

Instruction Manual



TMS 201 68000 & 68010 Microprocessor Support 070-9819-00

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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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.

Do Not Operate Without Covers. Do not operate this product with covers or panels removed.

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 201 68000 and 68010 microprocessor support 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 supports on the logic analyzer for which the TMS 201 68000 and 68010 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 supports, 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 supports is included with each product. Each logic analyzer has basic information that describes how to perform tasks common to supports 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 68010A. This is the name of the microprocessor in field selections and file names you must use to operate the 68000 and 68010 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 68/102/136-channel or a 96-channel module.
- 68010A refers to all supported variations of the 68000 and 68010 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	<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>http://www.tek.com</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 information on the following topics:

- A description of the TMS 201 microprocessor support
- Logic analyzer software compatibility
- Your system under test requirements
- Support restrictions
- How to configure the probe adapter
- How to connect to the system under test (SUT)

Support Description

The TMS 201 microprocessor support disassembles data from systems that are based on the Motorola 68000 and 68010 microprocessor. The support runs on a compatible Tektronix logic analyzer equipped with a 68/102/136-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 201 microprocessor support.

Table 1–1 shows the microprocessors and packages from which the TMS 201 support can acquire and disassemble data.

Table 1–1: Supported microprocessors

Name	Package
68000	PGA, DIP, PLCC
68010	PGA, DIP, PLCC
68HC000	PGA, DIP, PLCC
68HC001	PGA, PLCC
68EC000	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 following:

- the *68000 Microprocessor User's Manual*, Motorola, Inc.
- the *MC68000 Family Reference Manual*, Motorola, Inc.

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 68000 and 68010 support, the Tektronix logic analyzer must be equipped with either a 68/102/136-channel module or a 96-channel module at a minimum. The module must be equipped with enough probes to acquire clock and channel data from signals in your 68000 and 68010-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 68000 and 68010 support requirements and restrictions.

System Clock Rate. The TMS 201 support can acquire data from the 68000 and 68010 microprocessors at speeds of up to 16.67 MHz¹.

68HC000 Microprocessor. The TMS 201 support can acquire data from the 68HC000 microprocessor operating in 16-bit mode.

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

Configuring the Probe Adapter

The probe adapter contains jumpers that need to be in certain positions for proper disassembly. Table 1–2 shows the jumper positions.

Table 1–2: Jumper positions

Function	Probe adapter type	Jumper #	Position
Disassembly Mode	DIP	J300	1–2
	PGA	J440 J230	1–2 1–2 (68HC001) 2–3 (all others)
	PLCC	J440	1–2
Timing Mode	DIP	J300	2–3
	PGA	J440 J230	2–3 1–2 (68HC001) 2–3 (all others)
	PLCC	J440	2–3

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 68/102/136-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.

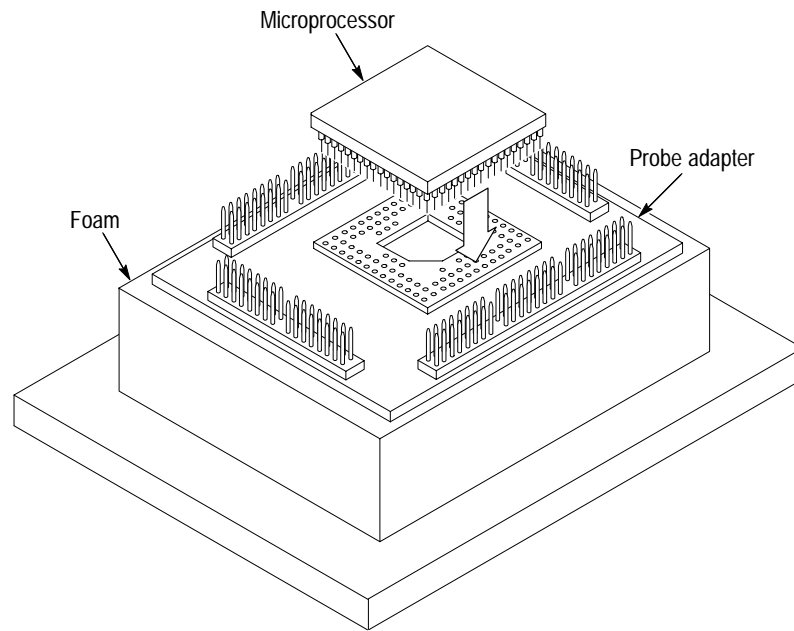


Figure 1-1: Placing a microprocessor into a PGA probe adapter

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.

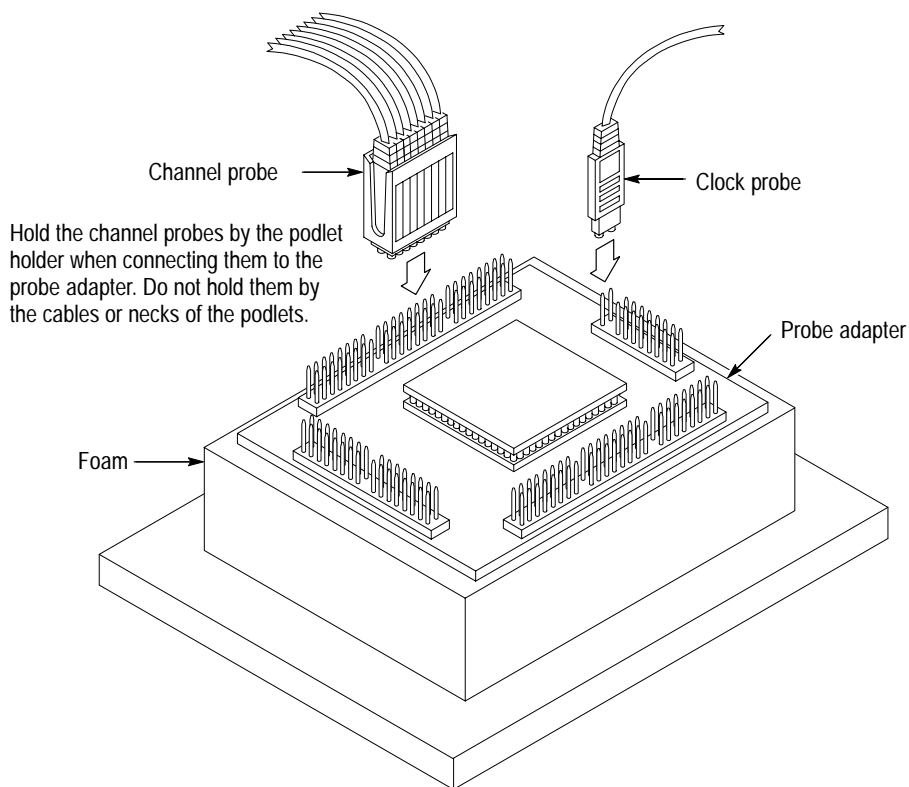


Figure 1-2: Connecting probes to a PGA probe adapter

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.

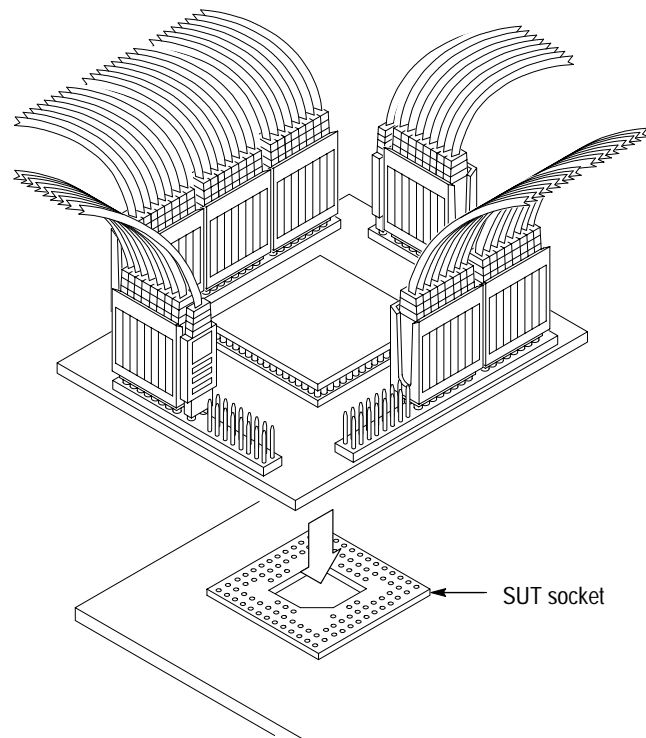


Figure 1-3: Placing a PGA probe adapter onto the SUT

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.

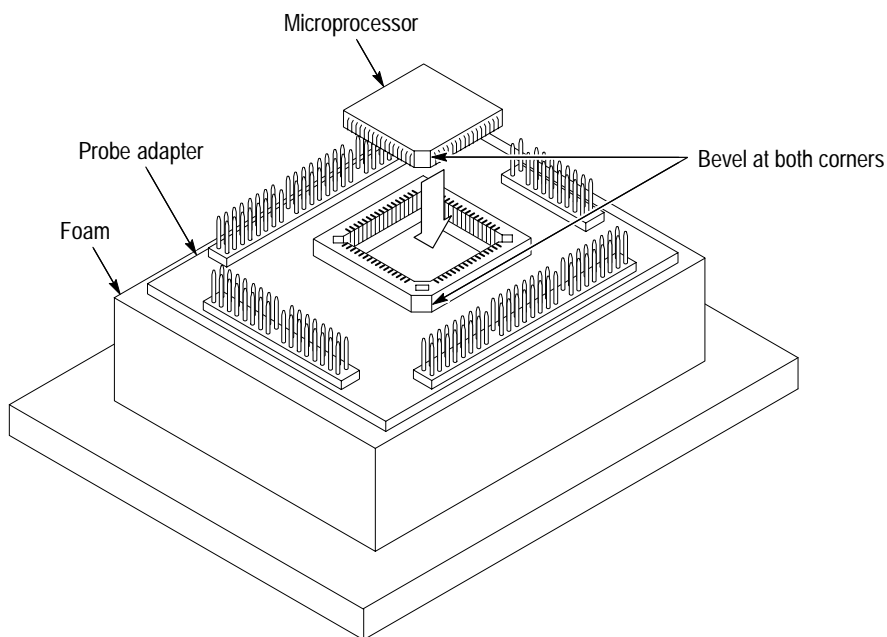


Figure 1–4: Placing a microprocessor into a PLCC probe adapter

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.

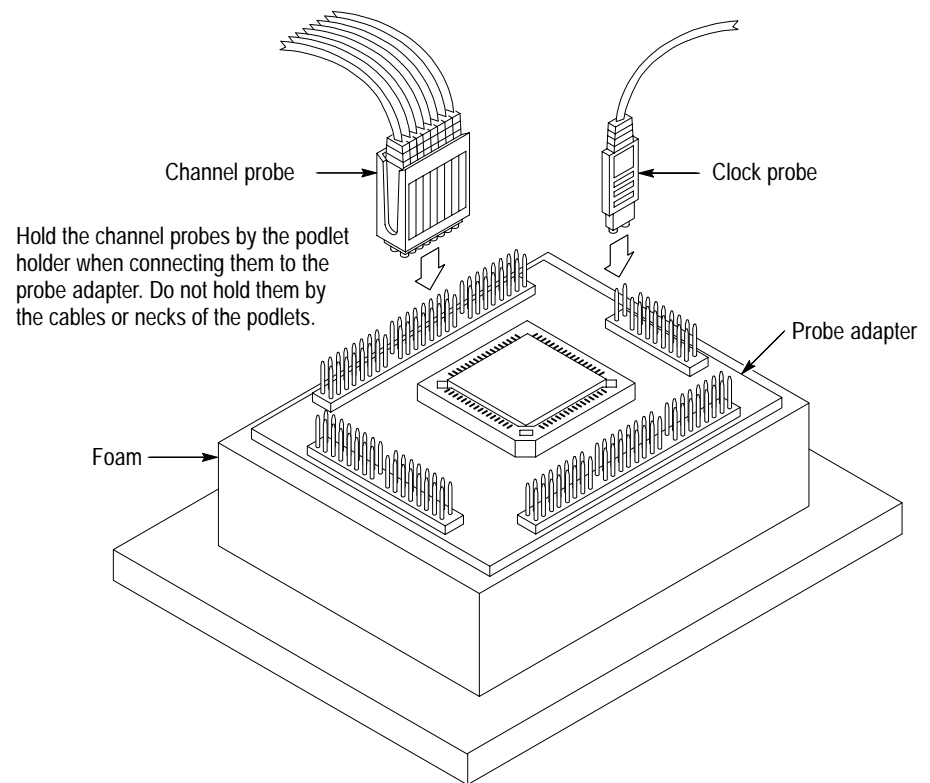


Figure 1-5: Connecting probes to a PLCC probe adapter

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

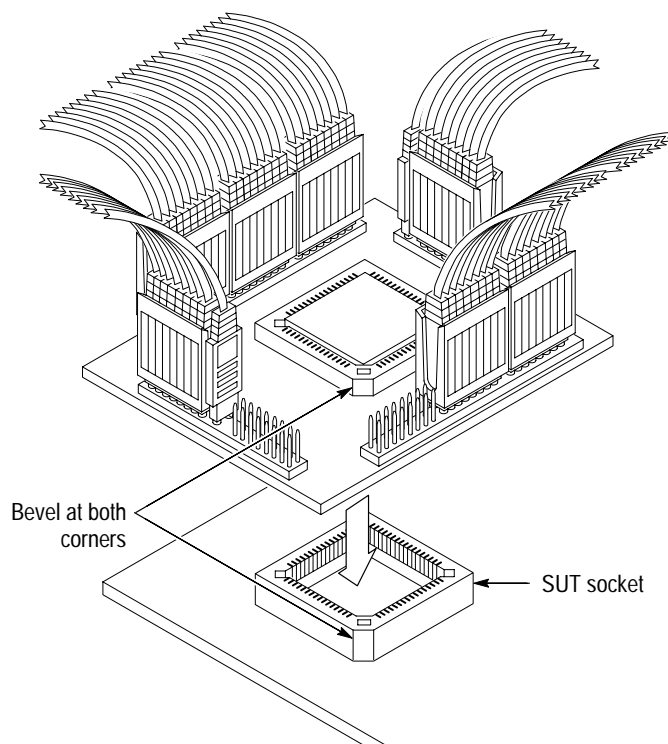


Figure 1-6: Placing a PLCC probe adapter onto the SUT

DIP Probe Adapter

To connect the logic analyzer to a SUT using a DIP 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 Figure 1-7. This prevents the circuit board from flexing and the socket pins from bending.
4. Remove the microprocessor from your SUT.

5. Line up pin 1 on the microprocessor with the pin 1 indicator on the probe adapter board.



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 1–7.

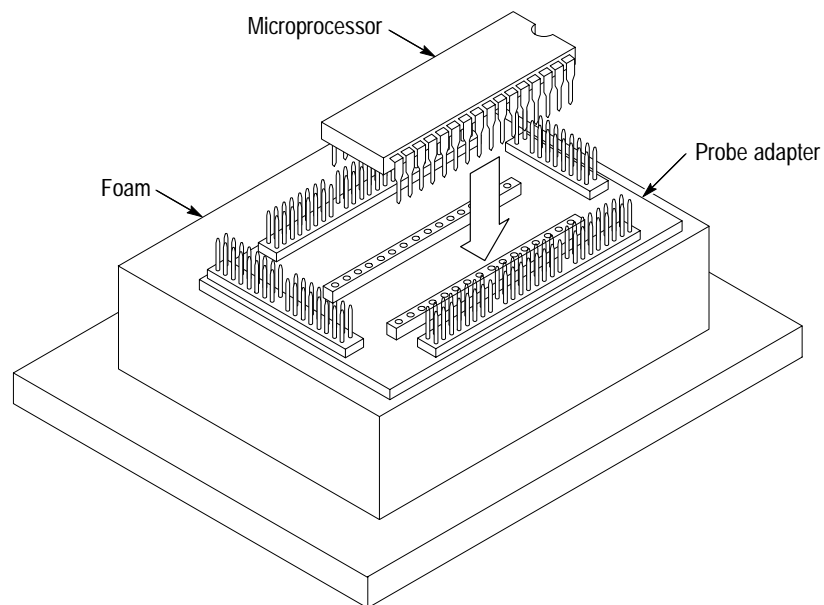


Figure 1–7: Placing a microprocessor into a DIP probe adapter

7. Connect the channel and clock probes to the probe adapter as shown in Figure 1–8. 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.

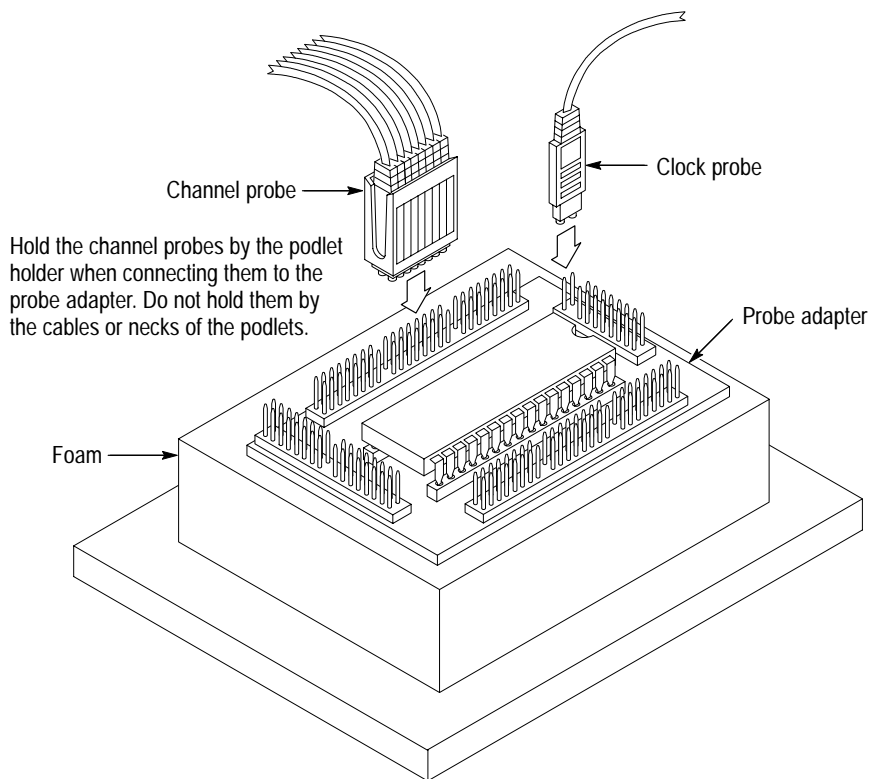


Figure 1-8: Connecting probes to a DIP probe adapter

8. Place the probe adapter onto the SUT as shown in Figure 1-9.

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.

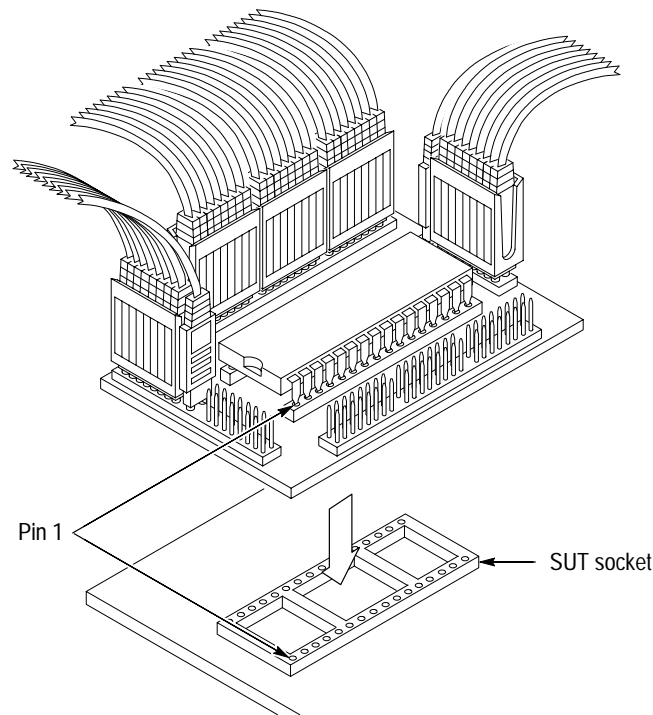


Figure 1–9: Placing a DIP probe adapter onto the SUT

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 68000 and 68010 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 1–3 to connect the channel probes to 68000 and 68010 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.

Table 1–3: 68000 and 68010 signal connections for channel probes

Section:channel	68000 and 68010 signal	Section:channel	68000 and 68010 signal
A2:7	A23	D1:7	D15
A2:6	A22	D1:6	D14
A2:5	A21	D1:5	D134
A2:4	A20	D1:4	D12
A2:3	A19	D1:3	D11
A2:2	A18	D1:2	D10
A2:1	A17	D1:1	D9
A2:0	A16	D1:0	D8
A1:7	A15	D0:7	D7
A1:6	A14	D0:6	D6
A1:5	A13	D0:5	D5
A1:4	A12	D0:4	D4
A1:3	A11	D0:3	D3
A1:2	A10	D0:2	D2
A1:1	A9	D0:1	D1
A1:0	A8	D0:0	D0
A0:7	A7	A3:7	BR~
A0:6	A6	A3:6	HALT~
A0:5	A5	A3:5	BERR~
A0:4	A4	A3:4	DTACK~
A0:3	A3	A3:3	BGACK_L~
A0:2	A2	A3:2	BG_L~
A0:1	A1	A3:1	AVEC_L~
A0:0	A0/UDS_BUF~*	A3:0	MODE_8_L~†

Table 1–3: 68000 and 68010 signal connections for channel probes (cont.)

Section:channel	68000 and 68010 signal	Section:channel	68000 and 68010 signal
C3:7	Not connected	C2:7	CLK_B
C3:6	VMA~	C2:6	FC2_L
C3:5	E†	C2:5	FC1_L
C3:4	VPA~†	C2:4	FC0_L
C3:3	IPL2_L~†	C2:3	AS_L~
C3:2	IPL1_L~†	C2:2	UDS_L~
C3:1	IPL0_L~†	C2:1	LDS_L~
C3:0	R/W_L~	C2:0	RESET_L~
C1:7-C1:0	Not connected	C0:7-C0:0	Not connected

* On the DIP probe adapter, the signal is UDS_BUF. On the PGA probe adapter, a jumper is used for the 68HC001 to select the A0 signal. On the PLCC probe adapter for the 68EC00, the signal is A0.

† Signal not required for disassembly.

Table 1–4 shows the clock probes and the 68000 and 68010 signal to which they must connect for disassembly to be correct.

Table 1–4: 68000 and 68010 signal connections for clock probes

Section:channel	68000 and 68010 signal
CK:3	Not Connected
CK:2	BGACK_L~
CK:1	BG_L~
CK:0	CLK

- Align pin 1 or A1 of your test clip with the corresponding pin 1 or A1 of the 68000 and 68010 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 201 68000 and 68010 support on any compatible Tektronix logic analyzer. 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 68000 and 68010 support are Address, Data, Control, Intr, and Misc. If you want to know which signal is in which group, refer to the channel assignment tables beginning on page 3–7.

Clocking Options

The TMS 201 support offers a microprocessor-specific clocking mode for the 68000 and 68010 microprocessors. This clocking mode is the default selection whenever you load the 68010A support.

A description of how cycles are sampled by the module using the TMS 201 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 201 support are: Probe Interface Type and DMA Cycles.

Probe Interface Type You can acquire data with or without using a TMS 201 probe adapter.

DMA Cycles A DMA Cycle (cycles when BG~ or BGACK~ is asserted) is defined as one in which the 68000 and 68010 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. The default selection is Excluded.

Symbols

The TMS 201 support supplies one symbol table file. The 68010A_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 68010A_Ctrl, the Control channel group symbol table.

Table 2–1: Control group symbol table definitions

Symbol	Control group value								Meaning
	UDS- LDS-	R/W- FC2	FC1	FC0	HALT- RESET-	DTACK- BG-	BR- BERR-	VMA- BGACK-	
SYSTEM_RESET	X X	X X X X			0 0 X X		X X X X		System Reset
PREFETCH?	0 0	1 X 1 0			X X X X		X 1 1 1		Read from program space
AUTOVECTOR	X X	1 1 1 1			X X X X		X X 0 X		Autovector interrupt acknowledge †
SPURIOUS_INT	X X	1 1 1 1			X X X X		X 0 X X		Spurious interrupt
INT_ACK	X 1	1 1 1 1			X X X X		X x X X		Interrupt acknowledge
DMA_READ	X X	1 X X X			X X X X		X X X 0		DMA read cycle
DMA_WRITE	X X	0 X X X			X X X X		X X X 0		DMA write cycle
DMA	X X	X X X X			X X X X		X X X 0		Any DMA cycle
INVALID_DMA	1 1	X X X X			X X X X		X X X 0		DMA cycle without valid address or data
RESET	X X	X X X X			X 0 X X		X X X X		Reset signal asserted
HALT	X X	X X X X			0 X X X		X X X X		Halt
BUS_REQUEST	X X	X X X X			X X X X		0 X X X		Bus request to the microprocessor
BUS_GRANT	X X	X X X X			X X X 0		X X X X		Bus grant from the microprocessor
BUS_ERROR	X X	X X X X			X X X X		X 0 X X		Bus error
BUS_ERR_RETRY	X X	X X X X			0 X X X		X 0 X X		Bus error with retry
VMA	X X	X X X X			X X X X		X X 0 X		A 68000 peripheral I/O cycle

Table 2-1: Control group symbol table definitions (cont.)

Symbol	Control group value								Meaning
	UDS- LDS-	RW- FC2	FC1	FC0	HALT- RESET- DTACK- BG-	BR- BERR- VMA- BGACK-			
DATA_SPACE_R	X X	1 X	0 1		X X X X	X X X X			Read from data space
DATA_SPACE_W	X X	0 X	0 1		X X X X	X X X X			Write to data space
SUPER_DATA	X X	X 1	0 1		X X X X	X X X X			Supervisor data space ‡
SUPER_PROG	X X	X 1	1 0		X X X X	X X X X			Supervisor program space ‡
READ	X X	1 X	X X		X X X X	X X X X			Word read
READ_L	X X	1 X	X X		X X X X	X X X X			Lower byte read
READ_U	X X	1 X	X X		X X X X	X X X X			Upper byte read
READ_ANY	X X	1 X	X X		X X X X	X X X X			Any word or byte read
WRITE	X X	0 X	X X		X X X X	X X X X			Word write
WRITE_L	X X	0 X	X X		X X X X	X X X X			Lower byte write
WRITE_U	X X	0 X	X X		X X X X	X X X X			Upper byte write
WRITE_ANY	X X	0 X	X X		X X X X	X X X X			Any word or byte write
SUPER_DATA	X X	X 1	0 1		X X X X	X X X X			Supervisor data space ‡
SUPER_PROG	X X	X 1	1 0		X X X X	X X X X			Supervisor program space ‡
SUPERVISOR	X X	X 1	X X		X X X X	X X X X			Supervisor mode ‡
USER_DATA	X X	X 0	0 1		X X X X	X X X X			User data space ‡
USER_PROG	X X	X 0	1 0		X X X X	X X X X			User program space ‡
USER	X X	X 0	X X		X X X X	X X X X			User mode
PROG_SPACE	X X	X X	1 0		X X X X	X X X X			Program space access ‡
DATA_SPACE	X X	X X	0 1		X X X X	X X X X			Data space access ‡
CPU_SPACE	X X	X 1	1 1		X X X X	X X X X			CPU space access

† For the 68EC000 only.

‡ For triggering purposes only; does not appear in the display.

Table 2–2 shows the name, bit pattern, and meaning for the symbols in the file 68010A_Intr, the Interrupt channel group symbol table.

Table 2–2: Interrupt group symbol table definitions

Symbol	Intr group value	Meaning
	IPL2 IPL1 IPL0	
IPL_0	1 1 1	No interrupt requested
IPL_1	1 1 0	Level 1 interrupt requested
IPL_2	1 0 1	Level 2 interrupt requested
IPL_3	1 0 0	Level 3 interrupt requested
IPL_4	0 1 1	Level 4 interrupt requested
IPL_5	0 1 0	Level 5 interrupt requested
IPL_6	0 0 1	Level 6 interrupt requested
NMI_7	0 0 0	Level 7 interrupt requested (NMI)

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:

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

Acquiring Data

Once you load the 68010A 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, whichever is available.

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 2–9.*

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
m	The instruction was manually marked as a program fetch
****	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.
(S) or (U)	Indicates the mode in which the microprocessor is operating, Supervisor or User

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
(ADDRESS ERROR: READ)	A read cycle with UDS~=1 and LDS~=1, which is undefined
(ADDRESS ERROR: WRITE)	A write cycle with UDS~=1 and LDS~=1, which is undefined
(BREAKPOINT)	R/W~=1, FC2–FC0=111, A23–A1=0
(BUS ERROR)	BERR~=0, HALT~=1
(BUS ERROR RETRY)	BERR~=0, HALT~=0
(DMA READ)	R/W~=1, BGACK~=0, UDS~=0, LDS~=0
(DMA WRITE)	R/W~=0, BGACK~=0, UDS~=0, LDS~=0
(DMA READ.L)	Only lower byte is valid (UDS~=1, LDS~=0)
(DMA WRITE.L)	Only lower byte is valid (UDS~=1, LDS~=0)
(DMA READ.U)	Only upper byte is valid (UDS~=0, LDS~=1)
(DMA WRITE.U)	Only upper byte is valid (UDS~=0, LDS~=1)
(EXTENSION)	Read extension for instruction
(FLUSH)	Instruction flushed from pipeline due to change in control flow
(HALT)	BERR~=1, HALT~=0
(* ILLEGAL *)	An illegal instruction was detected by the disassembler
(INTERRUPT ACK)	R/W~=1, FC2–FC0=111, A23–A4=11...1

Table 2-4: Cycle type definitions (cont.)

Cycle type	Definition
(READ)	Data read of a word (R/W~=1, UDS~=0, LDS~=0)
(READ.L)	Data read of the lower byte of a word (UDS~=1, LDS~=0)
(READ.U)	Data read of the upper byte of a word (UDS~=0, LDS~=1)
(READ RESERVED SPACE)	Read cycle that is not in user or supervisor space as determined by FC2-FC0
(READ.L RESERVED SPACE)	Only lower byte is valid (UDS~=1, LDS~=0)
(READ.U RESERVED SPACE)	Only upper byte is valid (UDS~=0, LDS~=1)
(RESET)	RESET~=0
(SPURIOUS INTERRUPT)	BERR~=0, HALT~=1, FC2-FC0=111, A23-A4=11...1)
(WRITE)	Data write of a word (R/W~=0, UDS~=0, LDS~=0)
(WRITE.L)	Data write of the lower byte of a word (UDS~=1, LDS~=0)
(WRITE.U)	Data write of the upper byte of a word (LDS~=0, UDS~=1)
(WRITE RESERVED SPACE)	Write cycle is not in user or supervisor space as determined by FC2-FC0
(WRITE.L RESERVED SPACE)	Only lower byte is valid (UDS~=1, LDS~=0)
(WRITE.U RESERVED SPACE)	Only upper byte is valid (UDS~=0, LDS~=1)
(?)	Unknown or bad cycle type

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

	1	2	3	4	5	6
	Sample	Address	Data	Mnemonics	Control	Timest>
T	0	FFFFFF		(-RESET-)	SYSTEM_RESET	
	1	000000	00C0	(RESET: INITIAL SSP)	PREFETCH?	221.8>
	2	000002	8000	(RESET: INITIAL SSP)	PREFETCH?	500 ns
	3	000004	0000	(RESET: INITIAL PC)	PREFETCH?	500 ns
	4	000006	0404	(RESET: INITIAL PC)	PREFETCH?	500 ns
	5	000404	6100	BSR 0022DA	PREFETCH?	500 ns
	6	000406	1ED4	(EXTENSION)	PREFETCH?	750 ns
	7	C07FFC	0000	(WRITE)	DATA_SPACE_WR	750 ns
	8	C07FFE	0408	(WRITE)	DATA_SPACE_WR	500 ns
	9	0022DA	7000	MOVEQ #00,DO	PREFETCH?	500 ns
	10	0022DC	207C	MOVEA.L #00C03000,A0	PREFETCH?	500 ns
	11	0022DE	00C0	(EXTENSION)	PREFETCH?	500 ns
	12	0022E0	3000	(EXTENSION)	PREFETCH?	500 ns
	13	0022E2	2080	MOVE.L DO,(A0)	PREFETCH?	500 ns
	14	0022E4	23C0	MOVE.L DO,800000	PREFETCH?	500 ns
	15	C03000	0000	(WRITE)	DATA_SPACE_WR	500 ns
	16	C03002	0000	(WRITE)	DATA_SPACE_WR	500 ns
	17	0022E6	0080	(EXTENSION)	PREFETCH?	500 ns
	18	0022E8	0000	(EXTENSION)	PREFETCH?	500 ns
	19	0022EA	4E75	RTS	PREFETCH?	500 ns
	20	800000	0000	(WRITE)	DATA_SPACE_WR	500 ns
	21	800002	0000	(WRITE)	DATA_SPACE_WR	500 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 68000 and 68010 Address bus.
- 3 **Data Group.** Lists data from channels connected to the 68000 and 68010 Data bus.
- 4 **Mnemonics Column.** Lists the disassembled instructions and cycle types.
- 5 **Control Group.** Lists data from channels connected to some 68000 and 68010 control signals that are defined in the Control channel group.
- 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 68000 and 68010 microprocessor are as follows:

BRA JMP

Instructions that might generate a change in the flow of control in the 68000 and 68010 microprocessor are as follows:

Bcc DBcc

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 68000 and 68010 microprocessor are as follows:

BRA JMP RTD RTR TRAP
BSR JSR RTE RTS

Instructions that might generate a subroutine call or a return in the 68000 and 68010 microprocessor are as follows:

Bcc DBcc

Changing How Data is Displayed

There are fields and features that allow you to further modify displayed data to suit your needs. You can make selections unique to the 68000 and 68010 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 display selections for disassembled data to help you analyze the data. You can make these selections in the Disassembly property page (the Disassembly Format Definition overlay).

In addition to the common display options (described in the information on basic operations), you can change the displayed data in the following ways:

- Mark cycles
- Select the microprocessor

- Specify the starting address of the vector base register

Processor. You can select the type of 68000 or 68010 microprocessor to acquire and disassemble data from.

Vector Base. If your SUT has had its vector table relocated, you must use this field to inform the disassembler of the new base address. If the value in the Vector Base field is incorrect, the disassembler will not interpret interrupts or exceptions correctly.

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)
- Extension (a subsequent word of an instruction)
- Flush (an opcode or extension that is fetched but not executed)
- Read (marks a memory reference read as data)

Mark selections are as follows:

OPCODE
Extension
Flush
Read

Undo marks

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 68000 and 68010 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 68000 and 68010 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 68000 and 68010 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 system under test.

The standard DIP probe adapter accommodates the Motorola 68000 microprocessor in a 64-pin DIP package. The PGA probe adapter accommodates the 68000 in a 68-pin PGA package. The PLCC probe adapter accommodates the 68000 in a 68-pin PLCC package.

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 68/102/136-channel module, one podlet load is 20 k Ω in parallel with 2 pF. For the 96-channel module, one podlet load is 100 k Ω in parallel with 10 pF.

Table 3–1: Electrical specifications

Characteristics	Requirements	
SUT DC power requirements		
Voltage	4.75-5.25 VDC	
Current	40-65 mA	
SUT clock		
Clock rate	4-16.67 MHz	
	Specification	
Minimum setup time required	Probe adapter	68000 @ 16.67 MHz
Address	-----	5 ns
Data	-----	5 ns
Control (latched)	-----	2 ns
All other signals	-----	5 ns
Minimum hold time required		
Address	-----	5 ns
Data	-----	0 ns
Control (latched)	-----	6 ns
All other signals	-----	0 ns
Measured typical SUT signal loading	AC load	DC load
Address	10–15 pF+podlet	(1) podlet
Data	10–15 pF+podlet	(1) podlet
CLK0	10–15 pF+podlet	(1) 74AS1004 + podlet
Latched control signals	10–15 pF	(1) 74FCT652AS0
All other signals	10–15 pF+podlet	(1) podlet

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° C 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 68000 and 68010 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 68000 DIP probe adapter. Information on basic operations shows the vertical clearance of the channel and clock probes when connected to a probe adapter.

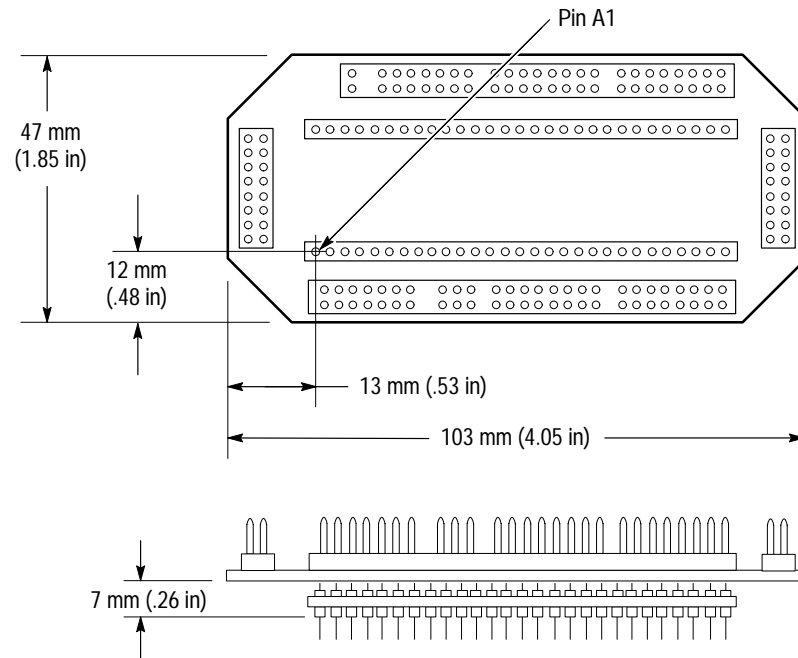


Figure 3–1: Dimensions of the 68000 DIP probe adapter

Figure 3–2 shows the dimensions of the 68000 PGA probe adapter. Information on basic operations shows the vertical clearance of the channel and clock probes when connected to a probe adapter.

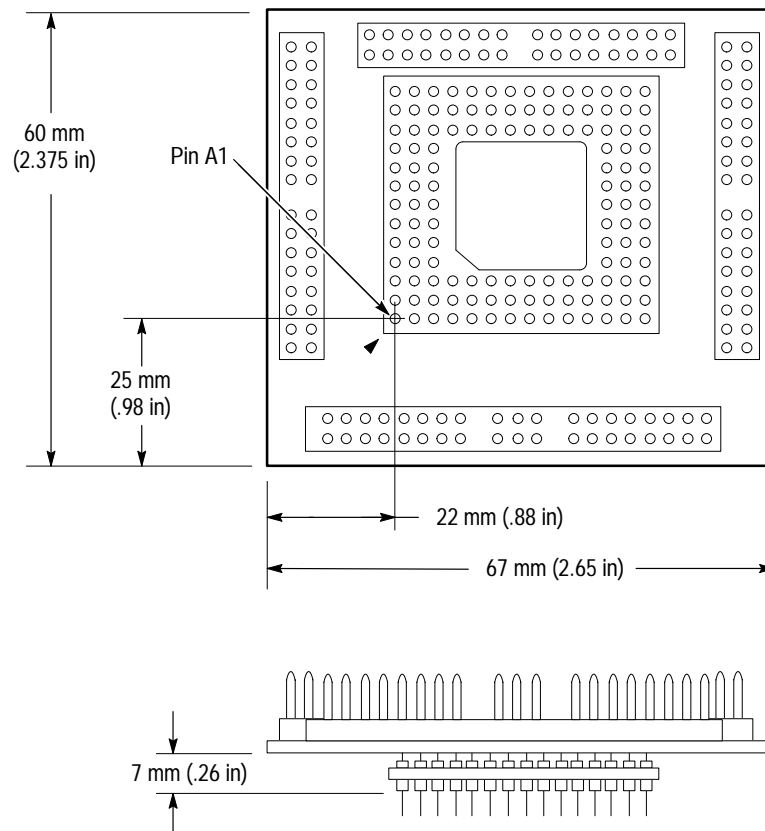


Figure 3-2: Dimensions of the 68000 PGA probe adapter

Figure 3-3 shows the dimensions of the 68EC000 PLCC probe adapter. Information on basic operations shows the vertical clearance of the channel and clock probes when connected to a probe adapter.

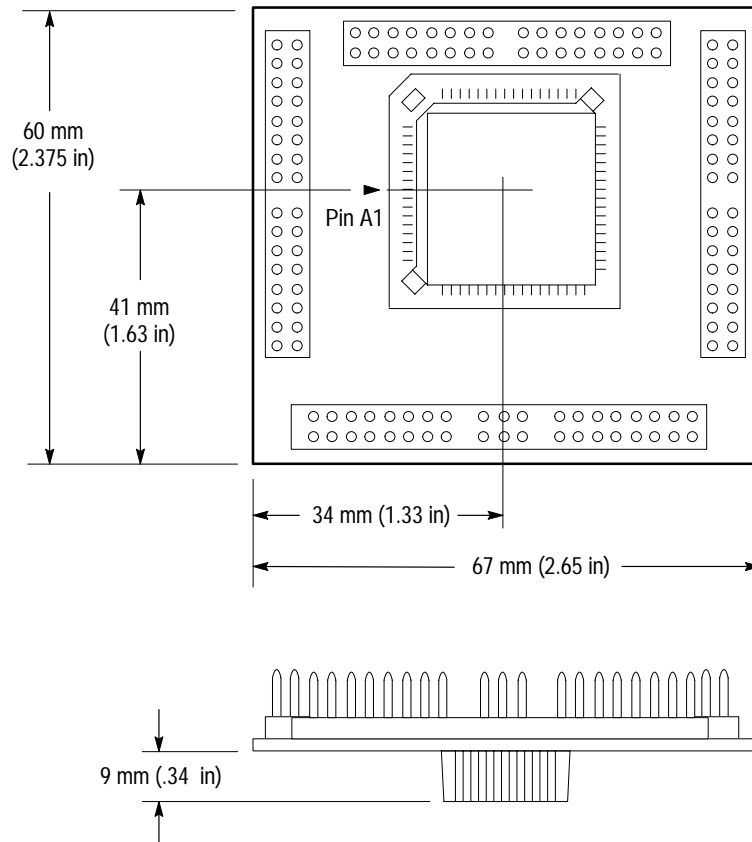


Figure 3-3: Dimensions of the 68EC000 PLCC probe adapter

Figure 3-4 shows the dimensions of the 68000, 68010, 68HC000, and 68HC001 PLCC probe adapter. Information on basic operations shows the vertical clearance of the channel and clock probes when connected to a probe adapter.

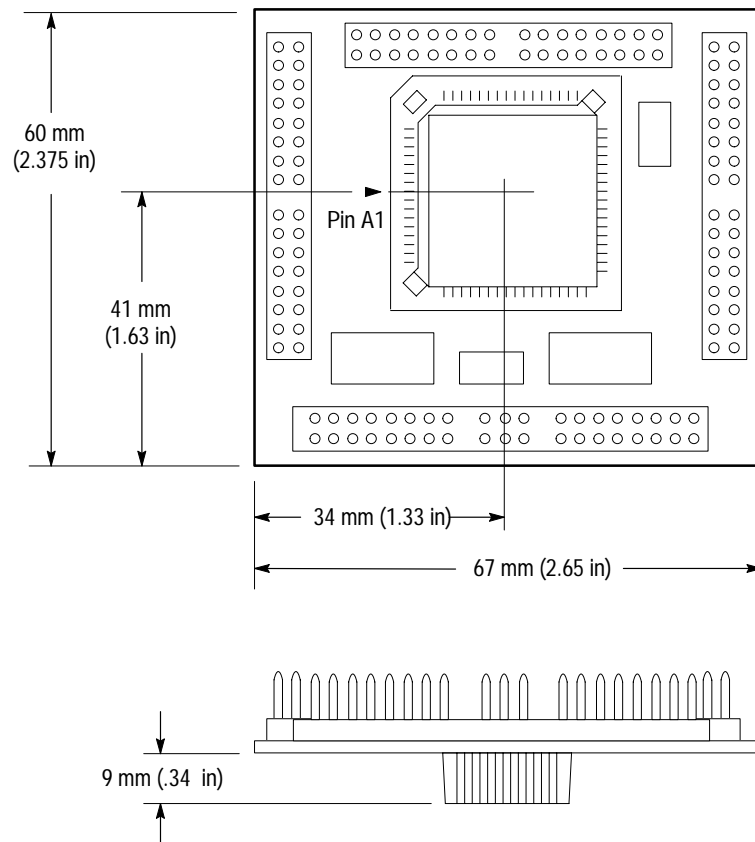


Figure 3-4: Dimensions of the 68000/010/HC000/HC001 PLCC probe adapter

Channel Assignments

Channel assignments shown in Table 3-4 through Table 3-9 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).
- A tilde (~) following a signal name indicates an active low signal.
- An equals sign (=) following a signal name indicates that it is double probed.

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	68000 and 68010 signal name
23	A2:7	A23
22	A2:6	A22
21	A2:5	A21
20	A2:4	A20
19	A2:3	A19
18	A2:2	A18
17	A2:1	A17
16	A2:0	A16
15	A1:7	A15
14	A1:6	A14
13	A1:5	A13
12	A1:4	A12
11	A1:3	A11
10	A1:2	A10
9	A1:1	A9
8	A1:0	A8
7	A0:7	A7
6	A0:6	A6
5	A0:5	A5
4	A0:4	A4
3	A0:3	A3
2	A0:2	A2
1	A0:1	A1
0	A0:0	A0/UDS_BUF~*

* On the DIP probe adapter, the signal is UDS_BUF. On the PGA probe adapter, a jumper is used for the 68HC001 to select the A0 signal. On the PLCC probe adapter for the 68EC00, the signal is A0.

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.

Table 3–5: Data group channel assignments

Bit order	Section:channel	68000 and 68010 signal name
15	D1:7	D15
14	D1:6	D14
13	D1:5	D13
12	D1:4	D12
11	D1:3	D11
10	D1:2	D10
9	D1:1	D9
8	D1:0	D8
7	D0:7	D7
6	D0:6	D6
5	D0:5	D5
4	D0:4	D4
3	D0:3	D3
2	D0:2	D2
1	D0:1	D1
0	D0:0	D0

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	68000 and 68010 signal name
13	C2:2	UDS_L~
12	C2:1	LDS_L~
11	C3:0	R/W~
10	C2:6	FC2_L
9	C52:	FC1_L
8	C24:	FC0_L
7	A3:6	HALT~

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

Bit order	Section:channel	68000 and 68010 signal name
6	C2:0	RESET_L~
5	A3:4	DTACK~
4	A3:2	BG_L~
3	A3:7	BR~
2	A3:5	BERR~
1	C3:6	VMA~
0	A3:3	BGACK_L~

Table 3–7 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 displayed symbolically.

Table 3–7: Intr group channel assignments

Bit order	Section:channel	68000 and 68010 signal name
2	C3:3	IPL2_L~*
1	C3:2	IPL1_L~*
0	C3:1	IPL0_L~*

* Signal not required for disassembly.

Table 3–8 shows the probe section and channel assignments for the Misc group and the microprocessor signal to which each channel connects. By default, this channel group is not visible.

Table 3–8: Misc group channel assignments

Bit order	Section:channel	68000 and 68010 signal name
5	A3:1	AVEC_L~
4	C3:4	VPA_L~*
3	C3:5	E*
2	A3:0	MODE_8_L~*
1	C2:7	CLK_B
0	C2:3	AS_L~

* Signal not required for disassembly.

Table 3–9 shows the probe section and channel assignments for the clock probes (not part of any group) and the 68000 and 68010 signal to which each channel connects.

Table 3–9: Clock channel assignments

Section:channel	68000 and 68010 signal name
CK:3	Not connected
CK:2	BGACK_L~
CK:1	BG_L~
CK:0	CLK

These channels are used only to clock in data; they are not acquired or displayed. To acquire data from any of the signals shown in Table 3–9, you must connect another channel probe to the signal, a technique called double probing. An equals sign (=) following a signal name indicates that it is already double probed.

How Data is Acquired

This section explains how the module acquires 68000 and 68010 signals using the TMS 201 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.

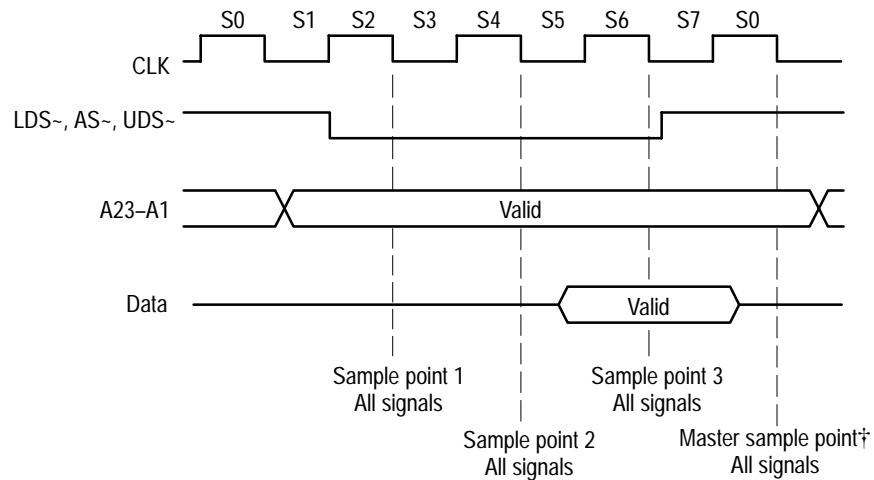
Custom Clocking

A special clocking program is loaded to the module every time you load the 68010A 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 68000 and 68010 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 3–5 shows the sample points and the Master sample point.



†Channels not set up in a channel group by the TMS 201 software are logged with the Master sample.

Figure 3-5: 68000 and 68010 bus timing

Clocking Options

The clocking algorithm for the 68000 and 68010 support has two variations: DMA Cycles Excluded, and DMA Cycles Included.

DMA Cycles Excluded. DMA cycles are not acquired.

DMA Cycles Included. The DMA Cycles Included works the same as Normal clocking with either the BG~ or BGACK~ signal being asserted for the entire duration the DMA device is in charge of the bus.

There are three possible 68000 and 68010 system designs and clocking interactions when an alternate bus master has control of the bus. The three different possibilities are listed below :

- If the alternate bus master drives the same control lines as the 68000 and 68010 microprocessor, and the microprocessor “sees” these signals, the bus activity is logged in like for normal bus cycles.
- If none of the control lines are driven or if the 68000 and 68010 microprocessor can not see them, the module will not acquire DMA cycles.
- If some of the 68000 and 68010 microprocessor control lines are visible (but not all), the module logs in what it determines is valid from the control signals and logs in the Address and Data signals whether valid or not.

Alternate Microprocessor Connections

You can connect to microprocessor signals that are not required by the support so that you can do more advanced timing analysis.

For a list of signals required or not required for disassembly, refer to the channel assignment tables beginning on page 3–7. 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 On the Probe Adapter

All 68000 and 68010 microprocessor signals are accessible on the probe adapter.

Extra Channels

Table 3–10 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.

Table 3–10: Extra module sections and channels

Module	Section: channels
68-channels	C3:7, C3:6-4*
102-channels	C3:7, C3:6-4*, C1:7-0, C0:7-0, D3:7-0, D2:7-0
136-channels	C3:7, C3:6-4*, C1:7-0, C0:7-0, D3:7-0, D2:7-0, E3:7-0, E2:7-0, E1:7-0, E0:7-0
96-channels	C3:7, C3:6-4*, C1:7-0, C0:7-0, D3:7-0, D2:7-0

* Extra channels only for the 68EC000 PLCC probe adapter.

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 section contains probe adapter circuit descriptions.

Probe Adapter Circuit Descriptions

The DIP 68000 probe adapter allows the Address, Data, HALT~, BERR~, BR~, and DTACK~ signals through without being buffered. All other signals go through 74FCT652ATS, which are transceivers that can be operated in two modes selected by J300: Latched (marked D for disassembly) or Transparent (marked T).

The PGA 68000 probe adapter supports both standard 68000 microprocessors and the 68HC001. Because the latter can operate in 8-bit mode (using the separate A0 signal), you must use J230 to indicate that you are using the 68HC001.

The PLCC 68EC000 probe adapter supports only the 68EC000, and operates in the same manner as the DIP 68000 probe adapter.

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 201 68000 and 68010 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.

Manufacturers cross index

Mfr. code	Manufacturer	Address	City, state, zip code
TK0875	MATSUO ELECTRONICS INC	831 S DOUBLAS ST	EL SEGUNDO CA 92641
0TJ19	QUALITY SEMICONDUCTOR INC	851 MARTIN AVENUE	SANTA CLARA CA 95050-2903
00779	AMP INC	2800 FULLING MILL PO BOX 3608	HARRISBURG PA 17105
01295	TEXAS INSTRUMENTS INC SEMICONDUCTOR GROUP	13500 N CENTRAL EXPY PO BOX 655303	DALLAS TX 75262-5303
04222	AVX CERAMICS DIV OF AVX CORP	19TH AVE SOUTH P O BOX 867	MYRTLE BEACH SC 29577
50139	ALLEN-BRADLEY CO ELECTRONIC COMPONENTS	1414 ALLEN BRADLEY DR	EL PASO TX 79936
63058	MCKENZIE TECHNOLOGY	44370 OLD WARMS SPRINGS BLVD	FREMONT CA 94538
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. discount'd	Name & description	Mfr. code	Mfr. part number
A01	671-2349-00			CIRCUIT BD ASSY:68000,DIP68,SOCKETED;	80009	671234900
A02	671-2350-00			CIRCUIT BD ASSY:68000,PGA68,SOCKETED;	80009	671235000
A03	671-2351-00			CIRCUIT BD ASSY:68EC000,PLCC68,SOCKETED;	80009	671235100
A04	671-2993-00			CIRCUIT BD ASSY:68000/010/HC000/HC001 PROBE	80009	671299300

Replaceable electrical parts list

Component number	Tektronix part number	Serial no. effective	Serial no. discontinued	Name & description	Mfr. code	Mfr. part number
A01	671-2349-00			CIRCUIT BD ASSY:68000,DIP68,SOCKETED;	80009	671234900
A01C230	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	04222	12063C104KAT3A
A01C232	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	04222	12063C104KAT3A
A01C240	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	04222	12063C104KAT3A
A01C250	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	04222	12063C104KAT3A
A01J130	131-5267-00			CONN,HDR:PCB,;MALE,STR,2 X 40,0.1 CTR,0.235	80009	131526700
A01J210	131-5267-00			CONN,HDR:PCB,;MALE,STR,2 X 40,0.1 CTR,0.235	80009	131526700
A01J250	131-5267-00			CONN,HDR:PCB,;MALE,STR,2 X 40,0.1 CTR,0.235	80009	131526700
A01J300	131-4530-00			CONN,HDR:PCB,;MALE,STR,1 X 3,0.1 CTR,0.230 MLG X 0.120 TAIL,30 GOLD,BD RETENTION	00779	104344-1
A01J330	131-5267-00			CONN,HDR:PCB,;MALE,STR,2 X 40,0.1 CTR,0.235	80009	131526700
A01P300	----			CONN,BOX:SHUNT/SHORTING,;FEMALE,1 X 2,0.1 CTR,0.630 H,BLK,W/HANDLE,JUMPER (SEE RMPL FIG. 1)		
A01U230	156-5178-00			IC,DIGITAL:ASTTL,GATE;HEX INV DRIVER	01295	SN74AS1004AD
A01U240	156-6176-00			IC,DIGITAL:FCTCMOS,TRANSCEIVER;OCTAL,NON-INV,3-STATE	0TJ19	QS74FCT652ASO
A01U250	156-6176-00			IC,DIGITAL:FCTCMOS,TRANSCEIVER;OCTAL,NON-INV,3-STATE	0TJ19	QS74FCT652ASO

Replaceable electrical parts list

Component number	Tektronix part number	Serial no. effective	Serial no. discont'd	Name & description	Mfr. code	Mfr. part number
A02	671-2350-00			CIRCUIT BD ASSY:68000,PGA68,SOCKETED;	80009	671235000
A02C210	290-5005-00			CAP,FXD,TANT:47UF,10%,10V,SMD,T&R	TK0875	267M-1002-476-K
A02C220	283-5004-00			CAP,FXD,CERAMIC:MLC:0.1UF,10%,25V,X7R,1206	04222	12063C104KAT3A
A02C223	283-5004-00			CAP,FXD,CERAMIC:MLC:0.1UF,10%,25V,X7R,1206	04222	12063C104KAT3A
A02C310	283-5004-00			CAP,FXD,CERAMIC:MLC:0.1UF,10%,25V,X7R,1206	04222	12063C104KAT3A
A02C320	283-5004-00			CAP,FXD,CERAMIC:MLC:0.1UF,10%,25V,X7R,1206	04222	12063C104KAT3A
A02C330	283-5004-00			CAP,FXD,CERAMIC:MLC:0.1UF,10%,25V,X7R,1206	04222	12063C104KAT3A
A02J120	131-5267-00			CONN,HDR:PCB,;MALE,STR,2 X 40,0.1 CTR,0.235	80009	131526700
A02J200	131-5267-00			CONN,HDR:PCB,;MALE,STR,2 X 40,0.1 CTR,0.235	80009	131526700
A02J230	131-4530-00			CONN,HDR:PCB,;MALE,STR,1 X 3,0.1 CTR,0.230 MLG X 0.120 TAIL,30 GOLD,BD RETENTION	00779	104344-1
A02J240	131-5267-00			CONN,HDR:PCB,;MALE,STR,2 X 40,0.1 CTR,0.235	80009	131526700
A02J420	131-5267-00			CONN,HDR:PCB,;MALE,STR,2 X 40,0.1 CTR,0.235	80009	131526700
A02J440	131-4530-00			CONN,HDR:PCB,;MALE,STR,1 X 3,0.1 CTR,0.230 MLG X 0.120 TAIL,30 GOLD,BD RETENTION	00779	104344-1
A02P230	-----			CONN,BOX:SHUNT/SHORTING,;FEMALE,1 X 2,0.1 CTR,0.630 H,BLK,W/HANDLE,JUMPER (SEE RMPL FIG.2)		
A02P440	-----			CONN,BOX:SHUNT/SHORTING,;FEMALE,1 X 2,0.1 CTR,0.630 H,BLK,W/HANDLE,JUMPER (SEE RMPL FIG.2)		
A02R330	321-5030-00			RES,FXD:THICK FILM;10.0K OHM,1%,0.125W, TC=100 PPM	50139	BCK1002FT
A02U310	156-6176-00			IC,DIGITAL:FCTCMOS,TRANSCEIVER;OCTAL,NON-INV,3-STATE	0TJ19	QS74FCT652ASO
A02U320	156-5178-00			IC,DIGITAL:ASTTL,GATE;HEX INV DRIVER	01295	SN74AS1004AD
A02U330	156-6176-00			IC,DIGITAL:FCTCMOS,TRANSCEIVER;OCTAL,NON-INV,3-STATE	0TJ19	QS74FCT652ASO

Replaceable electrical parts list

Component number	Tektronix part number	Serial no. effective	Serial no. discont'd	Name & description	Mfr. code	Mfr. part number
A03	671-2351-00			CIRCUIT BD ASSY:68EC000,PLCC68,SOCKETED;	80009	671235100
A03C205	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	04222	12063C104KAT3A
A03C305	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	04222	12063C104KAT3A
A03C325	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	04222	12063C104KAT3A
A03C335	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	04222	12063C104KAT3A
A03J120	131-5267-00			CONN,HDR:PCB,;MALE,STR,2 X 40,0.1 CTR,0.235	80009	131526700
A03J200	131-5267-00			CONN,HDR:PCB,;MALE,STR,2 X 40,0.1 CTR,0.235	80009	131526700
A03J240	131-5267-00			CONN,HDR:PCB,;MALE,STR,2 X 40,0.1 CTR,0.235	80009	131526700
A03J420	131-5267-00			CONN,HDR:PCB,;MALE,STR,2 X 40,0.1 CTR,0.235	80009	131526700
A03J440	131-4530-00			CONN,HDR:PCB,;MALE,STR,1 X 3,0.1 CTR,0.230 MLG X 0.120 TAIL,30 GOLD,BD RETENTION	00779	104344-1
A02P440	----			CONN,BOX:SHUNT/SHORTING,;FEMALE,1 X 2,0.1 CTR,0.630 H,BLK,W/HANDLE,JUMPER (SEE RMPL FIG.3)		
A03R335	321-5030-00			RES,FXD:THICK FILM;10.0K OHM,1%,0.125W, TC=100 PPM	50139	BCK1002FT
A03U310	156-6176-00			IC,DIGITAL:FCTCMOS,TRANSCEIVER;OCTAL,NON-INV,3-STATE	0TJ19	QS74FCT652ASO
A03U320	156-5178-00			IC,DIGITAL:ASTTL,GATE;HEX INV DRIVER	01295	SN74AS1004AD
A03U330	156-6176-00			IC,DIGITAL:FCTCMOS,TRANSCEIVER;OCTAL,NON-INV,3-STATE	0TJ19	QS74FCT652ASO

Replaceable electrical parts list

Component number	Tektronix part number	Serial no. effective	Serial no. discont'd	Name & description	Mfr. code	Mfr. part number
A04	671-2993-00			CIRCUIT BD ASSY:68000/010/HC000/HC001 PROBE	80009	671299300
A04C110	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	04222	12063C104KAT3A
A04C130	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	04222	12063C104KAT3A
A04C310	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	04222	12063C104KAT3A
A04C320	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	04222	12063C104KAT3A
A04C330	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	04222	12063C104KAT3A
A04J120	131-5267-00			CONN,HDR:PCB,;MALE,STR,2 X 40,0.1 CTR,0.235	80009	131526700
A04J200	131-5267-00			CONN,HDR:PCB,;MALE,STR,2 X 40,0.1 CTR,0.235	80009	131526700
A04J230	131-4530-00			CONN,HDR:PCB,;MALE,STR,1 X 3,0.1 CTR,0.230 MLG X 0.120 TAIL,30 GOLD,BD RETENTION	00779	104344-1
A04J240	131-5267-00			CONN,HDR:PCB,;MALE,STR,2 X 40,0.1 CTR,0.235	80009	131526700
A04J420	131-5267-00			CONN,HDR:PCB,;MALE,STR,2 X 40,0.1 CTR,0.235	80009	131526700
A04J440	131-4530-00			CONN,HDR:PCB,;MALE,STR,1 X 3,0.1 CTR,0.230 MLG X 0.120 TAIL,30 GOLD,BD RETENTION	00779	104344-1
A04J2220	131-5443-00			CONN,ADPT:SMD,PLCC;MALE,STR,68 POS,0.05 CTR,0.268H, PLCC MALE TOSMD PADS	63058	ADP68PLCC-SM
A04P230	----			CONN,BOX:SHUNT/SHORTING,;FEMALE,1 X 2,0.1 CTR,0.630 H,BLK,W/HANDLE,JUMPER (SEE RMPL FIG. 4)		
A04P440	----			CONN,BOX:SHUNT/SHORTING,;FEMALE,1 X 2,0.1 CTR,0.630 H,BLK,W/HANDLE,JUMPER (SEE RMPL FIG. 4)		
A04R335	321-5030-00			RES,FXD:THICK FILM;10.0K OHM,1%,0.125W, TC=100 PPM	50139	BCK1002FT
A04U310	156-6176-00			IC,DIGITAL:FCTCMOS,TRANSCEIVER;OCTAL,NON-INV,3-STATE	0TJ19	QS74FCT652ASO
A04U320	156-5178-00			IC,DIGITAL:ASTTL,GATE;HEX INV DRIVER	01295	SN74AS1004AD
A04U330	156-6176-00			IC,DIGITAL:FCTCMOS,TRANSCEIVER;OCTAL,NON-INV,3-STATE	0TJ19	QS74FCT652ASO

Replaceable Mechanical Parts

This chapter contains a list of the replaceable mechanical components for the TMS 201 68000 and 68010 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
TK2358	EMULATION TECHNOLOGY INC	2368B WALSH AVE, BLDG D	SANTA CLARA CA 95051
00779	AMP INC	2800 FULLING MILL PO BOX 3608	HARRISBURG PA 17105
05276	ITT POMONA ELECTRONICS DIV	1500 E 9TH ST PO BOX 2767	POMONA CA 91766-3835
26742	METHODE ELECTRONICS INC	7447 W WILSON AVE	CHICAGO IL 60656-4548
63058	MCKENZIE TECHNOLOGY	44370 OLD WARMS SPRINGS BLVD	FREMONT CA 94538
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
1-0	010-0533-00			1	PROBE, ADAPTER:68000 SUPPORT, DIP68, SOCKETED (68000/010/HC000)	80009	010053300
-1	671-2349-00			1	CIRCUIT BD ASSY:68000, DIP68, SOCKETED;	80009	671234900
-2	136-1062-00			2	SOCKET, DIP:PCB,; FEMALE, STR, 2 X 32, 0.1 X 0.9 CTR, 0.170 H X 0.275 TAIL, GOLD/GOLD, PHOS BRONZ, ACCOM 0.015-0.026 LEAD (U220)	63058	DIP-964-115B
-3	-----			2	CONN, HDR:PCB,; MALE, STR, 2 X 40, 0.1 CTR, 0.235 MLG X 0.110 TAIL, 30GOLD (SEE REPL SEE A01 AOE J130, J210, J250, J330)		
-4	-----			1	CONN, HDR:PCB,; MALE, STR, 1 X 3, 0.1 CTR, 0.230 MLG X 0.120 TAIL, 30 GOLD, BD RETENTION (SEE REPL A01 J300)		
-5	131-4356-00			1	CONN, BOX:SHUNT/SHORTING,; FEMALE, 1 X 2, 0.1 CTR, 0.630 H, BLK, W/HANDLE, JUMPER (P300)	26742	9618-302-50
-6	131-1062-00			1	SOCKET, DIP; PCB, FEMALE, STR, 2 X3 2, 0.1 X 0.9 CTR, 0.170 H X 0.275 TAIL, GOLD/GOLD, PHOS BRONZE, AC COM 0.015-0.026 LEAD	80009	131-1062-00
					STANDARD ACCESSORIES		
	070-9819-00			1	MANUAL, TECH:INSTRUCTION, 68000, DISSASSEMBLER, TMS 201	80009	070-9819-00
	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
	103-0296-00			1	ADAPTER, CONN:68000/10 68 PIN PGA TO 68 PIN PLCC	TK2358	AS-II-220-TEK
	013-0250-00			1	ADAPTER, TEST:68 PIN PLCC ADAPTER, CONN:68000/10 68	05276	E11886
	103-0297-00			1	PIN PLCC TO 68 PIN PGA ADAPTER, CONN:6800/10 68 PIN	TK2358	AS-II-221-TEK
	103-0312-00			1	PGA TO 68 PIN PLCC (USED WITH 013-0250-00 FORMING A PGA TO PLCC TESTCLIP)	TK2358	AC-PGA2-PCC680

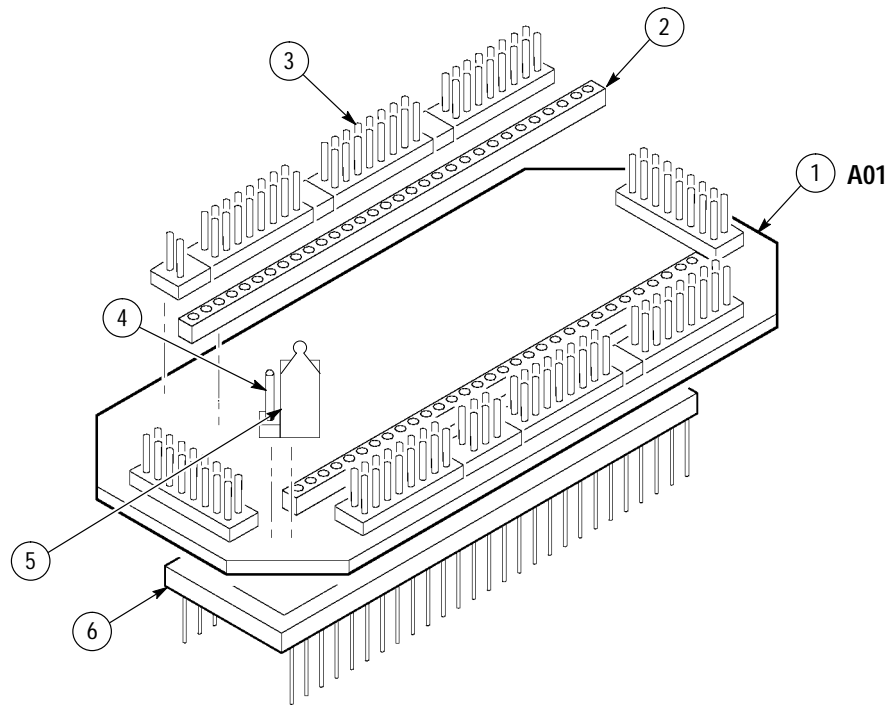


Figure 1: 68000 DIP probe adapter exploded view

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
2-0	010-0534-00			1	PROBE, ADAPTER:68000 SUPPORT, SUB PGA68, SOCKETED(68000/010/HC000/HC001);	80009	010053400
-1	671-2350-00			1	CIRCUIT BD ASSY:68000, PGA68, SOCKETED;	80009	671235000
-2	-----			2	CONN, HDR:PCB,; MALE, STR, 1 X 3, 0.1 CTR, 0.230 MLG X 0.120 TAIL, 30 GOLD, BD RETENTION (SEE REPL J230, J440)		
-3	131-4356-00			2	CONN, BOX:SHUNT/SHORTING,; FEMALE, 1 X 2, 0.1 CTR, 0.630 H, BLK, W/HANDLE, JUMPER (P230, P440)	26742	9618-302-50
-4	136-0924-00			2	SOCKET, PGA::PCB, MOT 68000:68 POS, 10 X 10, 0. 1 CTR, 0.170 H X 0.275 TAIL, OPEN CTR, SYMMETRICAL, PAT 1005, HIGH TEMP, GOLD/GOLD (U220)	63058	PGA 68H115B1-10
-5	-----			2	CONN, HDR:PCB,; MALE, STR, 2 X 40, 0.1 CTR, 0.235 MLG X 0.110 TAIL, 30GOLD (SEE REPL J120, J200, J240, J420)		
					STANDARD ACCESSORIES		
	070-9819-00			1	MANUAL, TECH:INSTRUCTION, 68000, DISSASSEMBLER, TMS 201	80009	070-9819-00
	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
	103-0296-00			1	ADAPTER, CONN:68000/10 68 PIN PGA TO 68 PIN PLCC	TK2358	AS-II-220-TEK
	013-0250-00			1	ADAPTER, TEST:68 PIN PLCC ADAPTER, CONN:68000/10 68	05276	E11886
	103-0297-00			1	PIN PLCC TO 68 PIN PGA ADAPTER, CONN:6800/10 68 PIN	TK2358	AS-II-221-TEK
	103-0312-00			1	PGA TO 68 PIN PLCC (USED WITH 013-0250-00 FORMING A PGA TO PLCC TESTCLIP)	TK2358	AC-PGA2-PCC680

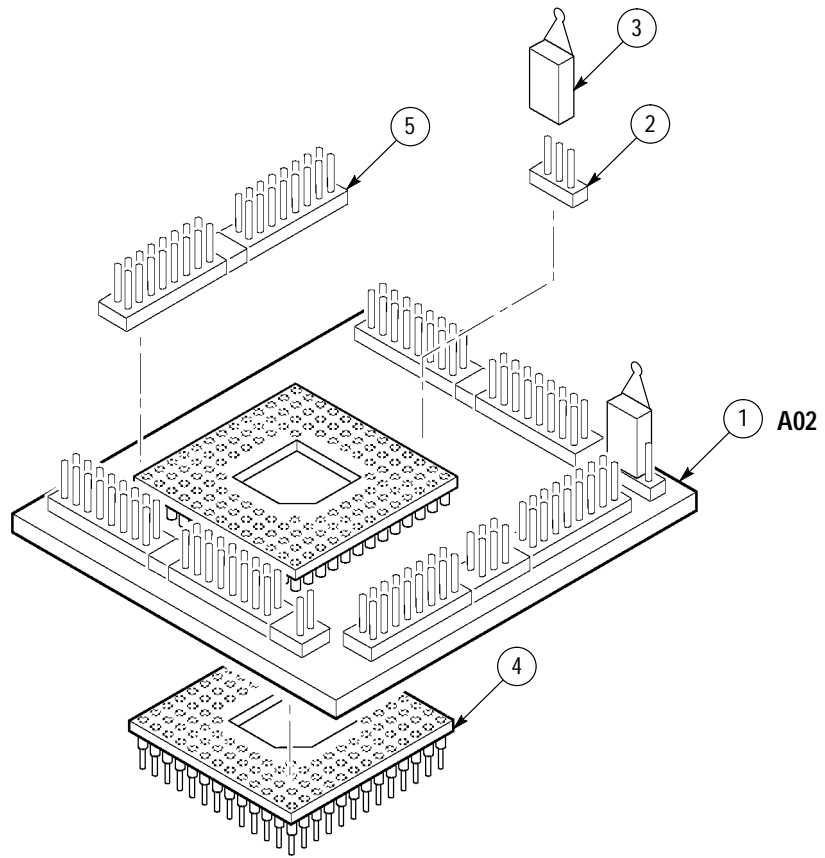


Figure 2: 68000 PGA probe adapter exploded view

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
3-1	671-2351-00			1	CIRCUIT BD ASSY:68EC000,PLCC68,SOCKETED;	80009	671235100
-2	-----			1	CONN,HDR:PCB,;MALE,STR,1 X 3,0.1 CTR,0.230 MLG X 0.120 TAIL,30 GOLD,BD RETENTION (SEE REPL J440)		
-3	131-4356-00			1	CONN,BOX:SHUNT/SHORTING,;FEMALE,1 X 2,0.1 CTR,0.630 H,BLK,W/HANDLE,JUMPER (P440)	26742	9618-302-50
-4	-----			2	CONN,HDR:PCB,;MALE,STR,2 X 40,0.1 CTR,0.235 MLG X 0.110 TAIL,30GOLD (SEE REPL J120,J200,J240,J420)		
STANDARD ACCESSORIES							
	070-9819-00			1	MANUAL,TECH:INSTRUCTION,68000,DISSASSEMBLER, TMS 201	80009	070-9819-00
	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
	103-0296-00			1	ADAPTER,CONN:68000/10 68 PIN PGA TO 68 PIN PLCC	TK2358	AS-II-220-TEK
	013-0250-00			1	ADAPTER,TEST:68 PIN PLCC ADAPTER,CONN:68000/10 68	05276	E11886
	103-0297-00			1	PIN PLCC TO 68 PIN PGA ADAPTER,CONN:6800/10 68 PIN	TK2358	AS-II-221-TEK
	103-0312-00			1	PGA TO 68 PIN PLCC (USED WITH 013-0250-00 FORMING A PGA TO PLCC TESTCLIP)	TK2358	AC-PGA2-PCC680

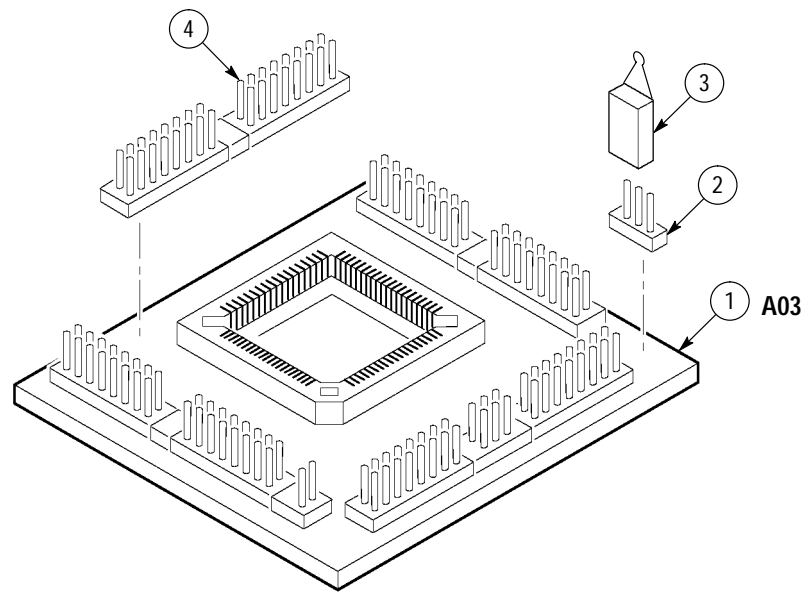


Figure 3: 68EC000 PLCC probe adapter exploded view

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
4-1	671-2993-00			1	CIRCUIT BD ASSY:68000/010/HC000/HC001 PROBE ADAPTER,PLCC68 SOCKETED;	80009	671299300
-2	-----			2	CONN,HDR:PCB,;MALE,STR,1 X 3,0.1 CTR,0.230 MLG X 0.120 TAIL,30 GOLD,BD RETENTION (SEE REPL A04 J230,J440)		
-3	131-4356-00			2	CONN,BOX:SHUNT/SHORTING,;FEMALE,1 X 2,0.1 CTR,0.630 H,BLK,W/HANDLE,JUMPER (P230,P440)	26742	9618-302-50
-4	-----			2	CONN,HDR:PCB,;MALE,STR,2 X 40,0.1 CTR,0.235 MLG X 0.110 TAIL,30GOLD (SEE REPL A04 J120,J200,J240,J420)		
STANDARD ACCESSORIES							
	070-9819-00			1	MANUAL,TECH:INSTRUCTION,68000,DISSASSEMBLER, TMS 201	80009	070-9819-00
	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
	103-0296-00			1	ADAPTER,CONN:68000/10 68 PIN PGA TO 68 PIN PLCC	TK2358	AS-II-220-TEK
	013-0250-00			1	ADAPTER,TEST:68 PIN PLCC ADAPTER,CONN:68000/10 68	05276	E11886
	103-0297-00			1	PIN PLCC TO 68 PIN PGA ADAPTER,CONN:6800/10 68 PIN	TK2358	AS-II-221-TEK
	103-0312-00			1	PGA TO 68 PIN PLCC (USED WITH 013-0250-00 FORMING A PGA TO PLCC TESTCLIP)	TK2358	AC-PGA2-PCC680

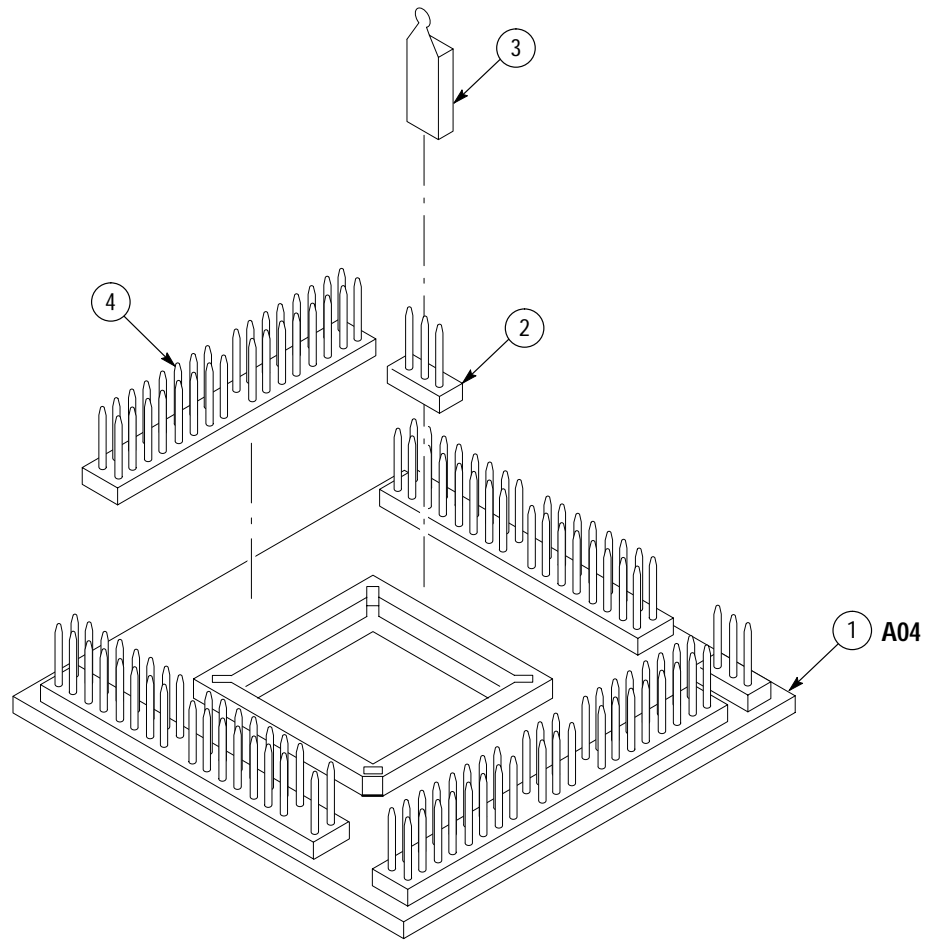


Figure 4: 68000/010/HC000/HC001 PLCC probe adapter exploded view

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