and its own display type.

**State**

A trigger specification term. Only one state (or step) in a trigger specification program is active at any one time. Usually expressed in the form of an *if...then* construction.

**State Display Menu**

Numeric or symbolic representation of data states; acquired data displays as numeric values such as binary, octal, hexadecimal, or as symbolic values.

**Storage Qualification**

The process of filtering out data that has been acquired but which you do not want to store in acquisition memory. This allows you to avoid filling up your module's acquisition memory with irrelevant data samples.

**SUT**

The system under test is referred to as the SUT. The SUT is the circuit from which the logic analyzer acquires data.

**Symbolic Radix**

A format that allows the you to substitute mnemonics (alpha-numeric names) for numeric values. You can enter your own mnemonics for a channel group into the Symbol Editor menu. The logic analyzer will replace channel group values throughout the menu structure with these assigned symbolic values.

**Timestamp**

A separate clock value stored with each acquisition cycle. Provides performance analysis features and time correlation for multiple acquisition memories and timing measurements.

**Timing Display Menu**

Graphic representation of data states and timing relationships as digital (two-state) waveforms or as busforms.

**Trigger**

Determines which block of the sampled data is stored in memory. It establishes a reference point in the acquired data around which pre- and post-trigger data points are included in the acquisition memory.

**Variable-Width Module**

The configuration of two 96-channel acquisition modules into a 192-channel module, or three acquisition modules into a 288-channel module.

**X**

The “don’t care” character.

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