Instruction Manual

Tektronix

TMS 420
R3051, R3052 & R3081 Microprocessor Support

070-9826-00

There are no current European directives that apply to this product. This product provides cable and test lead connections to a test object of electronic measuring and test equipment.

Warning
The servicing instructions are for use by qualified personnel only. To avoid personal injury, do not perform any servicing unless you are qualified to do so. Refer to all safety summaries prior to performing service.

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

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This warranty shall not apply to any defect, failure or damage caused by improper use or improper or inadequate maintenance and care. Tektronix shall not be obligated to furnish service under this warranty a) to repair damage resulting from attempts by personnel other than Tektronix representatives to install, repair or service the product; b) to repair damage resulting from improper use or connection to incompatible equipment; c) to repair any damage or malfunction caused by the use of non-Tektronix supplies; or d) to service a product that has been modified or integrated with other products when the effect of such modification or integration increases the time or difficulty of servicing the product.

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General Safety Summary

Review the following safety precautions to avoid injury and prevent damage to this product or any products connected to it. To avoid potential hazards, use this product only as specified.

Only qualified personnel should perform service procedures.

While using this product, you may need to access other parts of the system. Read the *General Safety Summary* in other system manuals for warnings and cautions related to operating the system.

To Avoid Fire or Personal Injury

Connect and Disconnect Properly. Do not connect or disconnect probes or test leads while they are connected to a voltage source.

Observe All Terminal Ratings. To avoid fire or shock hazard, observe all ratings and marking on the product. Consult the product manual for further ratings information before making connections to the product.

Do not apply a potential to any terminal, including the common terminal, that exceeds the maximum rating of that terminal.

Avoid Exposed Circuitry. Do not touch exposed connections and components when power is present.

Do Not Operate With Suspected Failures. If you suspect there is damage to this product, have it inspected by qualified service personnel.

Do Not Operate in Wet/Damp Conditions.

Do Not Operate in an Explosive Atmosphere.

Keep Product Surfaces Clean and Dry.

Provide Proper Ventilation. Refer to the manual's installation instructions for details on installing the product so it has proper ventilation.

Symbols and Terms

Terms in this Manual. These terms may appear in this manual:

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

CAUTION. *Caution statements identify conditions or practices that could result in damage to this product or other property.*

Terms on the Product. These terms may appear on the product:

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

WARNING indicates an injury hazard not immediately accessible as you read the marking.

CAUTION indicates a hazard to property including the product.

Symbols on the Product. The following symbols may appear on the product:

WARNING
High Voltage

Protective Ground
(Earth) Terminal

CAUTION
Refer to Manual

Double
Insulated

Service Safety Summary

Only qualified personnel should perform service procedures. Read this *Service Safety Summary* and the *General Safety Summary* before performing any service procedures.

Do Not Service Alone. Do not perform internal service or adjustments of this product unless another person capable of rendering first aid and resuscitation is present.

Disconnect Power. To avoid electric shock, disconnect the main power by means of the power cord or, if provided, the power switch.

Use Care When Servicing With Power On. Dangerous voltages or currents may exist in this product. Disconnect power, remove battery (if applicable), and disconnect test leads before removing protective panels, soldering, or replacing components.

To avoid electric shock, do not touch exposed connections.

Preface: Microprocessor Support Documentation

This instruction manual contains specific information about the TMS 420 R3051, R3052 and R3081 microprocessor support package and is part of a set of information on how to operate this product on compatible Tektronix logic analyzers.

If you are familiar with operating microprocessor support packages on the logic analyzer for which the TMS 420 R3051, R3052 and R3081 support was purchased, you will probably only need this instruction manual to set up and run the support.

If you are not familiar with operating microprocessor support packages, you will need to supplement this instruction manual with information on basic operations to set up and run the support.

Information on basic operations of microprocessor support packages is included with each product. Each logic analyzer has basic information that describes how to perform tasks common to support packages on that platform. This information can be in the form of online help, an installation manual, or a user manual.

This manual provides detailed information on the following topics:

- Connecting the logic analyzer to the system under test
- Setting up the logic analyzer to acquire data from the system under test
- Acquiring and viewing disassembled data
- Using the probe adapter

Manual Conventions

This manual uses the following conventions:

- The term disassembler refers to the software that disassembles bus cycles into instruction mnemonics and cycle types.
- The phrase “information on basic operations” refers to online help, an installation manual, or a basic operations of microprocessor supports user manual.
- In the information on basic operations, the term XXX or P54C used in field selections and file names must be replaced with R3051. This is the name of the microprocessor in field selections and file names you must use to operate the R3051, R3052 and R3081 support.

- The term System Under Test (SUT) refers to the microprocessor-based system from which data will be acquired.
- The term logic analyzer refers to the Tektronix logic analyzer for which this product was purchased.
- The term module refers to a 102/136-channel or a 96-channel module.
- R3051 refers to all supported variations of the R3051, R3052 and R3081 microprocessor unless otherwise noted.
- A tilde (~) following a signal name indicates an active low signal.

Logic Analyzer Documentation

A description of other documentation available for each type of Tektronix logic analyzer is located in the corresponding module user manual. The manual set provides the information necessary to install, operate, maintain, and service the logic analyzer and associated products.

Contacting Tektronix

Product Support	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 Or, contact us by e-mail: tm_app_supp@tek.com For product support outside of North America, contact your local Tektronix distributor or sales office.
Service Support	Contact your local Tektronix distributor or sales office. Or, visit our web site for a listing of worldwide service locations. http://www.tek.com
For other information	In North America: 1-800-TEK-WIDE (1-800-835-9433) An operator will direct your call.
To write us	Tektronix, Inc. P.O. Box 1000 Wilsonville, OR 97070-1000

Getting Started

This chapter provides information on the following topics and tasks:

- A description of the TMS 420 microprocessor support package
- Logic analyzer software compatibility
- Your System Under Test (SUT) requirements
- Support restrictions
- How to configure your probe adapter
- How to connect to your SUT

Support Description

The TMS 420 microprocessor support package disassembles data from systems that are based on the Intel MIPS R3051, R3052, and R3081 microprocessors and their "E" versions. The support runs on a compatible Tektronix logic analyzer equipped with a 102/136-channel module or a 96-channel module.

Refer to information on basic operations to determine how many modules and probes your logic analyzer needs to meet the minimum channel requirements for the TMS 420 microprocessor support.

Table 1–1 shows the microprocessors and packages from which the TMS 420 support can acquire and disassemble data.

Table 1–1: Supported microprocessors

Name	Package
R3051/E	PGA, PLCC
R3052/E	PGA, PLCC
R3081/E	PGA, PLCC

A complete list of standard and optional accessories is provided at the end of the parts list in the *Replaceable Mechanical Parts* chapter.

To use this support efficiently, you need to have the items listed in the information on basic operations as well as the *R3051, R3052 and R3081 Microprocessor User's Manual,* Intel, 1991

Information on basic operations also contains a general description of supports.

Logic Analyzer Software Compatibility

The label on the microprocessor support floppy disk states which version of logic analyzer software the support is compatible with.

Logic Analyzer Configuration

To use the TMS 420 support, the Tektronix logic analyzer must be equipped with either a 102/136-channel module or a 96-channel module at a minimum. The module must be equipped with enough probes to acquire channel and clock data from signals in your R3051, R3052 and R3081-based system.

Refer to information on basic operations to determine how many modules and probes the logic analyzer needs to meet the channel requirements.

Requirements and Restrictions

You should review the general requirements and restrictions of microprocessor supports in the information on basic operations as they pertain to your SUT.

You should also review electrical, environmental, and mechanical specifications in the *Specifications* chapter in this manual as they pertain to your system under test, as well as the following descriptions of other R3051, R3052 and R3081 support requirements and restrictions.

System Clock Rate. The TMS 420 support can acquire data from the R3051, R3052 and R3081 microprocessor at speeds of up to 40 MHz[1].

Configuring the Probe Adapter

There are two jumpers on the probe adapter used to turn the cache on or off.

To turn the cache off, place jumpers J1771 and J1672 to the 2-3 position. When the jumpers are in the 2-3 position, the signal RSVD (2) must be disconnected from the probe adapter.

To turn the cache on, place jumpers J1771 and J1672 to the 1-2 position. When the jumpers are in the 1-2 position, the signal RSVD (2) may be reconnected.

1 **Specification at time of printing. Contact your Tektronix sales representative for current information on the fastest devices supported.**

Connecting to a System Under Test

Before you connect to the SUT, you must connect the probes to the module. 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 this manual for the required clearances.

The channel and clock probes shown in this chapter are for a 102/136-channel module. The probes will look different if you are using a 96-channel module.

The general requirements and restrictions of microprocessor supports in the information on basic operations shows the vertical dimensions of a channel or clock probe connected to square pins on a circuit board.

PGA Probe Adapter

To connect the logic analyzer to a SUT using a PGA probe adapter, follow these steps:

1. Turn off power to your SUT. It is not necessary to turn off power to the logic analyzer.

CAUTION. *Static discharge can damage the microprocessor, the probe adapter, the probes, or the module. To prevent static damage, handle all of the above only in a static-free environment.*

Always wear a grounding wrist strap or similar device while handling the microprocessor and probe adapter.

2. To discharge your stored static electricity, touch the ground connector located on the back of the logic analyzer. Then, touch any of the ground pins of the probe adapter to discharge stored static electricity from the probe adapter.
3. Place the probe adapter onto the antistatic shipping foam to support the probe as shown in Figure 1–1. This prevents the circuit board from flexing and the socket pins from bending.
4. Remove the microprocessor from your SUT.
5. Line up the pin A1 indicator on the probe adapter board with the pin A1 indicator on the microprocessor.

CAUTION. *Failure to correctly place the microprocessor into the probe adapter might permanently damage the microprocessor once power is applied.*

6. Place the microprocessor into the probe adapter as shown in Figure 1–1.

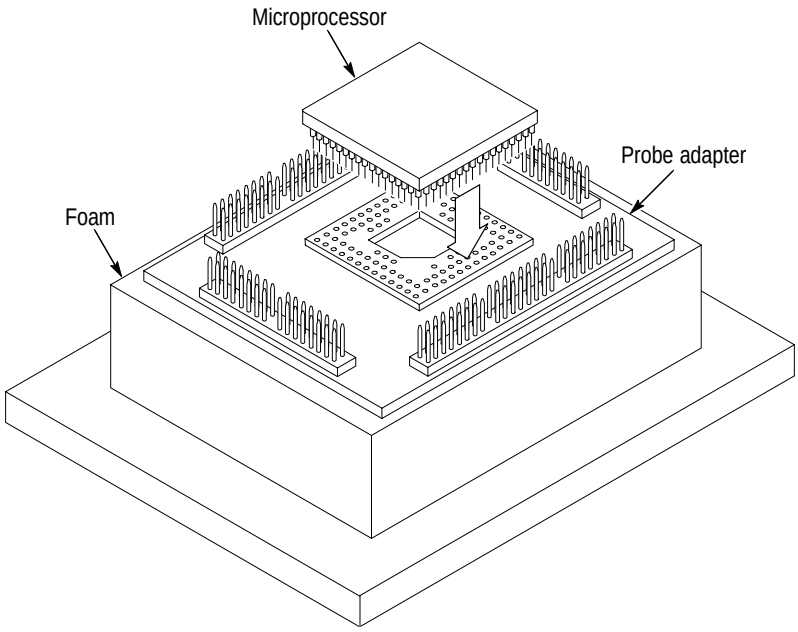


Figure 1–1: Placing a microprocessor into a PGA probe adapter

7. Connect the channel and clock probes to the probe adapter as shown in Figure 1–2. Match the channel groups and numbers on the probe labels to the corresponding pins on the probe adapter. Match the ground pins on the probes to the corresponding pins on the probe adapter.

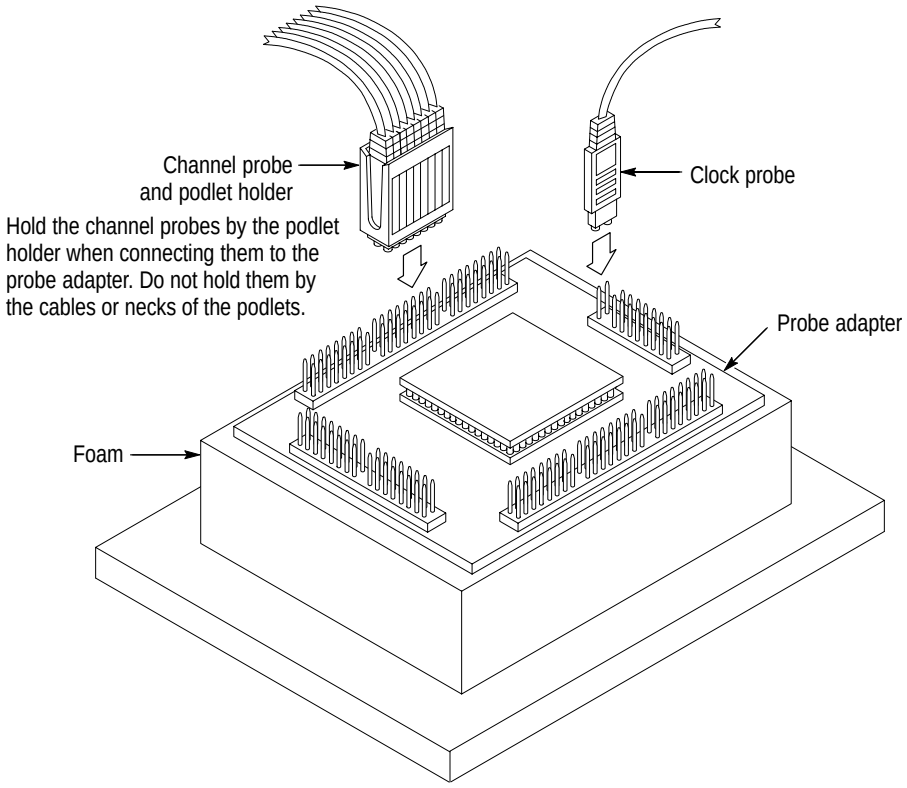


Figure 1–2: Connecting probes to a PGA probe adapter

8. Line up the pin A1 indicator on the probe adapter board with the pin A1 indicator on your SUT.

9. Place the probe adapter onto the SUT as shown in Figure 1–3.

NOTE. *You might need to stack one or more replacement sockets between the SUT and the probe adapter to provide sufficient vertical clearance from adjacent components. However, keep in mind that this might increase loading, which can reduce the electrical performance of your probe adapter.*

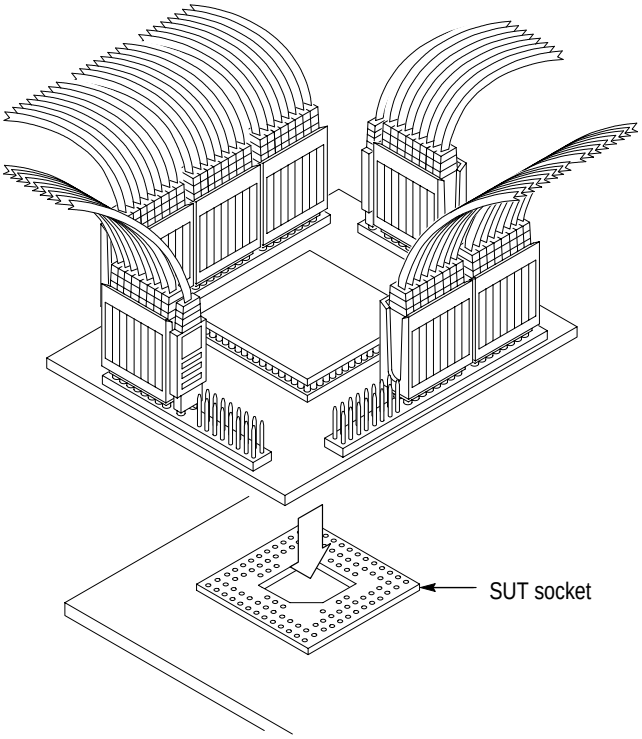


Figure 1–3: Placing a PGA probe adapter onto the SUT

PLCC Probe Adapter

To connect the logic analyzer to a SUT using a PLCC probe adapter, follow these steps:

1. Turn off power to your SUT. It is not necessary to turn off the logic analyzer.

CAUTION. *Static discharge can damage the microprocessor, the probe adapter, the probes, or the module. To prevent static damage, handle all of the above only in a static-free environment.*

Always wear a grounding wrist strap or similar device while handling the microprocessor and probe adapter.

2. To discharge your stored static electricity, touch the ground connector located on the back of the logic analyzer. Then, touch any of the ground pins of the probe adapter to discharge stored static electricity from the probe adapter.
3. Place the probe adapter onto the antistatic shipping foam to support the probe as shown in Figure 1–4. This prevents the circuit board from flexing.
4. Remove the microprocessor from your SUT.

5. Line up the pin 1 indicator on the microprocessor with pin 1 of the PLCC socket on the probe adapter.

CAUTION. *Failure to correctly place the microprocessor into the probe adapter might permanently damage all electrical components once power is applied.*

6. Place the microprocessor into the probe adapter as shown in Figure 1–4.

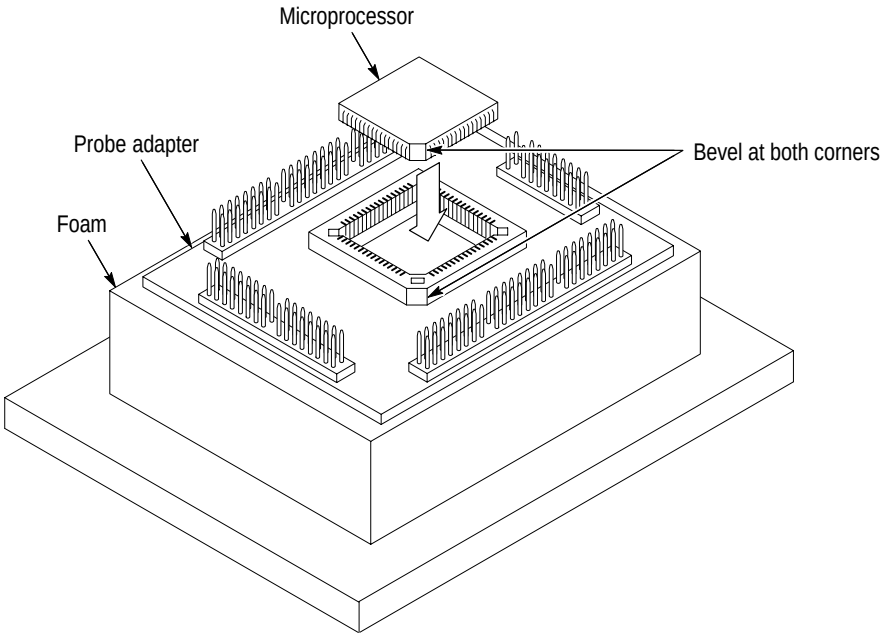


Figure 1–4: Placing a microprocessor into a PLCC probe adapter

7. Connect the channel and clock probes to the probe adapter as shown in Figure 1–5. Match the channel groups and numbers on the probe labels to the corresponding pins on the probe adapter. Match the ground pins on the probes to the corresponding pins on the probe adapter.

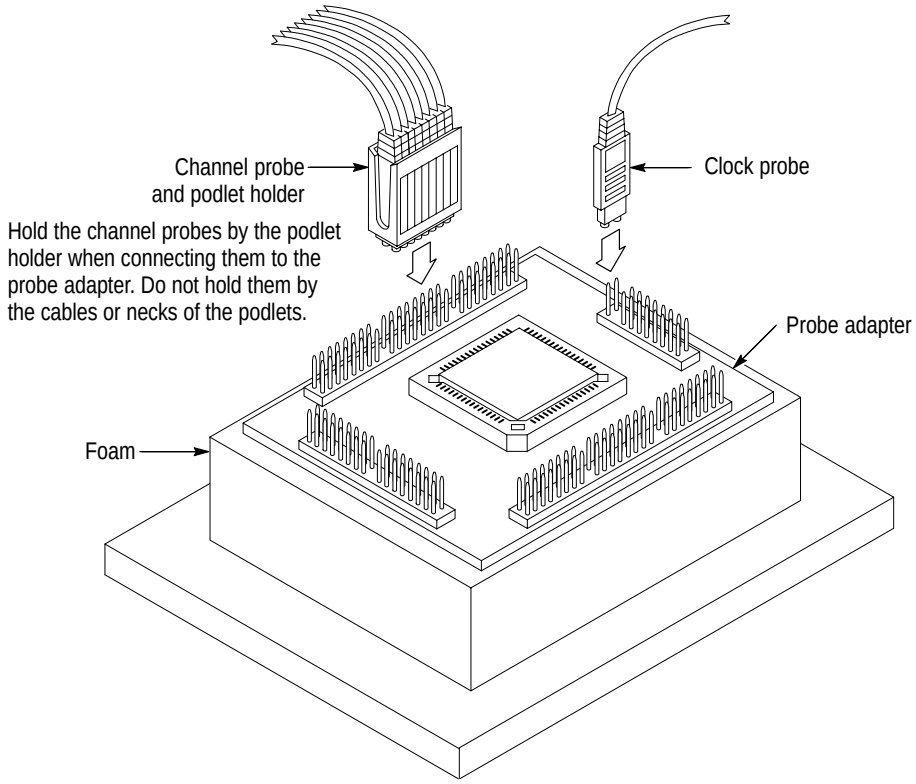


Figure 1–5: Connecting probes to a PLCC probe adapter

8. Place the probe adapter onto the SUT as shown in Figure 1–6.

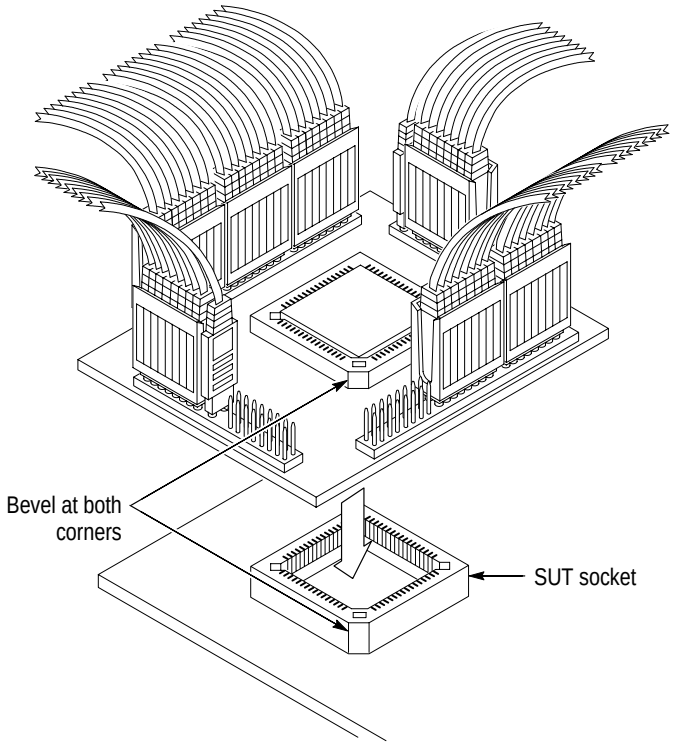


Figure 1–6: Placing a PLCC probe adapter onto the SUT

Without a Probe Adapter

You can use channel probes, clock probes, and leadsets with a commercial test clip (or adapter) to make connections between the logic analyzer and your SUT.

To connect the probes to R3051, R3052 and R3081 signals in the SUT using a test clip, follow these steps:

1. Turn off power to your SUT. It is not necessary to turn off power to the logic analyzer.

CAUTION. *Static discharge can damage the microprocessor, the probes, or the module. To prevent static damage, handle all of the above only in a static-free environment.*

Always wear a grounding wrist strap or similar device while handling the microprocessor.

2. To discharge your stored static electricity, touch the ground connector located on the back of the logic analyzer. If you are using a test clip, touch any of the ground pins on the clip to discharge stored static electricity from it.

CAUTION. *Failure to place the SUT on a horizontal surface before connecting the test clip might permanently damage the pins on the microprocessor.*

3. Place the SUT on a horizontal static-free surface.

4. Use Table 1–2 to connect the channel probes to R3051, R3052 and R3081 signal pins on the test clip or in the SUT.

   Use leadsets to connect at least one ground lead from each channel probe and the ground lead from each clock probe to ground pins on your test clip.

NOTE*. Since the probe adapter multiplexes address A31-A4 and data D31-D4 (as the A_D31-A_D4 signals), the D3:7-0, D2:7-0, D1:7-0 and D0:7-4 channel probes do not need to be connected.*

These channels are not considered to be extra channels, even though they are not connected. Do not use them to make connections to other signals in your SUT.

Table 1–2: R3051, R3052 and R3081 signal connections for channel probes

Section:channel	R3051, R3052 and R3081 signal	Section:channel	R3051, R3052 and R3081 signal
A3:7	A_D(31)	D3:7	A_D(31) *
A3:6	A_D(30)	D3:6	A_D(30) *
A3:5	A_D(29)	D3:5	A_D(29) *
A3:4	A_D(28)	D3:4	A_D(28) *
A3:3	A_D(27)	D3:3	A_D(27) *
A3:2	A_D(26)	D3:2	A_D(26) *
A3:1	A_D(25)	D3:1	A_D(25) *
A3:0	A_D(24)	D3:0	A_D(24) *
A2:7	A_D(23)	D2:7	A_D(23) *
A2:6	A_D(22)	D2:6	A_D(22) *
A2:5	A_D(21)	D2:5	A_D(21) *
A2:4	A_D(20)	D2:4	A_D(20) *

Table 1–2: R3051, R3052 and R3081 signal connections for channel probes (cont.)

Section:channel	R3051, R3052 and R3081 signal	Section:channel	R3051, R3052 and R3081 signal
A2:3	A_D(19)	D2:3	A_D(19) *
A2:2	A_D(18)	D2:2	A_D(18) *
A2:1	A_D(17)	D2:1	A_D(17) *
A2:0	A_D(16)	D2:0	A_D(16) *
A1:7	A_D(15)	D1:7	A_D(15) *
A1:6	A_D(14)	D1:6	A_D(14) *
A1:5	A_D(13)	D1:5	A_D(13) *
A1:4	A_D(12)	D1:4	A_D(12) *
A1:3	A_D(11)	D1:3	A_D(11) *
A1:2	A_D(10)	D1:2	A_D(10) *
A1:1	A_D(9)	D1:1	A_D(9) *
A1:0	A_D(8)	D1:0	A_D(8) *
A0:7	A_D(7)	D0:7	A_D(7) *
A0:6	A_D(6)	D0:6	A_D(6) *
A0:5	A_D(5)	D0:5	A_D(5) *
A0:4	A_D(4)	D0:4	A_D(4) *
A0:3	ADDR(3)	D0:3	A_D(3) *
A0:2	ADDR(2)	D0:2	A_D(2) *
A0:1	Ground	D0:1	A_D(1) *
A0:0	Ground	D0:0	A_D(0) *
C3:7	Diag_1	C2:7	BE_1~
C3:6	RdCEn_B~	C2:6	Ack_B~
C3:5	BE_3~	C2:5	BE_0~
C3:4	SysClk_B~	C2:4	Not connected
C3:3	Diag_0	C2:3	Rd~
C3:2	Brst~_WrNr~	C2:2	BusError_L~
C3:1	BE_2~	C2:1	Reset~
C3:0	ALE_B †	C2:0	BusGnt~
C1:7	SInt_0~ †	C0:7	BrCond_0 †
C1:6	SInt_1~ †	C0:6	Wr~ †
C1:5	SInt_2~ †	C0:5	DataEn~ †

Table 1–2: R3051, R3052 and R3081 signal connections for channel probes (cont.)

Section:channel	R3051, R3052 and R3081 signal	Section:channel	R3051, R3052 and R3081 signal
C1:4	Int_3~ †	C0:4	BusReq~ †
C1:3	Int_4~ †	C0:3	SBrCond_2 †
C1:2	Int_5~ †	C0:2	BrCond_1 †
C1:1	CohReq~ †	C0:1	Rsvd_2 †
C1:0	Rsvd_1 †	C0:0	SBrCond_3 †

***** **These channels do not have to be connected for disassembly because they are multiplexed on the probe adapter board.**

† **Signal not required for disassembly.**

Table 1–3 shows the clock probes and the R3051, R3052 and R3081 signal to which they must connect for disassembly to be correct.

Table 1–3: R3051, R3052 and R3081 signal connections for clock probes

Section:channel	R3051, R3052 and R3081 signal
CK:3	SysClk_B~
CK:2	RdCEn_L~
CK:1	Ack_L~
CK:0	ALE_B

5. Align pin 1 or A1 of your test clip with the corresponding pin 1 or A1 of the R3051, R3052 and R3081 microprocessor in your SUT and attach the clip.

Setting Up the Support

This section provides information on how to set up the support. Information covers the following topics:

- Channel group definitions
- Clocking options
- Symbol table files

Remember that the information in this section is specific to the operations and functions of the TMS 420 R3051, R3052 and R3081 support on any Tektronix logic analyzer for which it can be purchased. Information on basic operations describes general tasks and functions.

Before you acquire and disassemble data, you need to load the support and specify setups for clocking and triggering as described in the information on basic operations. The support provides default values for each of these setups, but you can change them as needed.

Channel Group Definitions

The software automatically defines channel groups for the support. The channel groups for the R3051, R3052 and R3081 support are Address, Data, Control, DataSize, Timing, MiscCtrl, Intr, Debug, and Conds. If you want to know which signal is in which group, refer to the channel assignment tables beginning on page 3–6.

Clocking Options

The TMS 420 support offers a microprocessor-specific clocking mode for the R3051, R3052 and R3081 microprocessor. This clocking mode is the default selection whenever you load the R3051 support.

A description of how cycles are sampled by the module using the support and probe adapter is found in the *Specifications* chapter.

Disassembly will not be correct with the Internal or External clocking modes. Information on basic operations describes how to use these clock selections for general purpose analysis.

The clocking options for the TMS 420 support are: DMA Cycles and Probe Interface Type.

DMA Cycles

A DMA cycle is defined as the cycle in which the R3051, R3052 and R3081 microprocessor gives up the bus to an alternate device (a DMA device or another microprocessor). These types of cycles are acquired when you select Included.

Probe Interface Type

You must use the TMS 420 probe adapter to acquire data from R3051, R3052 and R3081 microprocessor-based systems running at speeds to 40 MHz. When using the probe adapter, you must select With Probe Adapter in this field.

You can also connect the podlets directly to your SUT. However, the support speed is reduced from 40 to 33 MHz. If connecting directly to your SUT, you must select Without Probe Adapter in this field.

Symbols

The TMS 420 support supplies one symbol table file. The R3051_Ctrl file replaces specific Control channel group values with symbolic values when Symbolic is the radix for the channel group.

Table 2–1 shows the name, bit pattern, and meaning for the symbols in the file R3051_Ctrl, the Control channel group symbol table.

Table 2–1: Control group symbol table definitions

Symbol	Control group value RD~ Brst_WrNr~ Diag_1 Diag_0 BusGnt~ Reset~ BusError~	Meaning
DCACHE_RD	0 1 1 0 1 1 1	Data Cache Read
ICACHE_RD	0 1 1 1 1 1 1	Instruction Cache Read
DCBRST_RD	0 0 1 0 1 1 1	Data Cache Burst Read
ICBRST_RD	0 0 1 1 1 1 1	Instruction Cache Burst Read
MEM_RDI/D	0 1 0 X 1 1 1	Mem Read I/D
MEM_WRITE	1 1 X X 1 1 1	Mem Write
MEM_WR_NR	1 0 X X 1 1 1	Mem Write Near
DMA_READ	0 X X X 0 1 1	DMA Read
DMA_WRITE	1 X X X 0 1 1	DMA Write
DMA_RD_ER	0 X X X 0 1 0	DMA Read Buserror
DMA_WR_ER	1 X X X 0 1 0	DMA Write Buserror
RD_BUS_ER	0 X X X 1 1 0	Read Buserror
WR_BUS_ER	1 X X X 1 1 0	Write Buserror
RESET	X X X X X 0 X	Reset

Table 2–2 shows the name, bit pattern, and meaning for the symbols in the file R3051_Size, the DataSize channel group symbol table.

Table 2–2: DataSize group symbol table definitions

Symbol	DataSize group value BE(3)~ BE(2)~ BE(1)~ BE(0)~
WORD	0 0 0 0
BYTE_0	1 1 1 0
BYTE_1	1 1 0 1
BYTE_2	1 0 1 1
BYTE_3	0 1 1 1
HALFWD_0	1 1 0 0
HALFWD_1	0 0 1 1
TRIBYTE_0	1 0 0 0
TRIBYTE_1	0 0 0 1

Information on basic operations describes how to use symbolic values for triggering and for displaying other channel groups symbolically, such as the Address channel group.

Acquiring and Viewing Disassembled Data

This section describes how to acquire data and view it disassembled. Information covers the following topics and tasks:

- Acquiring data
- Viewing disassembled data in various display formats
- Cycle type labels
- Changing the way data is displayed
- Changing disassembled cycles with the mark cycles function

Acquiring Data

Once you load the R3051 support, choose a clocking mode, and specify the trigger, you are ready to acquire and disassemble data.

If you have any problems acquiring data, refer to information on basic operations in your online help or *Appendix A: Error Messages and Disassembly Problems* in the basic operations user manual.

Viewing Disassembled Data

You can view disassembled data in four display formats: Hardware, Software, Control Flow, and Subroutine. The information on basic operations describes how to select the disassembly display formats.

NOTE. *Selections in the Disassembly property page (the Disassembly Format Definition overlay) must be set correctly for your acquired data to be disassembled correctly. Refer to* Changing How Data is Displayed *on page 2–8.*

The default display format shows the Address, Data, and Control channel group values for each sample of acquired data.

The disassembler displays special characters and strings in the instruction mnemonics to indicate significant events. Table 2–3 shows these special characters and strings, and gives a definition of what they represent.

Table 2–3: Meaning of special characters in the display

Character or string displayed	Meaning
≫ or m	The instruction was manually marked
****	Indicates there is insufficient data available for complete disassembly of the instruction; the number of asterisks indicates the width of the data that is unavailable. Each two asterisks represent one byte.

Hardware Display Format

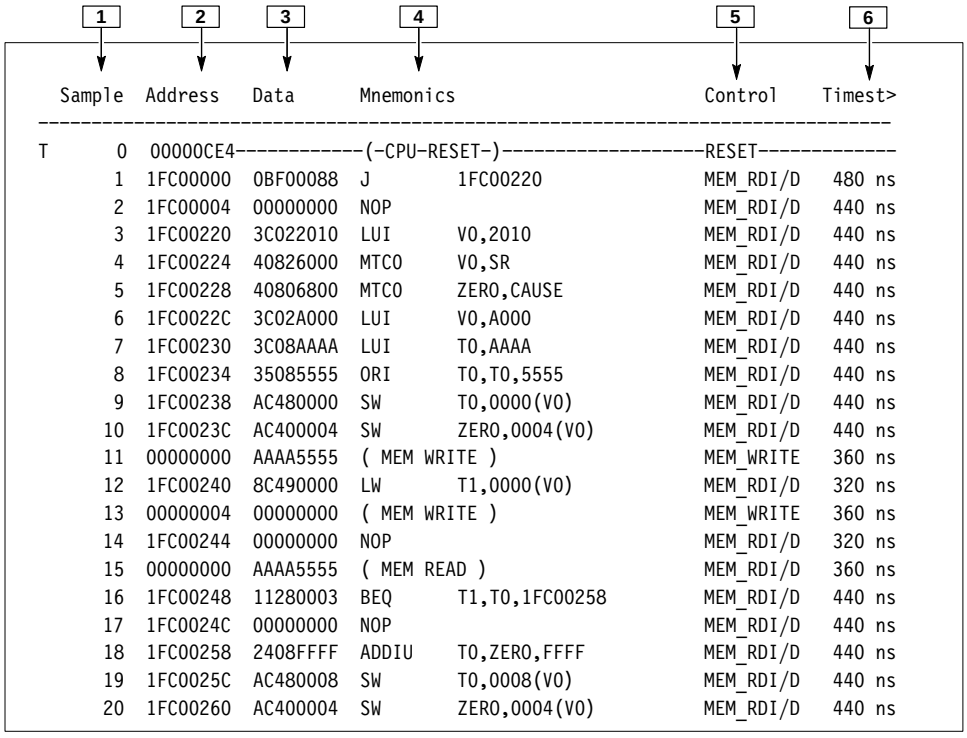
In Hardware display format, the disassembler displays certain cycle type labels in parentheses. Table 2–4 shows these cycle type labels and gives a definition of the cycle they represent. Reads to interrupt and exception vectors will be labeled with the vector name.

Table 2–4: Cycle type definitions

Cycle type	Definition
(DATA CACHE READ)	Single word read into the data cache
(DATA CACHE BURST READ)	Quad word read burst into data cache
(MEM READ)	Single word read from memory
(MEM WRITE)	Single word write into memory
(MEMORY WRITE NEAR)	Single word write into adjacent memory locations
(DMA READ)	DMA device has control of CPU bus for reading data
(DMA WRITE)	DMA device has control of CPU bus for writing data
(DMA READ BUS ERROR)	DMA read bus error detected
(DMA WRITE BUS ERROR)	DMA write bus error detected
(CPU READ BUS ERROR)	CPU read bus error detected
(CPU WRITE BUS ERROR)	CPU write bus error detected
(CPU RESET)	CPU reset initiated
** INVALID BUS CYCLE **	The combinations of control bits is unexpected and/or unrecognized

* **Computed cycle types.**

Figure 2–1 shows an example of the Hardware display.




```
  Sample  Address   Data      Mnemonics                        Control    Timest>
-------------------------------------------------------------------------------
T      0  00000CE4------------(-CPU-RESET-)-------------------RESET-------------
       1  1FC00000  0BF00088  J        1FC00220                MEM_RDI/D   480 ns
       2  1FC00004  00000000  NOP                              MEM_RDI/D   440 ns
       3  1FC00220  3C022010  LUI      V0,2010                 MEM_RDI/D   440 ns
       4  1FC00224  40826000  MTC0     V0,SR                   MEM_RDI/D   440 ns
       5  1FC00228  40806800  MTC0     ZERO,CAUSE              MEM_RDI/D   440 ns
       6  1FC0022C  3C02A000  LUI      V0,A000                 MEM_RDI/D   440 ns
       7  1FC00230  3C08AAAA  LUI      T0,AAAA                 MEM_RDI/D   440 ns
       8  1FC00234  35085555  ORI      T0,T0,5555              MEM_RDI/D   440 ns
       9  1FC00238  AC480000  SW       T0,0000(V0)             MEM_RDI/D   440 ns
      10  1FC0023C  AC400004  SW       ZERO,0004(V0)           MEM_RDI/D   440 ns
      11  00000000  AAAA5555  ( MEM WRITE )                    MEM_WRITE   360 ns
      12  1FC00240  8C490000  LW       T1,0000(V0)             MEM_RDI/D   320 ns
      13  00000004  00000000  ( MEM WRITE )                    MEM_WRITE   360 ns
      14  1FC00244  00000000  NOP                              MEM_RDI/D   320 ns
      15  00000000  AAAA5555  ( MEM READ )                     MEM_RDI/D   360 ns
      16  1FC00248  11280003  BEQ      T1,T0,1FC00258          MEM_RDI/D   440 ns
      17  1FC0024C  00000000  NOP                              MEM_RDI/D   440 ns
      18  1FC00258  2408FFFF  ADDIU    T0,ZERO,FFFF            MEM_RDI/D   440 ns
      19  1FC0025C  AC480008  SW       T0,0008(V0)             MEM_RDI/D   440 ns
      20  1FC00260  AC400004  SW       ZERO,0004(V0)           MEM_RDI/D   440 ns
```

Figure 2–1: Hardware display format

1 **Sample Column.** Lists the memory locations for the acquired data.

2 **Address Group.** Lists data from channels connected to the R3051, R3052 and R3081 address bus.

3 **Data Group.** Lists data from channels connected to the R3051, R3052 and R3081 data bus.

4 **Mnemonics Column.** Lists the disassembled instructions and cycle types.

5 **Control Group.** Lists data from channels connected to R3051, R3052 and R3081 microprocessor control signals (shown symbolically).

6 **Timestamp.** Lists the timestamp values when a timestamp selection is made. Information on basic operations describes how you can select a timestamp.

Software Display Format

The Software display format shows only the first fetch of executed instructions. Flushed cycles and extensions are not shown, even though they are part of the executed instruction. Read extensions will be used to disassemble the instruction, but will not be displayed as a separate cycle in the Software display format. Data reads and writes are not displayed.

Control Flow Display Format

The Control Flow display format shows only the first fetch of instructions that change the flow of control.

Instructions that generate a change in the flow of control in the R3051, R3052 and R3081 microprocessor are as follows:

BCzF	BGEZ	BLTZ	JR except R31
BCzT	BGTZ	BNE	J
BEQ	BLEZ		

Subroutine Display Format

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.

Instructions that generate a subroutine call or a return in the R3051, R3052 and R3081 microprocessor are as follows:

BGEZAL	BREAK	JALR	RFE
BLTZAL	JAL	JR R31	SYSCALL

Changing How Data is Displayed

There are common fields and features that allow you to further modify displayed data to suit your needs. You can make common and optional display selections in the Disassembly property page (the Disassembly Format Definition overlay).

You can make selections unique to the R3051, R3052 and R3081 support to do the following tasks:

- Change how data is displayed across all display formats
- Change the interpretation of disassembled cycles

Optional Display Selections

You can make optional selections for disassembled data. In addition to the common selections (described in the information on basic operations), you can change the displayed data in the following ways:

- Select the type of CPU general registers
- Mark invalid bytes in the Data channel group

The R3051, R3052 and R3081 support has two additional fields: CPU Regs and Data Bytes. These fields appear in the area indicated in the information on basic operations.

CPU Regs. You can select the names of the CPU general registers as either Software or Hardware.

Data Bytes. Marks invalid bytes within the Data group. You can choose to Mark Invalid Data or Display All Data.

Marking Cycles

The disassembler has a Mark Opcode function that allows you to change the interpretation of a cycle type. Using this function, you can select a cycle and change it to one of the following cycle types:

- Opcode (the first word of an instruction)
- Read (marks a memory reference read as data)

Mark selections are as follows:

```
OPCODE
Read

Undo marks on this cycle
```

Information on basic operations contains more details on marking cycles.

Viewing an Example of Disassembled Data

A demonstration system file (or demonstration reference memory) is provided so you can see an example of how your R3051, R3052 and R3081 microprocessor bus cycles and instruction mnemonics look when they are disassembled. Viewing the system file is not a requirement for preparing the module for use and you can view it without connecting the logic analyzer to your SUT.

Information on basic operations describes how to view the file.

Specifications

This chapter contains the following information:

- Probe adapter description
- Specification tables
- Dimensions of the probe adapter
- Channel assignment tables
- Description of how the module acquires R3051, R3052 and R3081 signals
- List of other accessible microprocessor signals and extra probe channels

Probe Adapter Description

The probe adapter is nonintrusive hardware that allows the logic analyzer to acquire data from a microprocessor in its own operating environment with little effect, if any, on that system. Information on basic operations contains a figure showing the logic analyzer connected to a typical probe adapter. Refer to that figure while reading the following description.

The probe adapter consists of a circuit board and a socket for a R3051, R3052 and R3081 microprocessor. The probe adapter connects to the microprocessor in the SUT. Signals from the microprocessor-based system flow from the probe adapter to the channel groups and through the probe signal leads to the module.

All circuitry on the probe adapter is powered from the SUT.

One probe adapter accommodates the Intel MIPS R3051, R3052 and R3081 microprocessor in a 84-pin PGA package. A second probe adapter accommodates the R3051, R3052 and R3081 microprocessor in an 84-pin PLCC package.

Configuration

There are two jumpers on the probe adapter used to turn the cache on or off.

To turn the cache off, place jumpers J1771 and J1671 to the 2-3 position. When the jumpers are in the 2-3 position, the signal RSVD (2) must be disconnected from the probe adapter.

To turn the cache on, place jumpers J1771 and J1671 to the 1-2 position. When the jumpers are in the 1-2 position, the signal RSVD (2) may be reconnected.

Specifications

These specifications are for a probe adapter connected between a compatible Tektronix logic analyzer and a SUT. Table 3–1 shows the electrical requirements the SUT must produce for the support to acquire correct data.

In Table 3–1, for the 102/136-channel module, one podlet load is 20 kΩ in parallel with 2 pF. For the 96-channel module, one podlet load is 100 kΩ in parallel with 10 pF.

Table 3–1: Electrical specifications

Characteristics	Requirements	
SUT DC power requirements		
Voltage	4.75-5.25 VDC	
Current	I maximum I typical	455 mA 350 mA
SUT clock		
Clock rate	Maximum (40 MHz with probe adapter)	33 MHz
Minimum setup time required		
All signals	4 ns	
Minimum hold time required		
All signals	4 ns	
	Specification	
Measured typical SUT signal loading	**AC load**	**DC load**
A_D (31-4)	4 pF + 1 podlet	1 podlet
A_D (3-0)	10 pF + 2 podlets	2 podlets
Rd~, Daig_(1-0), Busrst~_WrNr~, Addr_(1-0), ALE	12 pF	74FR244
RdCEn~, Ack~, BusError~	11 pF	16R4-4 PLCC
BRcond (1-0), Sint_(0-2), Int_(3-5), SBrcond_(3-2)	11 pF	16L8-5 in parallel with podlet
Rsvd_(1-2), BusBnt~, Reset~	9 pF	1 podlet
SYSCLK~	10 pF †	74FR244

† **This does not include the transmission line termination network of 100 pF in series with 100 Ω. With good clock signal quality you can remove the network to improve signal quality.**

Table 3–2 shows the environmental specifications.

Table 3–2: Environmental specifications*

Characteristic	Description
Temperature	
Maximum operating	+50° C (+122° F)†
Minimum operating	0° C (+32° F)
Non-operating	–55° to +75° C (–67° to +167° F)
Humidity	10 to 95% relative humidity
Altitude	
Operating	4.5 km (15,000 ft) maximum
Non-operating	15 km (50,000 ft) maximum
Electrostatic immunity	The probe adapter is static sensitive

*** Designed to meet Tektronix standard 062-2847-00 class 5.**

† **Not to exceed R3051, R3052 and R3081 microprocessor thermal considerations. Forced air cooling might be required across the CPU.**

Table 3–3 shows the certifications and compliances that apply to the probe adapter.

Table 3–3: Certifications and compliances

EC Compliance	There are no current European Directives that apply to this product.

Figure 3–1 shows the dimensions of the PGA probe adapter. Information on basic operations shows the vertical clearance of the channel and clock probes when connected to a probe adapter.

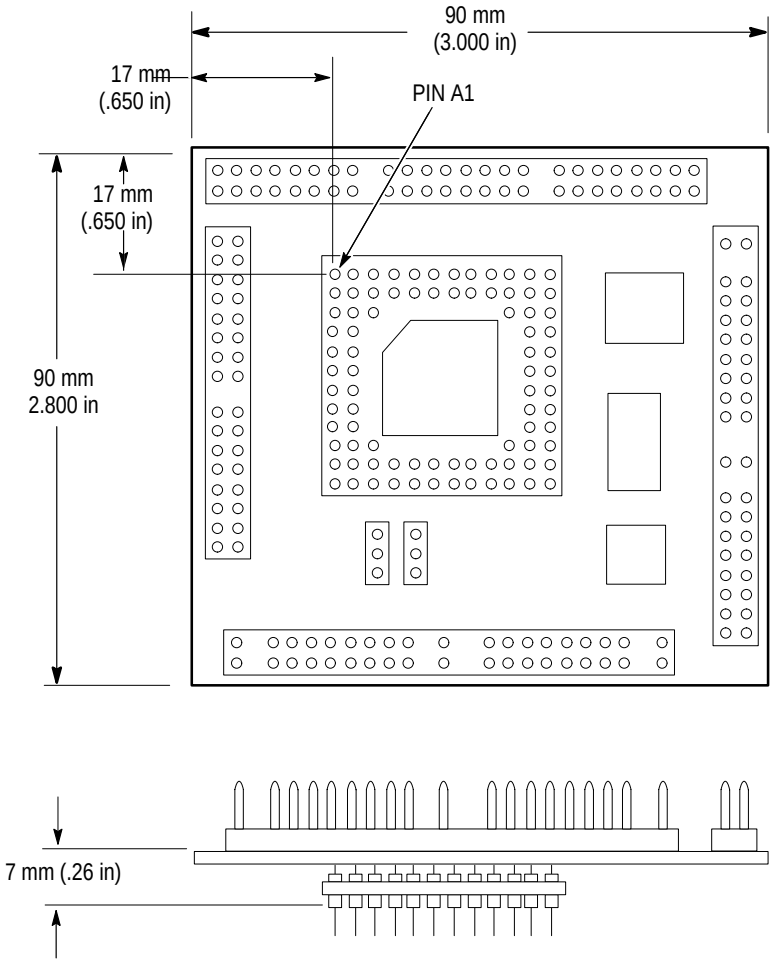


Figure 3–1: Dimensions of the PGA probe adapter

Figure 3–2 shows the dimensions of the PLCC probe adapter. Information on basic operations shows the vertical clearance of the channel and clock probes when connected to a probe adapter.

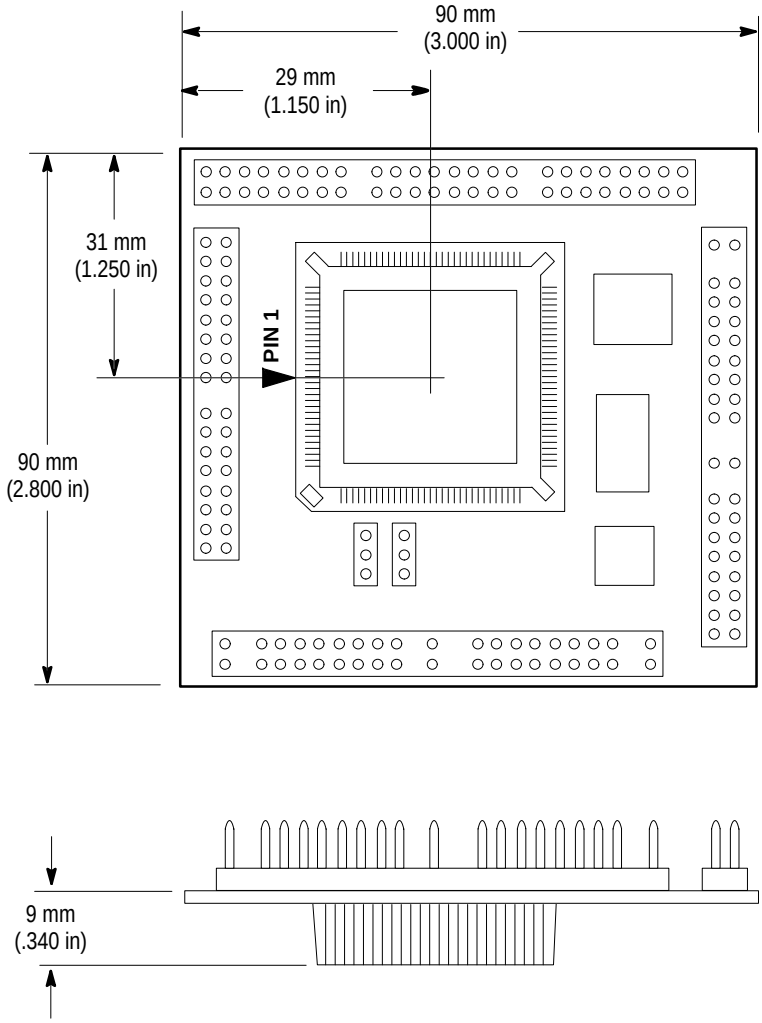


Figure 3–2: Dimensions of the probe adapter

Channel Assignments

Channel assignments shown in Table 3–4 through Table 3–13 use the following conventions:

- All signals are required by the support unless indicated otherwise.
- Channels are shown starting with the most significant bit (MSB) descending to the least significant bit (LSB).
- Channel group assignments are for all modules unless otherwise noted.
- A tilde (~) following a signal name indicates an active low signal.

Table 3–4 shows the probe section and channel assignments for the Address group and the microprocessor signal to which each channel connects. By default, this channel group is displayed in hexadecimal.

Table 3–4: Address group channel assignments

Bit order	Section:channel	R3051, R3052 and R3081 signal name
31	A3:7	A_D31(31)
30	A3:6	A_D30(30)
29	A3:5	A_D29(29)
28	A3:4	A_D28(28)
27	A3:3	A_D27(27)
26	A3:2	A_D26(26)
25	A3:1	A_D25(25)
24	A3:0	A_D24(24)
23	A2:7	A_D23(23)
22	A2:6	A_D22(22)
21	A2:5	A_D21(21)
20	A2:4	A_D20(20)
19	A2:3	A_D19(19)
18	A2:2	A_D18(18)
17	A2:1	A_D17(17)
16	A2:0	A_D16(16)
15	A1:7	A_D15(15)
14	A1:6	A_D14(14)
13	A1:5	A_D13(13)
12	A1:4	A_D12(12)
11	A1:3	A_D11(11)
10	A1:2	A_D10(10)
9	A1:1	A_D9(9)

Table 3–4: Address group channel assignments

Bit order	Section:channel	R3051, R3052 and R3081 signal name
8	A1:0	A_D8(8)
7	A0:7	A_D7(7)
6	A0:6	A_D6(6)
5	A0:5	A_D5(5)
4	A0:4	A_D4(4)
3	A0:3	ADDR(3)
2	A0:2	ADDR(2)
1	A0:1	Ground
0	A0:0	Ground

Table 3–5 shows the probe section and channel assignments for the Data group and the microprocessor signal to which each channel connects. By default, this channel group is displayed in hexadecimal.

***NOTE**. Since the probe adapter multiplexes address A31-A4 and data D31-D4 (as the A_D31-A_D4 signals), the D3:7-0, D2:7-0, D1:7-0 and D0:7-4 channel probes do not need to be connected.*

These channels are not considered to be extra channels, even though they are not connected. Do not use them to make connections to other signals in your SUT.

Table 3–5: Data group channel assignments

Bit order	Section:channel	R3051, R3052 and R3081 signal name
31	D3:7	A_D31(31) *
30	D3:6	A_D30(30) *
29	D3:5	A_D29(29) *
28	D3:4	A_D28(28) *
27	D3:3	A_D27(27) *
26	D3:2	A_D26(26) *
25	D3:1	A_D25(25) *
24	D3:0	A_D24(24) *
23	D2:7	A_D23(23) *
22	D2:6	A_D22(22) *
21	D2:5	A_D21(21) *
20	D2:4	A_D20(20) *

Table 3–5: Data group channel assignments

Bit order	Section:channel	R3051, R3052 and R3081 signal name
19	D2:3	A_D19(19) *
18	D2:2	A_D18(18) *
17	D2:1	A_D17(17) *
16	D2:0	A_D16(16) *
15	D1:7	A_D15(15) *
14	D1:6	A_D14(14) *
13	D1:5	A_D13(13) *
12	D1:4	A_D12(12) *
11	D1:3	A_D11(11) *
10	D1:2	A_D10(10) *
9	D1:1	A_D9(9) *
8	D1:0	A_D8(8) *
7	D0:7	A_D7(7) *
6	D0:6	A_D6(6) *
5	D0:5	A_D5(5) *
4	D0:4	A_D4(4) *
3	D0:3	A_D3(3) *
2	D0:2	A_D2(2) *
1	D0:1	A_D1(1) *
0	D0:0	A_D0(0) *

*** These channels do not have to be connected for disassembly because they are multiplexed on the probe adapter board.**

Table 3–6 shows the probe section and channel assignments for the Control group and the microprocessor signal to which each channel connects. By default, this channel group is displayed symbolically.

Table 3–6: Control group channel assignments

Bit order	Section:channel	R3051, R3052 and R3081 signal name
6	C2:3	Rd~
5	C3:2	Brst~_WrNr~
4	C3:7	Diag_1
3	C3:3	Diag_0
2	C2:0	BusGnt~

Table 3–6: Control group channel assignments (cont.)

Bit order	Section:channel	R3051, R3052 and R3081 signal name
1	C2:1	Reset~
0	C2:2	BusError_L~

Table 3–7 shows the probe section and channel assignments for the DataSize group and the microprocessor signal to which each channel connects. By default, this channel group is displayed in binary.

Table 3–7: DataSize group channel assignments

Bit order	Section:channel	R3051, R3052 and R3081 signal name
3	C3:5	BE_3~
2	C3:1	BE_2~
1	C2:7	BE_1~
0	C2:5	BE_0~

Table 3–8 shows the probe section and channel assignments for the Timing group and the microprocessor signal to which each channel connects. By default, this channel group is displayed in binary.

Table 3–8: Timing group channel assignments

Bit order	Section:channel	R3051, R3052 and R3081 signal name
3	C3:4	SysClk_B~
2	C3:0	ALE_B~ *
1	C2:6	Ack_B~
0	C3:6	RdCEn_B~

*** Signal not required for disassembly**

Table 3–9 shows the probe section and channel assignments for the MiscCtrl group and the microprocessor signal to which each channel connects. By default, this channel group is not visible.

Table 3–9: MiscCtrl group channel assignments

Bit order	Section:channel	R3051, R3052 and R3081 signal name
3	C0:6	Wr~ *
2	C0:5	DataEn~ *
1	C0:4	BusReq~ *
0	C1:1	CohReq~ *

*** Signal not required for disassembly.**

Table 3–10 shows the probe section and channel assignments for the Intr group and the microprocessor signal to which each channel connects. By default, this channel group is not visible.

Table 3–10: Intr group channel assignments

Bit order	Section:channel	R3051, R3052 and R3081 signal name
5	C1:2	Int_5~ *
4	C1:3	Int_4~ *
3	C1:4	Int_3~ *
2	C1:5	Sint_2~ *
1	C1:6	Sint_1~ *
0	C1:7	Sint_0~ *

*** Signal not required for disassembly.**

Table 3–11 shows the probe section and channel assignments for the Debug group and the microprocessor signal to which each channel connects. By default, this channel group is not visible.

Table 3–11: Debug group channel assignments

Bit order	Section:channel	R3051, R3052 and R3081 signal name
1	C0:1	Rsvd_2 *
0	C1:0	Rsvd_1 *

*** Signal not required for disassembly.**

Table 3–12 shows the probe section and channel assignments for the Conds group and the microprocessor signal to which each channel connects. By default, this channel group is not visible.

Table 3–12: Conds group channel assignments

Bit order	Section:channel	R3051, R3052 and R3081 signal name
3	C0:0	SBrCond_3 *
2	C0:3	SBrCond_2 *
1	C0:2	BrCond_1 *
0	C0:7	BrCond_0 *

* Signal not required for disassembly.

Table 3–13 shows the probe section and channel assignments for the clock probes (not part of any group) and the R3051, R3052 and R3081 signal to which each channel connects.

Table 3–13: Clock channel assignments

Section:channel	R3051, R3052 and R3081 signal name
CK:3	SysClk_B~
CK:2	RdCEn_L~
CK:1	Ack_L~
CK:0	ALE_B

How Data is Acquired

This part of this chapter explains how the module acquires R3051, R3052 and R3081 signals using the TMS 420 software and probe adapter. This part also provides additional information on microprocessor signals accessible on or not accessible on the probe adapter, and on extra probe channels available for you to use for additional connections.

Custom Clocking

A special clocking program is loaded to the module every time you load the R3051 support. This special clocking is called Custom.

With Custom clocking, the module logs in signals from multiple groups of channels at different times as they become valid on the R3051, R3052 and R3081 bus. The module then sends all the logged-in signals to the trigger machine and to the memory of the module for storage.

In Custom clocking, the module clocking state machine (CSM) generates one master sample for each microprocessor bus cycle, no matter how many clock cycles are contained in the bus cycle.

Figure 3–3 shows the sample points and the master sample point.

Most R3051 signals are acquired on the falling edge of SYSCLK. The nine signals that do not become active at that time are hardware latched and shifted to the falling edge shown in Figure 3–3.

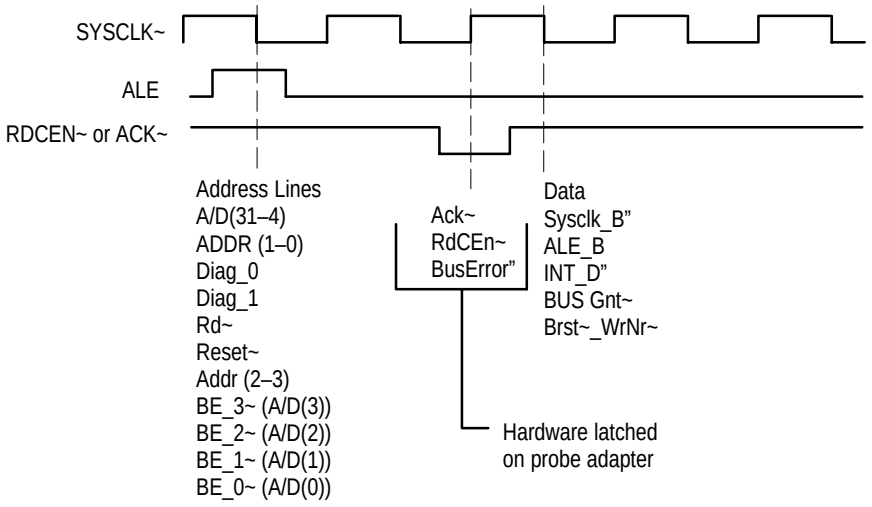


Figure 3–3: R3051, R3052 and R3081 bus timing with a probe adapter

If you choose to use Without Probe Adapter, both edges of Sysclk_B~ are used for clocking. Therefore, there is no need for hardware latches. The effect is lower clock speed support. Figure 3–4 shows the timing when not using the probe adapter.

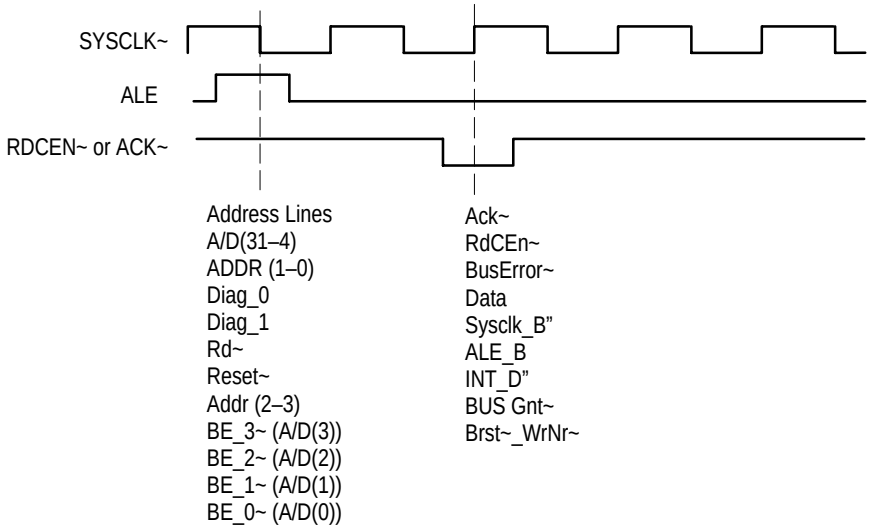


Figure 3–4: R3051, R3052 and R3081 bus timing without a probe adapter

Clocking Options

The clocking algorithm for the R3051, R3052 and R3081 support has two variations: Probe Interface Type and DMA Cycles.

One clock option establishes the type of bus cycles to include in or exclude from the acquisition. The second clock option tells the disassembler weather or not the probe adapter is being used.

Probe Interface Type With a Probe Adapter. The probe adapter is being used.

Probe Interface Type Without a Probe Adapter. The probe adapter is not being used.

DMA Cycles Excluded. Whenever the HLDA signal is high, no bus cycles are logged in. Only bus cycles initiated by the R3051, R3052 and R3081 microprocessor (HLDA low) will be logged in. Backoff cycles (caused by the BOFF# signal) are stored.

DMA Cycles Included. All bus cycles, including DMA cycles and Backoff cycles, are logged in.

Alternate Microprocessor Connections

You can connect to other signals that are not required by the support so that you can analyze other signal activity in your system. These signals might or might

not be accessible on the probe adapter board. The following paragraphs and tables list signals that are or are not accessible on the probe adapter board.

For a list of signals required or not required for disassembly, refer to the channel assignment tables beginning on page 3–6. Remember that these channels are already included in a channel group. If you do connect these channels to other signals, you should set up another channel group for them.

Signals Not On the Probe Adapter

The probe adapter does not provide access for the following microprocessor signals:

- RSVD3
- RSVD4
- CLKIN

Extra Channels

Table 3–14 lists extra sections and channels that are left after you have connected all the probes used by the support. You can use these extra channels to make alternate SUT connections.

Channels not defined in a channel group by the TMS 420 software are logged in with the Master sample point.

Table 3–14: Extra module sections and channels

Module	Section: channels
102-channels	Qual:1, Qual:0, C2:4
136-channels	E3:7-0, E2:7-0, E1:7-0, E0:7-0, Qual:3-0, C2:4
96-channels	C2:4

These channels are not defined in any channel group and data acquired from them is not displayed. To display data, you will need to define a channel group.

Maintenance

This chapter contains a circuit description of the probe adapter.

Probe Adapter Circuit Description

The 16R4 is used to latch three rising edge signals for disassembly and to buffer these signals to reduce loading on the CPU. The 16L8 is used to OR the interrupt lines for the module. The 74FR244 minimizes the load on the user clock and buffers other signals to keep the clock/signal timing relation the same.

J1771 and J1671 are used to turn off the cache. The SUT drives these lines, therefore the SUT driver must be disabled to use this option.

Replacing Signal Leads

Information on basic operations describes how to replace signal leads (individual channel and clock probes).

Replacing Protective Sockets

Information on basic operations describes how to replace protective sockets.

Replaceable Electrical Parts

This chapter contains a list of the replaceable electrical components for the TMS 420 R3051, R3052 and R3081 microprocessor support. Use this list to identify and order replacement parts.

Parts Ordering Information

Replacement parts are available through your local Tektronix field office or representative.

Changes to Tektronix products are sometimes made to accommodate improved components as they become available and to give you the benefit of the latest improvements. Therefore, when ordering parts, it is important to include the following information in your order:

- Part number
- Instrument type or model number
- Instrument serial number
- Instrument modification number, if applicable

If you order a part that has been replaced with a different or improved part, your local Tektronix field office or representative will contact you concerning any change in part number.

Change information, if any, is located at the rear of this manual.

Using the Replaceable Electrical Parts List

The tabular information in the Replaceable Electrical Parts List is arranged for quick retrieval. Understanding the structure and features of the list will help you find all of the information you need for ordering replacement parts. The following table describes each column of the electrical parts list.

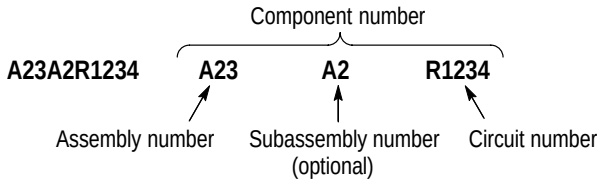
Parts list column descriptions

Column	Column name	Description
1	Component number	The component number appears on diagrams and circuit board illustrations, located in the diagrams section. Assembly numbers are clearly marked on each diagram and circuit board illustration in the *Diagrams* section, and on the mechanical exploded views in the *Replaceable Mechanical Parts* list section. The component number is obtained by adding the assembly number prefix to the circuit number (see Component Number illustration following this table). The electrical parts list is arranged by assemblies in numerical sequence (A1, with its subassemblies and parts, precedes A2, with its subassemblies and parts). Chassis-mounted parts have no assembly number prefix, and they are located at the end of the electrical parts list.
2	Tektronix part number	Use this part number when ordering replacement parts from Tektronix.
3 and 4	Serial number	Column three indicates the serial number at which the part was first effective. Column four indicates the serial number at which the part was discontinued. No entry indicates the part is good for all serial numbers.
5	Name & description	An item name is separated from the description by a colon (:). Because of space limitations, an item name may sometimes appear as incomplete. Use the U.S. Federal Catalog handbook H6-1 for further item name identification.
6	Mfr. code	This indicates the code number of the actual manufacturer of the part.
7	Mfr. part number	This indicates the actual manufacturer's or vendor's part number.

Abbreviations

Abbreviations conform to American National Standard ANSI Y1.1–1972.

Component Number



Read: Resistor 1234 (of Subassembly 2) of Assembly 23

List of Assemblies

A list of assemblies is located at the beginning of the electrical parts list. The assemblies are listed in numerical order. When a part's complete component number is known, this list will identify the assembly in which the part is located.

Chassis Parts

Chassis-mounted parts and cable assemblies are located at the end of the Replaceable Electrical Parts List.

Mfr. Code to Manufacturer Cross Index

The table titled Manufacturers Cross Index shows codes, names, and addresses of manufacturers or vendors of components listed in the parts list.

Manufacturers cross index

Mfr. code	Manufacturer	Address	City, state, zip code
00779	AMP INC	2800 FULLING MILL PO BOX 3608	HARRISBURG PA 17105
04222	AVX CERAMICS DIV OF AVX CORP	19TH AVE SOUTH P O BOX 867	MYRTLE BEACH SC 29577
50434	HEWLETT–PACKARD CO OPTOELECTRONICS DIV	370 W TRIMBLE RD	SAN JOSE CA 95131
91637	DALE ELECTRONICS INC	2064 12TH AVE PO BOX 609	COLUMBUS NE 68601–3632
80009	TEKTRONIX INC	14150 SW KARL BRAUN DR PO BOX 500	BEAVERTON, OR 97077–0001

Replaceable electrical parts list

Component number	Tektronix part number	Serial no. effective	Serial no. discont'd	Name & description	Mfr. code	Mfr. part number
A01	671–2691–00			ADAPTER CIRCUIT BD ASSY: R3051/52/81 PROBE	80009	671269100
A01C2500	283–5004–00			CAP,FXD,CER DI:0.1UF,10%,25V	04222	12063C104KAT3A
A01C2600	283–5004–00			CAP,FXD,CER DI:0.1UF,10%,25V	04222	12063C104KAT3A
A01C2800	283–5188–00			CAP,FXD,CER DI:100PF,5%,100V	04222	12061A0101JAT1A
A01C4700	283–5188–00			CAP,FXD,CER DI:100PF,5%,100V	04222	12061A0101JAT1A
A01C6100	283–5004–00			CAP,FXD,CER DI:0.1UF,10%,25V	04222	12063C104KAT3A
A01C6800	283–5004–00			CAP,FXD,CER DI:0.1UF,10%,25V	04222	12063C104KAT3A
A01C7200	283–5004–00			CAP,FXD,CER DI:0.1UF,10%,25V	04222	12063C104KAT3A
A01C7400	283–5004–00			CAP,FXD,CER DI:0.1UF,10%,25V	04222	12063C104KAT3A
A01C7500	283–5004–00			CAP,FXD,CER DI:0.1UF,10%,25V	04222	12063C104KAT3A
A01CR4800	152–5045–00			DIODE,SIG:SCHTKY,;20V,1.2PF,24 OHM	50434	HSMS–2810–T31
A01CR7800	152–5045–00			DIODE,SIG:SCHTKY,;20V,1.2PF,24 OHM	50434	HSMS–2810–T31
A01CR7801	152–5045–00			DIODE,SIG:SCHTKY,;20V,1.2PF,24 OHM	50434	HSMS–2810–T31
A01CR8400	152–5045–00			DIODE,SIG:SCHTKY,;20V,1.2PF,24 OHM	50434	HSMS–2810–T31
A01CR8800	152–5045–00			DIODE,SIG:SCHTKY,;20V,1.2PF,24 OHM	50434	HSMS–2810–T31
A01J1671	131–4530–00			CONN,HDR:PCB,;MALE,STR,1 X 3,0.1 CTR,0.230	00779	104344–1
A01J1771	131–4530–00			CONN,HDR:PCB,;MALE,STR,1 X 3,0.1 CTR,0.230	00779	104344–1
A01J1181	131–5267–00			CONN,HDR:PCB,;MALE,STR,2 X 40,0.1 CTR,0.235	80009	131526700
A01J1201	131–5267–00			CONN,HDR:PCB,;MALE,STR,2 X 40,0.1 CTR,0.235	80009	131526700
A01J1911	131–5267–00			CONN,HDR:PCB,;MALE,STR,2 X 40,0.1 CTR,0.235	80009	131526700
A01J1991	131–5267–00			CONN,HDR:PCB,;MALE,STR,2 X 40,0.1 CTR,0.235	80009	131526700
A01R2700	321–5006–00			RES,FXD,FILM:100 OHM,1%,0.125W	91637	CRCW12061000FT
A01R4700	321–5006–00			RES,FXD,FILM:100 OHM,1%,0.125W	91637	CRCW12061000FT
A01R8200	321–5022–00			RES,FXD,FILM:2.21K,1%,0.125W	91637	CRCW12062211FT
A01R8201	321–5022–00			RES,FXD,FILM:2.21K,1%,0.125W	91637	CRCW12062211FT
A01R8400	321–5022–00			RES,FXD,FILM:2.21K,1%,0.125W	91637	CRCW12062211FT
A01R8500	321–5022–00			RES,FXD,FILM:2.21K,1%,0.125W	91637	CRCW12062211FT
A01U3700	160–9451–00			IC,DIGITAL:STTL,PLD;PAL,16R4,4NX,210MA,PRGM	80009	160945100
A01U6700	156–6401–00			IC,DIGITAL:FTTL,BUFFER;NON INV OCTAL LINE	80009	156640100
A01U7700	160–9450–00			IC,DIGITAL:STTL,PLD;PAL,16L8,5NS,180MA,PRGM	80009	160945000

Replaceable electrical parts list

Component number	Tektronix part number	Serial no. effective	Serial no. discont'd	Name & description	Mfr. code	Mfr. part number
A02	671–2791–00			CIRCUIT BD ASSY: R3051/52/81 PROBE ADAPTER	80009	671279100
A02C1311	283–5004–00			CAP,FXD,CER DI:0.1UF,10%,25V	04222	12063C104KAT3A
A02C1361	283–5004–00			CAP,FXD,CER DI:0.1UF,10%,25V	04222	12063C104KAT3A
A02C1471	283–5004–00			CAP,FXD,CER DI:0.1UF,10%,25V	04222	12063C104KAT3A
A02C1511	283–5004–00			CAP,FXD,CER DI:0.1UF,10%,25V	04222	12063C104KAT3A
A02C1711	283–5004–00			CAP,FXD,CER DI:0.1UF,10%,25V	04222	12063C104KAT3A
A02C1871	283–5004–00			CAP,FXD,CER DI:0.1UF,10%,25V	04222	12063C104KAT3A
A02CR1110	152–5045–00			DIODE,SIG:SCHTKY,;20V,1.2PF,24 OHM	50434	HSMS–2810–T31
A02CR1261	152–5045–00			DIODE,SIG:SCHTKY,;20V,1.2PF,24 OHM	50434	HSMS–2810–T31
A02CR1271	152–5045–00			DIODE,SIG:SCHTKY,;20V,1.2PF,24 OHM	50434	HSMS–2810–T31
A02CR1281	152–5045–00			DIODE,SIG:SCHTKY,;20V,1.2PF,24 OHM	50434	HSMS–2810–T31
A02CR1475	152–5045–00			DIODE,SIG:SCHTKY,;20V,1.2PF,24 OHM	50434	HSMS–2810–T31
A02J1181	131–5267–00			CONN,HDR:PCB,;MALE,STR,2 X 40,0.1 CTR,0.235	80009	131526700
A02J1201	131–5267–00			CONN,HDR:PCB,;MALE,STR,2 X 40,0.1 CTR,0.235	80009	131526700
A02J1671	131–4530–00			CONN,HDR:PCB,;MALE,STR,1 X 3,0.1 CTR,0.230	00779	104344–1
A02J1771	131–4530–00			CONN,HDR:PCB,;MALE,STR,1 X 3,0.1 CTR,0.230	00779	104344–1
A02J1911	131–5267–00			CONN,HDR:PCB,;MALE,STR,2 X 40,0.1 CTR,0.235	80009	131526700
A02J1991	131–5267–00			CONN,HDR:PCB,;MALE,STR,2 X 40,0.1 CTR,0.235	80009	131526700
A02R1211	321–5006–00			RES,FXD,FILM:100 OHM,1%,0.125W	91637	CRCW12061000FT
A02R1241	321–5006–00			RES,FXD,FILM:100 OHM,1%,0.125W	91637	CRCW12061000FT
A02R1481	321–5022–00			RES,FXD,FILM:2.21K,1%,0.125W	91637	CRCW12062211FT
A02R1681	321–5022–00			RES,FXD,FILM:2.21K,1%,0.125W	91637	CRCW12062211FT
A02R1871	321–5022–00			RES,FXD,FILM:2.21K,1%,0.125W	91637	CRCW12062211FT
A02R1881	321–5022–00			RES,FXD,FILM:2.21K,1%,0.125W	91637	CRCW12062211FT
A02U1221	160–9451–00			IC,DIGITAL:STTL,PLD;PAL,16R4,4NX,210MA,PRGM	80009	160945100
A02U1251	156–6401–00			IC,DIGITAL:FTTL,BUFFER;NON INV OCTAL LINE D RIVER,3–STATE	80009	156640100
A02U1571	160–9450–00			IC,DIGITAL:STTL,PLD;PAL,16L8,5NS,180MA,PRGM	80009	160945000

Replaceable Mechanical Parts

This chapter contains a list of the replaceable mechanical components for the TMS 420 R3051, R3052 and R3081 microprocessor support. Use this list to identify and order replacement parts.

Parts Ordering Information

Replacement parts are available through your local Tektronix field office or representative.

Changes to Tektronix products are sometimes made to accommodate improved components as they become available and to give you the benefit of the latest improvements. Therefore, when ordering parts, it is important to include the following information in your order:

- Part number
- Instrument type or model number
- Instrument serial number
- Instrument modification number, if applicable

If you order a part that has been replaced with a different or improved part, your local Tektronix field office or representative will contact you concerning any change in part number.

Change information, if any, is located at the rear of this manual.

Using the Replaceable Mechanical Parts List

The tabular information in the Replaceable Mechanical Parts List is arranged for quick retrieval. Understanding the structure and features of the list will help you find all of the information you need for ordering replacement parts. The following table describes the content of each column in the parts list.

Parts list column descriptions

Column	Column name	Description
1	Figure & index number	Items in this section are referenced by figure and index numbers to the exploded view illustrations that follow.
2	Tektronix part number	Use this part number when ordering replacement parts from Tektronix.
3 and 4	Serial number	Column three indicates the serial number at which the part was first effective. Column four indicates the serial number at which the part was discontinued. No entries indicates the part is good for all serial numbers.
5	Qty	This indicates the quantity of parts used.
6	Name & description	An item name is separated from the description by a colon (:). Because of space limitations, an item name may sometimes appear as incomplete. Use the U.S. Federal Catalog handbook H6-1 for further item name identification.
7	Mfr. code	This indicates the code of the actual manufacturer of the part.
8	Mfr. part number	This indicates the actual manufacturer's or vendor's part number.

Abbreviations Abbreviations conform to American National Standard ANSI Y1.1–1972.

Chassis Parts Chassis-mounted parts and cable assemblies are located at the end of the Replaceable Electrical Parts List.

Mfr. Code to Manufacturer Cross Index

The table titled Manufacturers Cross Index shows codes, names, and addresses of manufacturers or vendors of components listed in the parts list.

Manufacturers cross index

Mfr. code	Manufacturer	Address	City, state, zip code
00779	AMP INC	2800 FULLING MILL PO BOX 3608	HARRISBURG PA 17105
26742	METHODE ELECTRONICS INC	7447 W WILSON AVE	CHICAGO IL 60656–4548
80009	TEKTRONIX INC	14150 SW KARL BRAUN DR PO BOX 500	BEAVERTON, OR 97077–0001

Replaceable mechanical parts list

Fig. & index number	Tektronix part number	Serial no. effective	Serial no. discont'd	Qty	Name & description	Mfr. code	Mfr. part number
					LOW-PROFILE PROBE ADAPTER		
1–0	010–0563–00			1	PROBE ADAPTER:R3051/52/81,PGA84 PIN,PROBE	80009	010056300
–3	671–2691–00			1	ADAPTER CIRCUIT BD ASSY:R3051/52/81	80009	671269100
–2	131–4356–00			2	CONN,HDR:PCB,;MALE,STR,1 X 2,0.98 CTR,295 (P1671,P1771)	00779	171825–2
–1	131–5267–00			2	CONN,HDR:PCB,;MALE,STR,2 X 40,0.1 CTR (SEE A01 REPL J1181,J1201,J1911,J1991)		
–5	131–4530–00			2	CONN,HDR:PCB,;MALE STR,1X3,0.1 CTR, (SEE A01 REPL J1671,J1771)		
–4	136–1181–00			1	SOCKET,PGA:PCB,;84 POS,12 X 12 MATREX,0.1 (A01 U2200 CUSTOMER SUPPLIED PART)	80009	136118100
					STANDARD ACCESSORIES		
	063–2740–00			1	SOFTWARE PACKAGE R3051/52/81 SUPPORT	80009	063139000
	070–9826–00			1	MANUAL,TECH:INSTRUCTION,R3051/52/81,DISSASEMBLER, TMS 420	80009	070–9826–00
	070–9803–00			1	MANUAL, TECH:TLA 700 SERIES MICRO SUPPORT INSTALLATION	80009	070–9803–00
					OPTIONAL ACCESSORIES		
	070–9802–00			1	MANUAL, TECH:BASIC OPS MICRO SUP ON DAS/TLA 500 SERIES LOGIC ANALYZERS	80009	070–9802–00

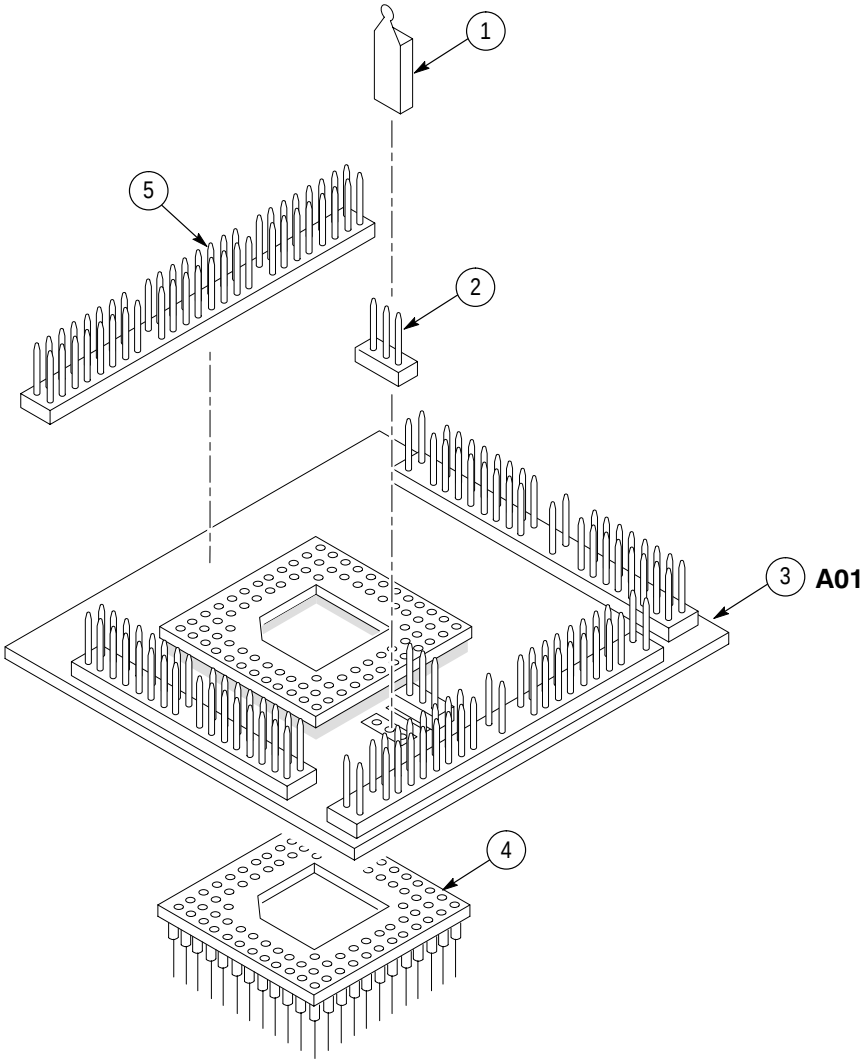


Figure 1: R3051, R3052 and R3081 probe adapter exploded view

Replaceable mechanical parts list

Fig. & index number	Tektronix part number	Serial no. effective	Serial no. discont'd	Qty	Name & description	Mfr. code	Mfr. part number
					CONVENTIONAL PROBE ADAPTER		
					OPTION 1S		
2–3	671–2791–00			1	CIRCUIT BD ASSY:R3051/52/81,PROBE ADAPTER	80009	671279100
–2	131–4530–00			2	CONN,HDR:PCB,;MALE,STR,1 X 3,0.1 CTR,0.230 (SEE REPL J1671,J1771)		
–1	131–4356–00			2	CONN,BOX:SHUNT/SHORTING,;FEMALE,1 X 2,0.1 (P1671,P1771)	80009	131435600
–4	131–5267–00			3	CONN,HDR:PCB,;MALE,STR,2 X 40,0.1 CTR (SEE REPL J1181,J1201,J1911,J1991)	80009	131526700
					STANDARD ACCESSORIES		
	070–8692–00			1	MANUAL TECH:INSTRUCT,92DM925,R3051/52/81	80009	070869200
					OPTIONAL ACCESSORIES		
	070–9802–00			1	MANUAL, TECH:BASIC OPS MICRO SUP ON DAS/TLA 500 SERIES LOGIC ANALYZERS	80009	070–9802–00
	161–0104–06			1	CA ASSY,PWR:3,1.0MM SQ,250V/10AMP,2.5 METER, RTANG,IEC320,RCPT, EUROPEAN,SAFETY CONTROLLED (OPT A1)	S3109	ORDER BY DESCRIPTION
	161–0104–07			1	CA ASSY,PWR:3,1.0MM SQ,240V/10AMP,2.5 METER, RTANG,IEC320,RCPT X 13A, FUSED, UK PLUG, (13A FUSE), UNITED KINGDOM,SAFETY CONTROL (OPT A2)	S3109	ORDER BY DESCRIPTION
	161–0104–05			1	CA ASSY,PWR:3,1.0MM SQ,250V/10AMP,2.5 METER, RTANG,IEC320,RCPT, AUSTRALIA,SAFETY CONTROLLED (OPT A3)	S3109	ORDER BY DESCRIPTION
	161–0167–00			1	CA ASSY,PWR:3,0.75MM SQ,250V/10AMP,2.5 METER, RTANG,IEC320,RCPT, SWISS,NO CORD GRIP, SAFETY CONTROLLED (OPT A5)	S3109	ORDER BY DESCRIPTION

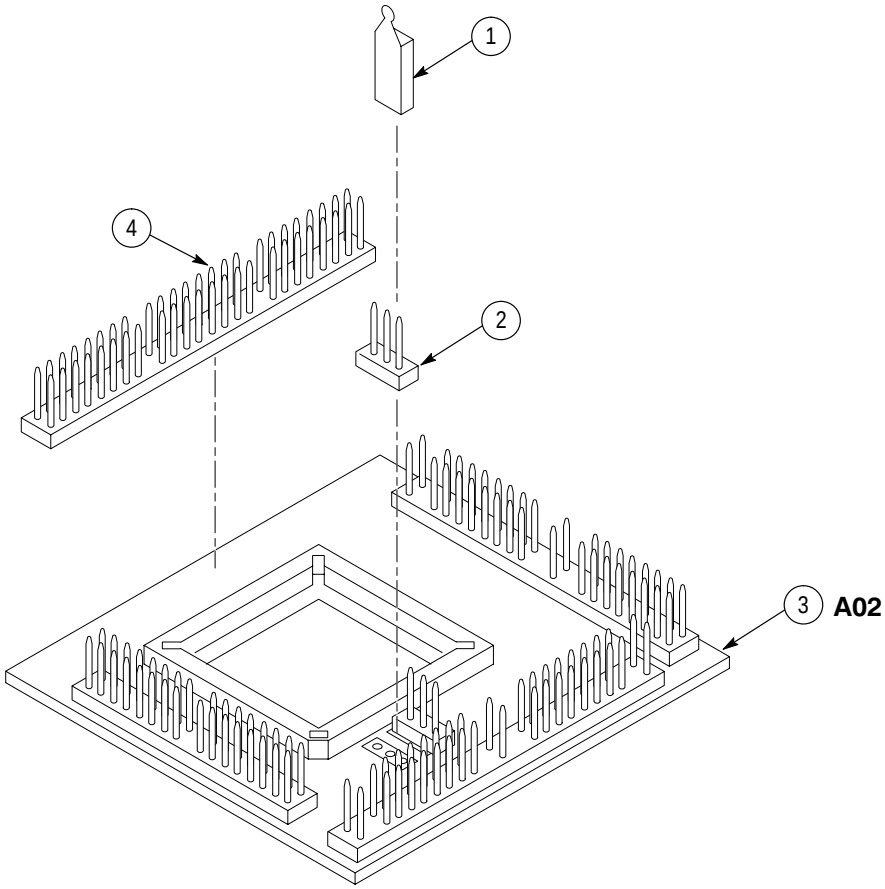


Figure 2: R3051, R3052 and R3081 probe adapter exploded view

Replaceable mechanical parts list

Fig. & index number	Tektronix part number	Serial no. effective	Serial no. discont'd	Qty	Name & description	Mfr. code	Mfr. part number
3–0	010– 0582–00			1	ADAPTER,PROBE:192–CHANNEL,HIGH DENSITY PROBE	80009	010058200
–1	380–1095–00			1	HOUSING,HALF:UPPER,192 CHANNEL HIGH DENSITY PROBE	80009	380109500
–2	211–0152–00			4	SCR,ASSEM WSHR:4–40 X 0.625,PNH,BRS,NP,POZ	TK0435	ORDER BY DESC
–3	131–5947–00			2	CONN BOX:CPCB, MICRO–STRIP;FEMALE,STR,100 POS,0.05 CTR,W/GRD PLANE,0.320 H X 0.124 TAIL, LATCHING, 4 ROW, 0.05 PCB, STAGGER (J150, J250)	80009	131594700
–4	671–3395–00			1	CKT BD ASSY:192–CHANNELS,HIGH DENSITY PROBE	80009	671339500
–5	380–1096–00			1	HOUSING,HALF:LOWER,192 CHANNEL HIGH DENSITY PROBE	80009	380109600
–6	348–0070–01			2	PAD,CUSHIONING:2.03 X 0.69 X 0.18 SI RBR	85471	ORDER BY DESC
–7	131–4917–00			8	CONN,HDR CPCB,;MALE,STR,1 X 2,0.1 CTR,0.235 MLF X 0.110 TAIL,20 BOLD, TUBE, HIGH TEMP (J300,J340J400,J440J500,J640,J600)	53387	131491700
–8	131–5267–00			5	CONN,HDR CPCB,;MALE,STR,2 X 40.O.1 CTR,0.234 MLG X 0.110 TAIL, 30 GOLD (J310,J320,J330,J340,J350,J360,J370,J410,J420,J430,J450,J460,J470,J510,J520,J530,J550,J560,J570,J610,J620,J630,J650,J660,J670)	53387	131526700

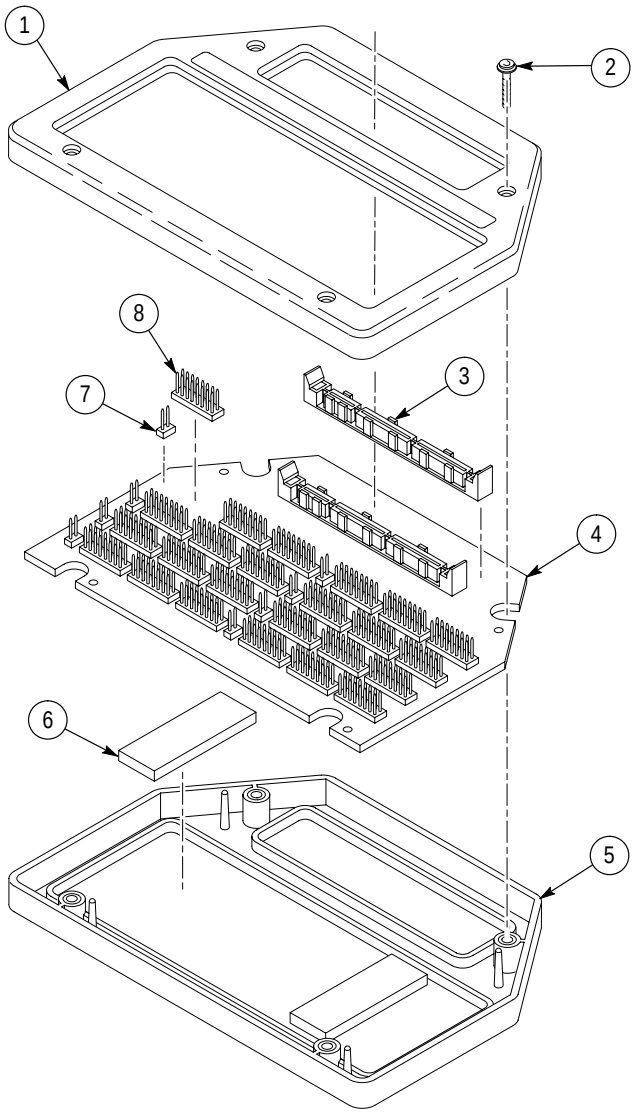


Figure 3: 192-Channel High-Density Probe exploded view

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