Instruction Manual

Tektronix

**TMS 801
APIC Bus Support**

070-9834-00

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 warrants that the media on which this software product is furnished and the encoding of the programs on the media will be free from defects in materials and workmanship for a period of three (3) months from the date of shipment. If a medium or encoding proves defective during the warranty period, Tektronix will provide a replacement in exchange for the defective medium. Except as to the media on which this software product is furnished, this software product is provided "as is" without warranty of any kind, either express or implied. Tektronix does not warrant that the functions contained in this software product will meet Customer's requirements or that the operation of the programs will be uninterrupted or error-free.

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In order to obtain service under this warranty, Customer must notify Tektronix of the defect before the expiration of the warranty period and make suitable arrangements for the performance of service. Customer shall be responsible for packaging and shipping the defective product to the service center designated by Tektronix, with shipping charges prepaid. Tektronix shall pay for the return of the product to Customer if the shipment is to a location within the country in which the Tektronix service center is located. Customer shall be responsible for paying all shipping charges, duties, taxes, and any other charges for products returned to any other locations.

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

Use Proper Power Cord. Use only the power cord specified for this product and certified for the country of use.

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.

Use Proper AC Adapter. Use only the AC adapter specified for this product.

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

Use Proper Fuse. Use only the fuse type and rating specified for this product.

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 801 APIC bus 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 bus supports on the logic analyzer for which the TMS 801 APIC 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 bus 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 bus 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

- The TMS 801 APIC 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 bus supports user manual.

- In the information on basic operations, the term XXX or P54C used in field selections and file names can be replaced with APIC. This is the name of the bus in field selections and file names you must use to operate the APIC support.

- The term system under test (SUT) refers to the bus-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, a 96-channel, or a module.

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 user manual 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:

- The TMS 801 APIC bus support

- Logic analyzer software compatibility

- Your APIC system requirements

- APIC support restrictions

- How to connect to the system under test (SUT)

- How to apply power to and remove power from the probe adapter

Support Description

The TMS 801 bus support disassembles data from systems that are based on the Intel APIC bus. 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 801 bus support.

You can also use this product with another Tektronix probe adapter designed for a microprocessor that follows the APIC bus protocol. Examples are the TMS 109 Pentium\100, or the TMS 110 Pentium Pro microprocessor supports.

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 *APIC External Architecture Specifications, Intel*,Version 4.0 Intel.

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

Logic Analyzer Software Compatibility

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

Logic Analyzer Configuration

To use the APIC support, the Tektronix logic analyzer must be equipped with at least a 102/136-channel module or a 96-channel module. The module must be equipped with enough probes to acquire channel and clock data from signals in your APIC-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 bus 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 APIC support requirements and restrictions.

System Clock Rate. The bus support can acquire data from the APIC bus at speeds of up to 33 MHz[1].

APIC Bus Interface Cables

The TMS 801 APIC Bus support product comes with three cables for different methods of connecting to the system under test. The connection procedures in this chapter inform you when to use which cable. Refer to Table 1–1 to determine which cable to use for your application.

Table 1–1: APIC interface cables used with microprocessor probe adapters

APIC Bus interface cable	Microprocessor probe adapter
Flying Lead with four barrel connectors	Connects directly to the SUT
174-3485-XX	TMS 109
174-3484-XX	TMS 110

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[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 bus 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. Your probes will look different if you are using a 96-channel module.

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

TMS 801 provides the following connection methods for probing the APIC bus:

- Connecting directly to the SUT

- Connecting to the SUT using a microprocessor probe adapter

- Connecting to the SUT using a microprocessor probe adapter and an 192-channel High-Density Probe.

Connecting Directly to the SUT

To connect the logic analyzer directly to the SUT, 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 probe adapter, the podlets, 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 bus 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. Connect the flying lead APIC bus interface cable to the probe adapter as shown in Figure 1–1.
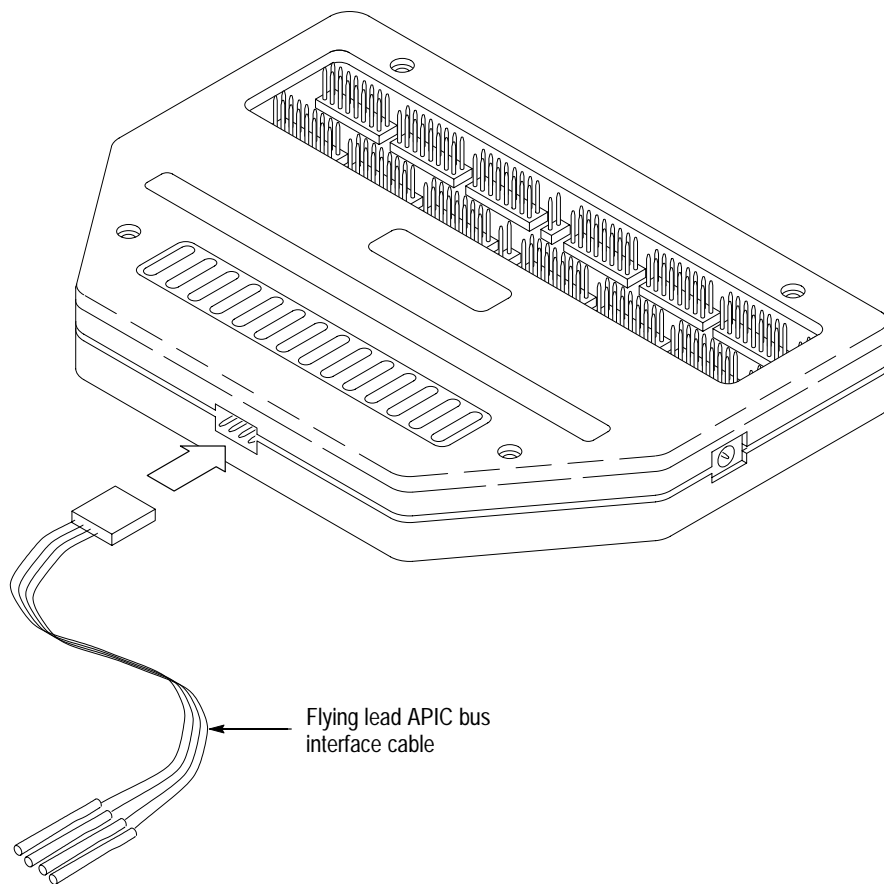
Figure 1–1: Connecting the flying lead interface APIC bus cable

4. Connect the clock and 8-channel 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.
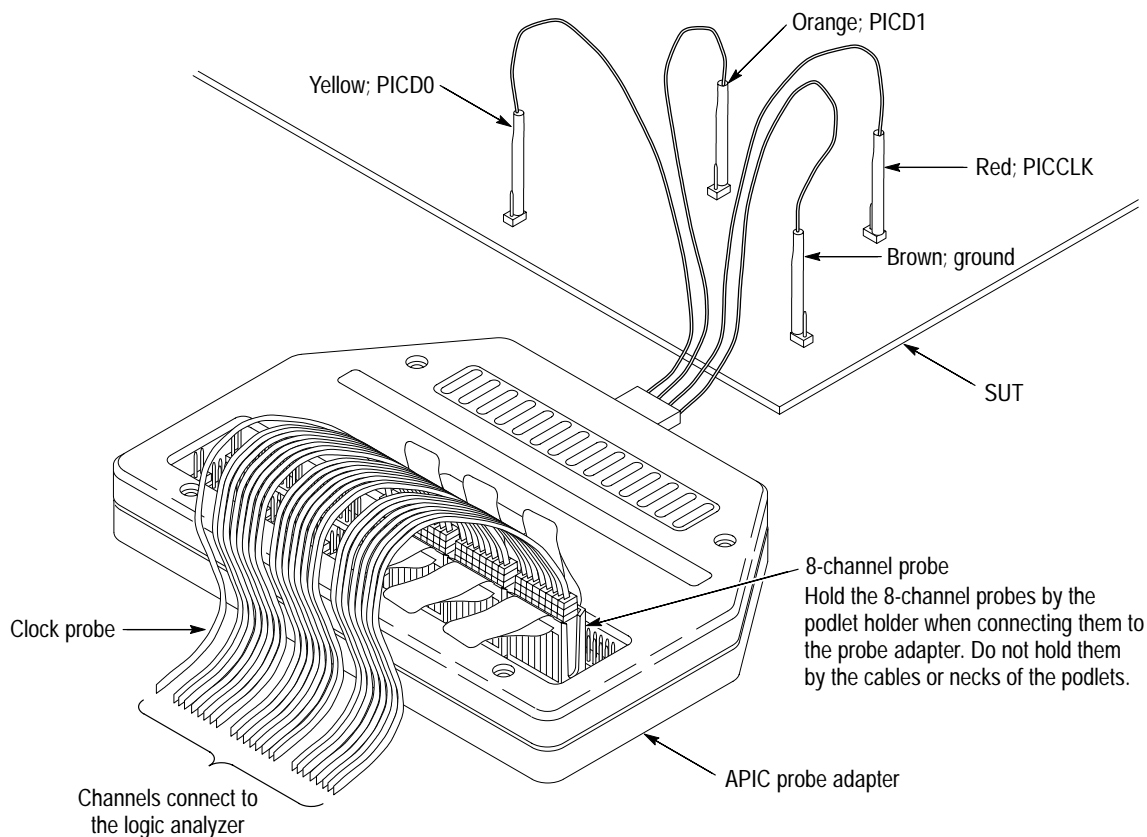
Figure 1–2: Direct connection to the SUT

5. Connect the leads on the APIC bus interface cable to the SUT as shown in Figure 1–2. The color codes for connecting the interface cables to the proper signal are located on the top of the probe adapter case.

NOTE. If your SUT does not have pin connections for the interface cables, you can use KlipChip connectors to connect to appropriate IC pins. Refer to the Replaceable Mechanical Parts List *chapter for part number information.*

Connecting to the SUT Using a Microprocessor Probe Adapter

You can connect to the SUT using a microprocessor probe adapter that is designed to support a microprocessor the follows the APIC bus protocol. To connect the logic analyzer to the SUT using a microprocessor 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 probe adapters, the podlets, 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 bus 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 each probe adapter to discharge stored static electricity from the probe adapters.

3. Connect the clock and 8-channel probes to the APIC probe adapter as shown in Figure 1–3. Match the channel groups and numbers on the probe cables to the corresponding pins on the probe adapter.

4. Connect the appropriate prewired cable to the APIC probe adapter as shown in Figure 1–3. Refer to Table 1–1 on page 1–2 for the appropriate cable.

5. Connect the other end of the cable to the microprocessor probe adapter's HI_D0 group of square pins.

6. If the probe adapter has a Timing/Disassembly jumper, position it in the Timing position (pins 2 and 3).

7. Align the pin A1 indicator on the microprocessor probe adapter board with the pin A1 indicator on the microprocessor.

8. Place the microprocessor probe adapter onto your SUT as shown in Figure 1–3.
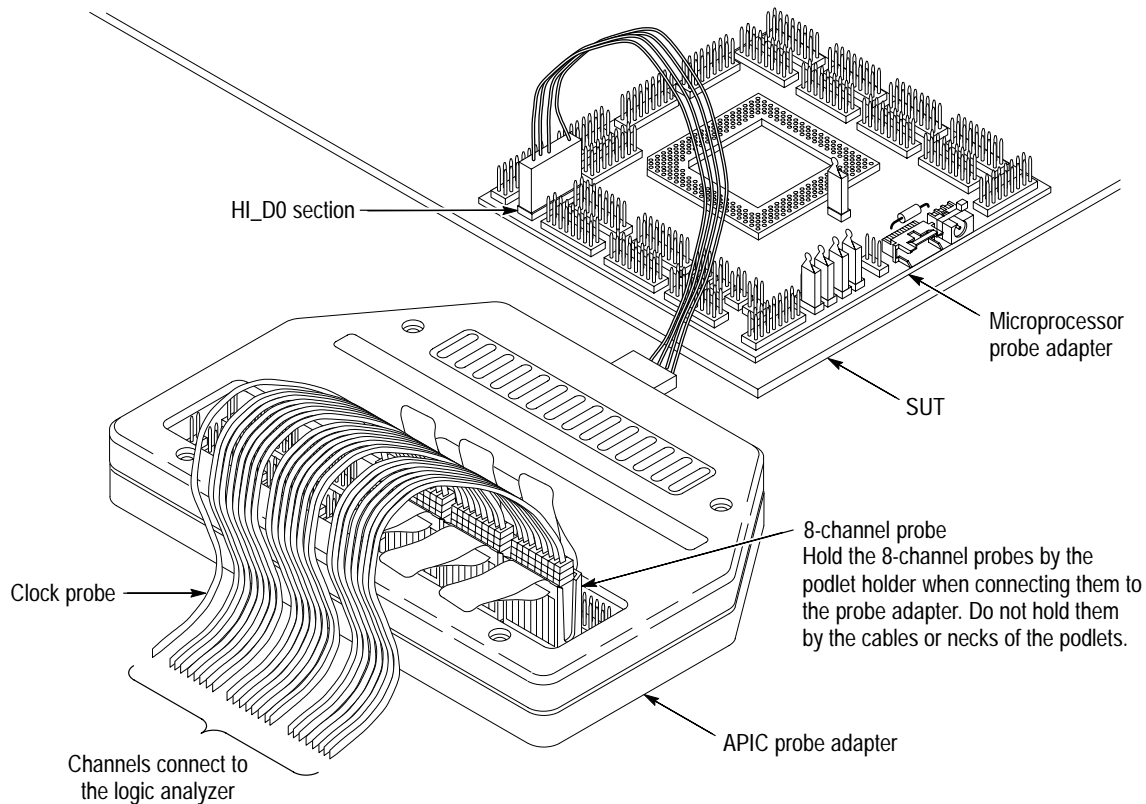
Figure 1–3: Connecting to the SUT using a microprocessor probe adapter

Connecting to the SUT Using a Microprocessor Probe Adapter and a high-Density Probe

You can connect to the SUT using a microprocessor probe adapter that is designed to support a microprocessor the follows the APIC bus protocol and a 192-Channel High-Density probe. To connect the logic analyzer using another probe adapter and a high-density probe to the SUT, 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 probe adapters, the podlets, 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 bus 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 each probe adapter to discharge stored static electricity from the probe adapters.

3. Connect the clock and 8-channel probes to the APIC probe adapter as shown in Figure 1–4. Match the channel groups and numbers on the probe labels to the corresponding pins on the probe adapter.

4. Connect the appropriate prewired cable to the APIC probe adapter as shown in Figure 1–4. Refer to Table 1–1 on page 1–2 for the appropriate cable.

5. Connect the other end of the cable to the HI – D0 group of square pins on the high-density probe.

6. If the probe adapter has a Timing/Disassembly jumper, position it in the Timing position (2 and 3).

7. Line up the pin A1 indicator on the microprocessor probe adapter board with the pin A1 indicator on the microprocessor

8. Place the low-profile probe adapter onto your SUT.

9. Align pin 1 on the LO Cable connector, the end on the narrowest cable strip part of the LO Cable, with pin 1 on the LO Connector on the high-density probe. Connect the cable to the connector as shown in Figure 1–4.

NOTE. The length of the LO Cable is 12 inches; the length of the HI Cable is 13 inches.

10. Align pin 1 on the HI Cable connector, the end on the narrowest cable strip part of the HI Cable, with pin 1 on the HI Connector on the high-density probe. Connect the cable to the connector as shown in Figure 1–4.
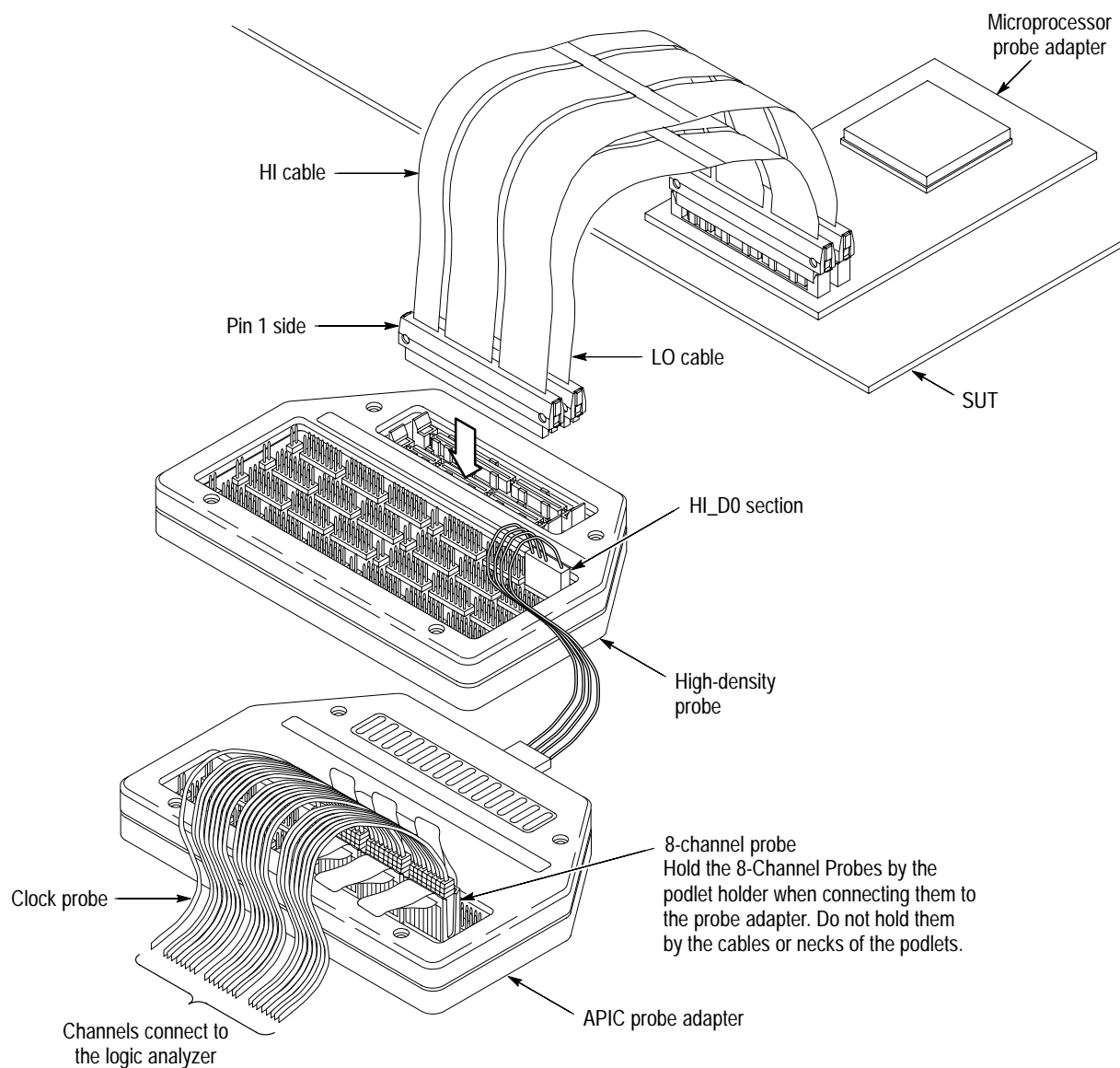
Figure 1–4: Connecting to the SUT using a microprocessor probe adapter with a high-density probe

Applying and Removing Power

The power supply provides +5 volts to the APIC probe adapter. The center connector of the power jack on the APIC adapter board connects to Vcc.

To apply power to the APIC probe adapter and SUT, follow these steps:

⚠ **CAUTION.** *Failure to use the +5 V power supply provided by Tektronix might permanently damage the probe adapter and APIC bus. Do not mistake another power supply that looks similar for the +5 V power supply.*

1. Connect the +5 V power supply to the jack on the probe adapter. Figure 1–5 shows the location of the jack on the adapter board.

⚠ **CAUTION.** *Failure to apply power to the probe adapter before applying power to your SUT might permanently damage the APIC bus and SUT.*

2. Plug the power supply for the probe adapter into an electrical outlet.

3. Power on the SUT.
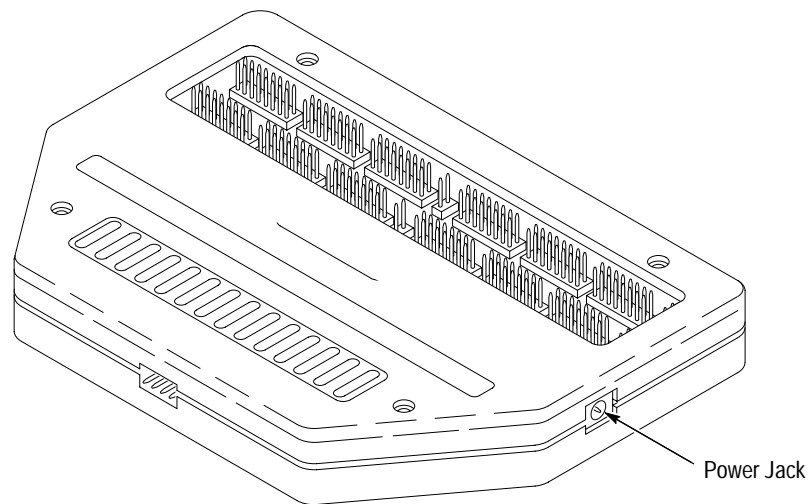
Power Jack

Figure 1–5: Location of the power jack

To power down the SUT and APIC probe adapter, follow these steps:

⚠ **CAUTION.** *Failure to power down your SUT before removing the power from the probe adapter might permanently damage the APIC probe adapter and SUT.*

1. Power down the SUT.

2. Unplug the power supply for the probe adapter from the electrical outlet.

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 801 APIC 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 APIC support are ArbID, Control, Vect, Dest, Chksum, Status, Priority, ArbID2, RR_Data, and Misc. If you want to know which signal is in which group, refer to the channel assignment tables beginning on page 3–4.

Clocking Options

The TMS 801 software offers a bus-specific clocking selection for the APIC bus. This clocking choice (Custom) is the default selection whenever you select APIC Support in the Configuration menu.

The TMS 801 support acquires all bus cycles. No clock options are available. A description of how cycles are sampled by the disassembler is found in the *Specifications* section.

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.

Symbols

The TMS 801 support supplies one symbol table file. The APIC_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 APIC_Ctrl, the Control channel group symbol table.

Table 2–1: Control group symbol table definitions

Symbol		Control group value EOI DM M2 M1 MO L TM							Meaning
EOI		1	X	X	X	X	X	X		End Of Interrupt mode cycle
Fixed	Phys	0	0	0	0	0	X	X		Deliv Mode = Fixed, Dest mode = Phys
Fixed	Log	0	1	0	0	0	X	X		Deliv Mode = Fixed, Dest Mode = Log
Low Pri	Phys	0	0	0	0	1	X	X		Deliv Mode = Low Pri, Dest Mode = Phys
Low Pri	Log	0	1	0	0	1	X	X		Deliv Mode = Low Pri, Dest Mode = Log
SMI	Phys	0	0	0	1	0	X	X		Deliv Mode = SMI, Dest Mode = Phys
SMI	Log	0	1	0	1	0	X	X		Deliv Mode = SMI, Dest Mode = Log
Rem Rd	Phys	0	0	0	1	1	X	X		Deliv Mode = Rem Rd, Dest Mode = Phys
Rem Rd	Log	0	1	0	1	1	X	X		Deliv Mode = Rem Rd, Dest Mode = Log
NMI	Phys	0	0	1	0	0	X	X		Deliv Mode = NMI, Dest Mode = Phys
NMI	Log	0	1	1	0	0	X	X		Deliv Mode = NMI, Dest Mode = Log
INIT	Phys	0	0	1	0	1	X	X		Deliv Mode = INIT, Dest Mode = Phys
INIT	Log	0	1	1	0	1	X	X		Deliv Mode = INIT, Dest Mode = Log
StartUP	Phys	0	0	1	1	0	X	X		Deliv Mode = StrtUp, Dest Mode = Phys
StartUP	Log	0	1	1	1	0	X	X		Deliv Mode = StrtUp, Dest Mode = Log
ExtINT	Phys	0	0	1	1	1	X	X		Deliv Mode = ExtINT, Dest Mode = Phys
ExtINT	Log	0	1	1	1	1	X	X		Deliv Mode = ExtINT, Dest Mode = Log
Fixed		0	X	0	0	0	X	X		Deliv Mode = Fixed *
Lowest	Pri	0	X	0	0	1	X	X		Deliv Mode = Low Pri *
SMI		0	X	0	1	0	X	X		Deliv Mode = SMI * Trigger only
Remote Read		0	X	0	1	1	X	X		Deliv Mode = Rem Rd *
NMI		0	X	1	0	0	X	X		Deliv Mode = NMI *
INIT		0	X	1	0	1	X	X		Deliv Mode = INIT *
Start UP		0	X	1	1	0	X	X		Deliv Mode = StrtUp *
ExtINT		0	X	1	1	1	X	X		Deliv Mode = ExtINT *

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

Symbol	Control group value EOI DM M2 M1 MO L TM							Meaning
Physical	0	0	X	X	X	X	X	Dest Mode = Phys *
Logical	0	1	X	X	X	X	X	Dest Mode = Log *

*Symbols used only for triggering; they are not displayed.

Information on basic operations describes how to use symbolic values for triggering, and 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

- How to change the way data is displayed

Acquiring Data

Once you load the APIC 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

There are four disassembly display formats: Hardware, Software, Control Flow, and Subroutine. However the disassembly display for the TMS 801 is the same for all. Each format shows all of the APIC bus cycles. The reasons for this are:

- Each acquisition sample contains exactly one bus message.

- There is no branching behavior or program flow of control.

Display Format   The display format shows the channel values for each sample of acquired data in the order they occurred.

Figure 2–1 shows an example of the display.

```
      1              2                            3              4

   Sample  Deliv   Type   DM Trig  Error   Vect  Dest  Status     Timestamp
   ---------------------------------------------------------------------------
T      4  EOI------EOI----------------------91----------00001000------115.730-us
       5  Low Pri No Foc  L  Lvl            91    03    00101100      914.280 us
       6  EOI     EOI     -  ---            91    ----  00001000      120.670 us
       7  Fixed   Short   L  Edg            D1    01    00001000    8.915,470 ms
       8  Fixed   Short   P  Edg            D1    0F    00001000       16.020 us
       9  Low Pri No Foc  L  Lvl            A1    03    00101100      145.320 us
      10  EOI     EOI     -  ---            A1    ----  00001000       77.990 us
      11  Low Pri No Foc  L  Lvl            A1    03    00101100    1.061,110 ms
      12  EOI     EOI     -  ---            A1    ----  00001000      114.410 us
      13  Fixed   Short   L  Edg            D1    01    00001000   14.210,370 ms
      14  Fixed   Short   P  Edg            D1    0F    00001000       17.780 us
      15  Fixed   Short   L  Edg            D1    01    00001000   15.607,390 ms
      16  Fixed   Short   P  Edg            D1    0F    00001000       16.400 us
      17  Fixed   Short   L  Edg            E1    02    00001000       62.650 us
      18  Low Pri No Foc  L  Lvl            A1    03    00101100   10.618,530 ms
      19  EOI     EOI     -  ---            A1    ----  00001000      128.500 us
      20  Low Pri No Foc  L  Lvl            A1    03    00101100    1.619,700 ms
      21  EOI     EOI     -  ---            A1    ----  00001000      242.900 us
      22  Fixed   Short   L  Edg            D1    01    00001000    2.937,300 ms
      23  Fixed   Short   P  Edg            D1    0F    00001000       34.050 us
      24  Fixed   Short   L  Edg            D1    01    00001000   15.590,420 ms
      25  Fixed   Short   P  Edg            D1    0F    00001000       52.080 us
```

Figure 2–1: Display

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

2. **Derived Mnemonic Messages.** List information about the Delivery Mode, Message Type, Destination Mode, Trigger Mode, and Error Status. Refer to *Derived Mnemonic Messages* next in this section.

3. **Channel Groups.** Lists data from the other channel groups connected to the APIC bus. These groups are: ArbID, Vect, Dest, Status, Priority, ArbID2, RR_Data, Chksum, and Misc.

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

Derived Mnemonic Messages

The Derived Mnemonic Messages group is composed of five types of mnemonics: Delivery Mode, Message Type, Destination Mode, Trigger Mode and Error. Each type of mnemonics occupies its own column in the display as shown in Figure 2–1. Table 2–2 lists the column heading with the corresponding mnemonic type.

Table 2–2: Derived Mnemonic Message information

Column heading	Type of mnemonic
Deliv	Delivery Mode
Type	Message Type
DM	Destination Mode
Trig	Trigger Mode
Error	Error

The Delivery Mode is a 3-bit field (M2-0) that specifies how the APIC(s) listed in the Destination field of the message should act upon reception of the message. The Delivery Mode column shows a mnemonic description of the delivery mode of the message. There are twelve possible mnemonics in the Delivery Mode column. Refer to Table 2–3 for a list of the mnemonics, the Delivery Mode and the value of the 3-bit field.

Table 2–3: Delivery Mode mnemonics

Mnemonic	Delivery Mode	M2-0
Fixed	Fixed	000
Low Pri	Lowest Priority	001
SMI	SMI	010
S Ck On	Stop Clock On	010
S C Off	Stop Clock Off	010
Rem Rd	Remote Read	011
Rem Dis	Remote Disable	011
NMI	NMI	100
INIT	INIT	101
Deassrt	INIT Deassert	101
Start Up	Start Up	110
ExtINT	ExtINT	111

The Message Type column describes the format and length (number of cycles) of the APIC message. Refer to Table 2–4 for a list of the mnemonics, the message type, and the length of the message.

Table 2–4: Message Type mnemonics

Mnemonic	Type	Length
EOI	EOI Message	14 cycles
Short	Short Message	21 cycles
No Foc	Lowest Priority without Focus Processor Message	34 cycles
Rem Rd	Remote Read Message	39 cycles

The Destination Mode is a 1-bit field (DM) which determines the interpretation of the Destination field of the message. The Destination Mode column shows a mnemonic description of the destination mode of the message. Refer to Table 2–5 for a list of the mnemonics, the Destination Mode and the 1-bit value.

Table 2–5: Destination Mode mnemonics

Mnemonic	Destination Mode	DM
P	Physical mode	0
L	Logical mode	1

The Trigger Mode is a 1-bit field (TM) that indicates the type of signal that triggers an interrupt and is present on the interrupt pin. The Trigger Mode column shows a mnemonic description of the trigger mode of the message. Refer to Table 2–6 for a list of the mnemonics, the Trigger Mode, and the 1-bit value.

Table 2–6: Trigger Mode mnemonics

Mnemonic	Trigger Mode	TM
Edg	Edge sensitive	0
Lvl	Level sensitive	1

The Error column describes any errors which may occur in APIC messages. If errors do not occur in the message, then the Error subfield will be left blank. The Error column shows a mnemonic description of the error. Refer to Table 2–7 for a list of the mnemonics and an explanation of the error.

Table 2–7: Error mnemonics

Mnemonic	Error
ERROR	An error was signaled in the A0 or A1 status cycles of the message.
CS ERR	A check sum error was signaled in the A0 status cycle of the message.
RETRY	A retry was signaled in the A0 and A1 status cycles of a Fixed, EOI, or Lowest Priority message.
ACC ERR	An Accept error was signaled in the A0 and A1 status cycles of a Fixed or EOI message.
VEC ERR	The Vector (V7–0) field of a message with Delivery Mode (M2–0) of 010 was invalid. The vector field must be 0x00, 0x01, or 0x02.
ARB ERR	An error was signaled in the A2 status cycle of a Lowest Priority w/o Focus Processor message.
RRD ERR	A Data status error was signaled in the S cycle of a Remote Read message. The remote read data is invalid.

Changing How Data is Displayed

There are fields and features that allow you to further modify displayed data to suit your needs.

There are no new fields for this support product. Refer to the information on basic operations for descriptions of common fields.

Marking Cycles No user-placed marks are necessary for APIC disassembly. However, you can place delta (▲) and A through M marks for ease in locating significant bus cycles. Refer to your module user manual for details.

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 APIC bus 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 APIC signals

- List of other accessible APIC signals and extra acquisition channels

Probe Adapter Description

The probe adapter is a nonintrusive piece of hardware that allows the logic analyzer to acquire data from a APIC bus 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 enclosed in a case with a connector for the APIC bus interface cable on the front. The interface cable can connect to the APIC bus using one of following methods:

- Connecting directly to the SUT

- Connecting to the SUT using a second probe adapter

- Connecting to the SUT using a second probe adapter and the LAHDP2 192-channel high density probe

Signals from the APIC system flow from the probe adapter to the podlet groups and through the probe signal leads to the Module.

All circuitry on the probe adapter is powered from the external power supply.

Specifications

These specifications are for a probe adapter connected to a Acquisition Module and the system under test (SUT). Table 3–1 shows the electrical requirements the SUT must produce for the disassembler to acquire correct data.
Table 3–2 shows the environmental specifications.

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 max (calculated) 1200 mA I typ (measured) 850 mA	
Probe adapter power supply requirements		
Voltage	90-265 VAC	
Current	1.1 A maximum at 100 VAC	
Frequency	47-63 Hz	
Power	25 W maximum	
SUT clock		
Clock rate	Max. 33 MHz	
Minimum setup time required		
PICD0	5 ns	
PICD1	5 ns	
Minimum hold time required		
PICD0	3 ns	
PICD1	3 ns	
	Specification	
	AC load	**DC load**
Measured typical SUT signal loading		
PICCLK	30 pF*	74ABT16244 in parallel with HSMS-2810
PICD0	30 pF*	74ABT16244 in parallel with HSMS-2810

Table 3–1: Electrical specifications (cont.)

Characteristics	Requirements	
PICD1	30 pF*	74ABT16244 in parallel with HSMS-2810

* **This load includes the cable and a 100Ω/15 pF RC termination**

Table 3–2 shows the environmental specifications.

Table 3–2: Environmental specification *

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

* **Not to exceed APIC thermal considerations. Forced air cooling may be required across the CPU.**

† **All Environmental specifications are designed to meet Tektronix standard 062-2847-00 class 5.**

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.
Pollution Degree 2	Do not operate in environments where conductive pollutants might be present.

Figure 3–1 shows the dimensions of the probe adapter.

If you are using the APIC bus probe adapter with a second microprocessor probe adapter, refer to that probe adapter's instruction manual for its dimensions.
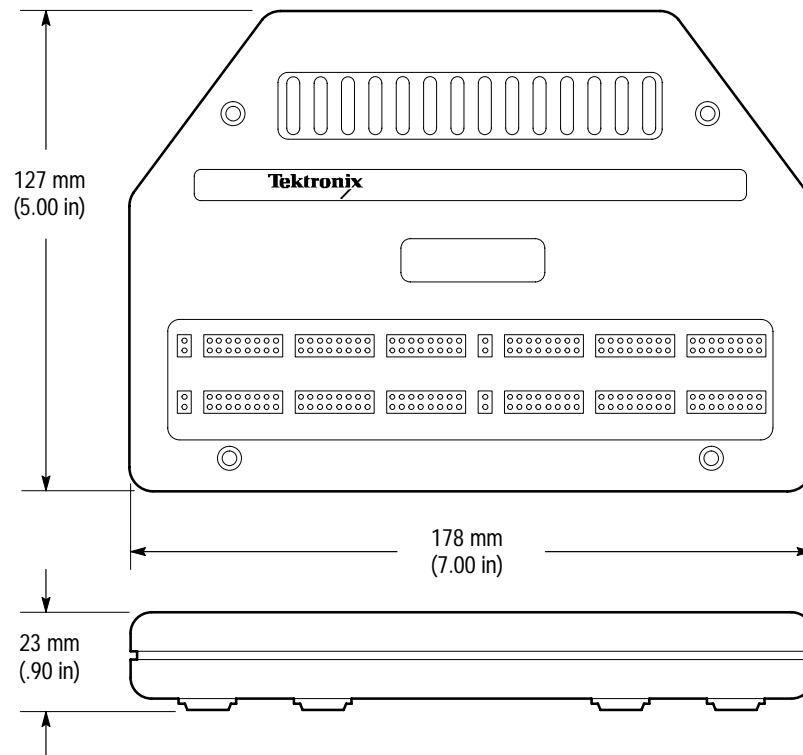
Figure 3–1: Dimensions of the probe adapter

Channel Assignments

Channel assignments shown in Table 3–4 through Table 3–14 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.

Table 3–4 shows the section and channel assignments for the ArbID group, and the bus signal to which each channel connects. By default, this channel group is displayed in binary.

Table 3–4: ArbID group channel assignments

Bit order	Channel	APIC signal name
3	C2:7	ARBID3
2	C2:6	ARBID2
1	C2:5	ARBID1
0	C2:4	ARBID0

Table 3–5 shows the section and channel assignments for the Control group, and the bus signal to which each channel connects. By default, this channel group is displayed symbolically.

Table 3–5: Control group channel assignments

Bit order	Channel	APIC signal name
6	C3:7	EOI
5	A2:7	DM
4	A2:6	M2
3	A2:5	M1
2	A2:4	M0
1	A2:3	L
0	A2:2	TM

Table 3–6 shows the section and channel assignments for the Vect group, and the bus signal to which each channel connects. By default, this channel group is displayed in hexadecimal.

Table 3–6: Vect group channel assignments

Bit order	Channel	APIC signal name
7	A3:7	V7
6	A3:6	V6
5	A3:5	V5
4	A3:4	V4
3	A3:3	V3
2	A3:2	V2
1	A3:1	V1
0	A3:0	V0

Table 3–7 shows the section and channel assignments for the Dest group, and the bus signal to which each channel connects. By default, this channel group is displayed in hexadecimal.

Table 3–7: Dest group channel assignments

Bit order	Channel	APIC signal name
7	C1:7	D7
6	C1:6	D6
5	C1:5	D5
4	C1:4	D4
3	C1:3	D3
2	C1:2	D2
1	C1:1	D1
0	C1:0	D0

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

Table 3–8: Chksum group channel assignments

Bit order	Channel	APIC signal name
3	A0:7	RR_D_CHEK_1
2	A0:6	RR_D_CHEDK_0
1	C3:6	CHEDKSUM_1
0	C3:5	CHEDKSUM_0

Table 3–9 shows the section and channel assignments for the Status group, and the bus signal to which each channel connects. By default, this channel group is displayed in binary.

Table 3–9: Status group channel assignments

Bit order	Channel	APIC signal name
7	A2:1	RR_D_STAT_1
6	A2:0	RR_D_STAT_0
5	A0:5	SA2_1
4	A0:4	SA2_0
3	C3:2	SA1_1
2	C3:1	SA1_0
1	C3:4	SA0_1
0	C3:3	SA0_0

Table 3–10 shows the section and channel assignments for the Priority group, and the bus signal to which each channel connects. By default, this channel group is displayed in hexadecimal.

Table 3–10: Priority group channel assignments

Bit order	Channel	APIC signal name
7	A1:7	P7
6	A1:6	P6
5	A1:5	P5
4	A1:4	P4
3	A1:3	P3
2	A1:2	P2

Table 3–10: Priority group channel assignments (cont.)

Bit order	Channel	APIC signal name
1	A1:1	P1
0	A1:0	P0

Table 3–11 shows the section and channel assignments for the ArbID2 group, and the bus signal to which each channel connects. By default, this channel group is displayed in binary.

Table 3–11: ArbID2 group channel assignments

Bit order	Channel	APIC signal name
3	A0:3	ARBID2_3
2	A0:2	ARBID2_2
1	A0:1	ARBID2_1
0	A0:0	ARBID2_0

Table 3–12 shows the section and channel assignments for the RR_Data group, and the bus signal to which each channel connects. By default, this channel group is displayed in hexadecimal.

Table 3–12: RR_Data group channel assignments

Bit order	Channel	APIC signal name
3	D3:7–0	RRD31-RRD24
2	D2:7–0	RRD23–RRD16
1	D1:7–0	RRD15–RRD8
0	D0:7–0	RRD7-RRD0

Table 3–13 shows the section and channel assignments for the Misc group, and the bus signal to which each channel connects. By default, this channel group is not visible.

Table 3–13: Misc group channel assignments

Bit order	Channel	APIC signal name
9	C0:7	START_TR3[†]
8	C2:2	START_TR2[†]
7	C2:1	START_TR1[†]
6	C2:0	START_TR0[†]
5	C0:6	DEPTH_TR1[†]
4	C0:2	DEPTH_TR0[†]
3	C0:3	PICCLK[†]
2	C0:4	BIT1_L[†]
1	C0:5	BIT0_L[†]
0	C2:3	_LA_LOG

[†]   **Signal not required for disassembly.**

Table 3–14 shows the section and channel assignments for the Clock channels (not part of any group), and the bus signal to which each channel connects.

Table 3–14: Clock channel assignments

Channel	APIC signal name
CLK:0	PICCLK=
CLK:1	START_TR3=[†]
CLK:2	DEPTH_TRL=[†]
CLK:3	DEPTH_TR0=[†]

[†]   **Signal not required for disassembly.**

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 3–14, 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 part of this chapter explains how the module acquires APIC signals using the TMS 801 support and probe adapter. This part also provides additional information on bus signals accessible on or not accessible on the probe adapter, and on extra acquisition 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 APIC support. This special clocking is called Custom.

With Custom clocking, the module logs in all APIC bus signals on every rising edge of the PICCLK signal. The module then sends all the logged-in signals to the trigger machine and to the acquisition memory of the module for storage.

Alternate APIC Bus Connections

You can connect to bus 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 3–4. 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 APIC bus signals are accessible on the probe adapter.

Extra Channels

Table 3–15 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 3–15: Extra module sections and channels

Module	Section: channels
102-channels	C3:0, C0;1, C0:0
136-channels	C3:0, C0;1, C0:0, E3:7-0, E2:7-0, E1:7-0, E0:7-0
96-channels	C3:0, C0;1, C0:0

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 information on the following topics:

- Probe adapter circuit description
- How to replace a fuse

Probe Adapter Circuit Description

The APIC probe adapter connects to three systems signals (Picclk, PICD1, and PICD0) and ground. The Picclk signal is the free running APIC clock. This clock is buffered and duplicated on the TMS 801 to clock all the probe adapter circuitry. Picclk runs at 16 MHz maximum for Pentium products. The PICD1 and PICD0 signals are the serial data bits that carry the APIC messages. They are low true signals, and are referred to as Bit0 in this design.

The probe adapter consists of two shift registers, four counters, and one EPLD (Electically Programmable Logic Device). The Picclk signal clocks all probe circuitry. Bit0 and Bit1 each have their own 40-bit free running shift register. The EPLD uses the counters and the Bit1 and Bit0 signals to determine when the beginning of a message has reached the end of the shift register. This way the channels may be connected to predetermined points in the shift register, and the same fields appear on the same channels for every message type.

Since the fields within the messages appear in the same bit positions for all messages types except EOI (which has the vector, status, and Checksum fields earlier than the others), multiplexers are used to insure that the fields within an EOI message apper on the same channels that the fields within any other message would. The EOI bit (at the beginning of a message) is used as the mux select line.

The EPLD contains two state machines. The Start Tracker state machine watches the serial bus and determines the start of each message. The Depth Tracker state machine keeps track of where each message start is in the shift register and asserts the La_Log signal when a message start reaches the end of the shift register. The Start_Tracker state machine has four state variables (Start_Tr(3..0)) and the Depth Tracker state machine has two state variables (Depth–Tr(1..0)).

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.

Replacing the Fuse

If the fuse on the APIC probe adapter board opens, you can replace it with a 5 Amp, 125 V fuse. To replace the fuse, refer to Figure 4–1 and follow these steps:

1. Remove the four screws, then the top cover.

2. Remove the circuit board for the bottom cover.

3. Unsolder the fuse and install a new 5 amp, 125 V fuse.

Remove 4 screws and top cover

Unsolder and replace fuse
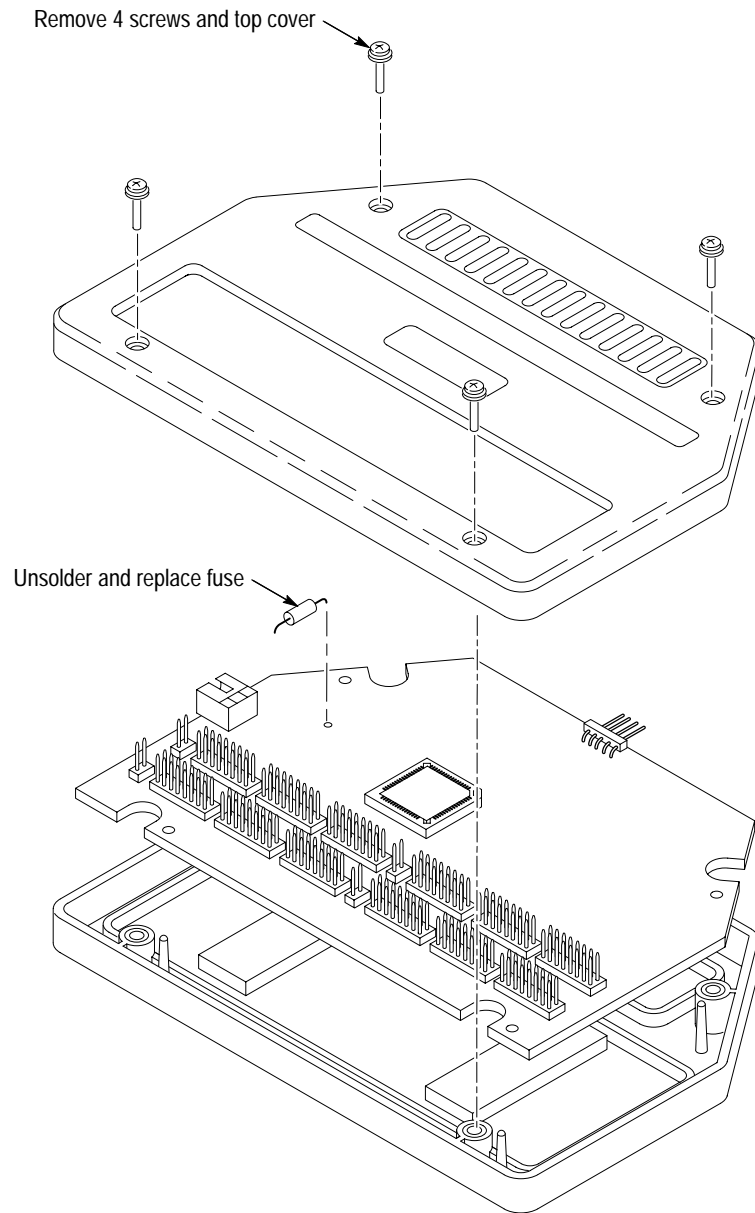
Figure 4–1: Removing the fuse

Replaceable Electrical Parts

This chapter contains a list of the replaceable electrical components for the TMS 801 APIC bus 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

Component Number

A23A2R1234   **A23**   **A2**   **R1234**

Assembly number   Subassembly Number   Circuit Number
(optional)

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
TK0875	MATSUO ELECTRONICS INC	831 S DOUBLAS ST	EL SEGUNDO CA 92641
TK2427	A/D ELECTRONIC	2121 17TH AVE SE	BOTHELL WA 97021
01295	TEXAS INSTRUMENTS INC SEMICONDUCTOR GROUP	13500 N CENTRAL EXPY PO BOX 655303	DALLAS TX 75262–5303
04222	AVX/KYOCERA DIV OF AVX CORP	19TH AVE SOUTH P O BOX 867	MYRTLE BEACH SC 29577
1CH66	PHILIPS SEMICONDUCTORS	811 E ARQUES AVENUE PO BOX 3409	SUNNYVALE CA 94088–3409
22526	BERG ELECTRONICS INC (DUPONT)	857 OLD TRAIL RD	ETTERS PA 17319
50139	ALLEN–BRADLEY CO ELECTRONIC COMPONENTS	1414 ALLEN BRADLEY DR	EL PASO TX 79936
50434	HEWLETT–PACKARD CO OPTOELECTRONICS DIV	370 W TRIMBLE RD	SAN JOSE CA 95131–1008
53387	3M COMPANY ELECTRONIC PRODUCTS DIV	3M AUSTIN CENTER	AUSTIN TX 78769–2963
58050	TEKA PRODUCTS INC	45 SALEM ST	PROVIDENCE RI 02907
61857	SAN–0 INDUSTRIAL CORP	91–3 COLIN DRIVE	HOLBROOK NY 11741
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
A1	671–3564–XX			CKT BD ASSY:INTEL,APIC BUS,TMS 801	80009	6713564XX
A1C220	283–5114–00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,50V,X7R,1206	04222	12065C104KAT(1A
A1C221	283–5187–00			CAP,FXD,CERAMIC:MLC;15PF,5%,100V,NPO,1206	04222	12061A150JAT1A
A1C230	283–5114–00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,50V,X7R,1206	04222	12065C104KAT(1A
A1C240	283–5187–00			CAP,FXD,CERAMIC:MLC;15PF,5%,100V,NPO,1206	04222	12061A150JAT1A
A1C241	283–5187–00			CAP,FXD,CERAMIC:MLC;15PF,5%,100V,NPO,1206	04222	12061A150JAT1A
A1C242	283–5187–00			CAP,FXD,CERAMIC:MLC;15PF,5%,100V,NPO,1206	04222	12061A150JAT1A
A1C250	283–5114–00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,50V,X7R,1206	04222	12065C104KAT(1A
A1C260	283–5114–00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,50V,X7R,1206	04222	12065C104KAT(1A
A1C320	283–5114–00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,50V,X7R,1206	04222	12065C104KAT(1A
A1C321	283–5187–00			CAP,FXD,CERAMIC:MLC;15PF,5%,100V,NPO,1206	04222	12061A150JAT1A
A1C330	283–5114–00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,50V,X7R,1206	04222	12065C104KAT(1A
A1C345	283–5114–00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,50V,X7R,1206	04222	12065C104KAT(1A
A1C350	283–5114–00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,50V,X7R,1206	04222	12065C104KAT(1A
A1C360	283–5114–00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,50V,X7R,1206	04222	12065C104KAT(1A
A1C420	283–5187–00			CAP,FXD,CERAMIC:MLC;15PF,5%,100V,NPO,1206	04222	12061A150JAT1A
A1C421	283–5114–00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,50V,X7R,1206	04222	12065C104KAT(1A
A1C430	283–5114–00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,50V,X7R,1206	04222	12065C104KAT(1A
A1C431	283–5114–00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,50V,X7R,1206	04222	12065C104KAT(1A
A1C440	283–5114–00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,50V,X7R,1206	04222	12065C104KAT(1A

Replaceable electrical parts list (cont.)

Component number	Tektronix part number	Serial no. effective	Serial no. discont'd	Name & description	Mfr. code	Mfr. part number
A1C450	283–5114–00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,50V,X7R,1206	04222	12065C104KAT(1A
A1C451	283–5187–00			CAP,FXD,CERAMIC:MLC;15PF,5%,100V,NPO,1206	04222	12061A150JAT1A
A1C460	283–5114–00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,50V,X7R,1206	04222	12065C104KAT(1A
A1C461	283–5187–00			CAP,FXD,CERAMIC:MLC;15PF,5%,100V,NPO,1206	04222	12061A150JAT1A
A1C470	290–5005–00			CAP,FXD,TANT:;47UF,10%,10V,5.8MM X 4.6MM	TK0875	267M–1002–476–K
A1C500	290–5005–00			CAP,FXD,TANT:;47UF,10%,10V,5.8MM X 4.6MM	TK0875	267M–1002–476–K
A1C520	283–5114–00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,50V,X7R,1206	04222	12065C104KAT(1A
A1C530	283–5114–00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,50V,X7R,1206	04222	12065C104KAT(1A
A1C540	283–5114–00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,50V,X7R,1206	04222	12065C104KAT(1A
A1C550	283–5114–00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,50V,X7R,1206	04222	12065C104KAT(1A
A1C570	283–5114–00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,50V,X7R,1206	04222	12065C104KAT(1A
A1C620	283–5114–00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,50V,X7R,1206	04222	12065C104KAT(1A
A1C630	283–5114–00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,50V,X7R,1206	04222	12065C104KAT(1A
A1C635	283–5114–00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,50V,X7R,1206	04222	12065C104KAT(1A
A1C640	283–5114–00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,50V,X7R,1206	04222	12065C104KAT(1A
A1C650	283–5114–00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,50V,X7R,1206	04222	12065C104KAT(1A
A1C651	283–5187–00			CAP,FXD,CERAMIC:MLC;15PF,5%,100V,NPO,1206	04222	12061A150JAT1A
A1C660	283–5114–00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,50V,X7R,1206	04222	12065C104KAT(1A
A1C661	283–5187–00			CAP,FXD,CERAMIC:MLC;15PF,5%,100V,NPO,1206	04222	12061A150JAT1A
A1C700	283–5187–00			CAP,FXD,CERAMIC:MLC;15PF,5%,100V,NPO,1206	04222	12061A150JAT1A
A1C710	283–5114–00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,50V,X7R,1206	04222	12065C104KAT(1A
A1C740	283–5114–00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,50V,X7R,1206	04222	12065C104KAT(1A
A1C770	283–5114–00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,50V,X7R,1206	04222	12065C104KAT(1A
A1CR240	152–5045–00			DIODE,SIG:SCHTKY,20V,1.2PF,24 OHM	50434	HSMS–2810–T31
A1CR241	152–5045–00			DIODE,SIG:SCHTKY,20V,1.2PF,24 OHM	50434	HSMS–2810–T31
A1CR242	152–5045–00			DIODE,SIG:SCHTKY,20V,1.2PF,24 OHM	50434	HSMS–2810–T31
A1CR410	152–5045–00			DIODE,SIG:SCHTKY,20V,1.2PF,24 OHM	50434	HSMS–2810–T31
A1F410	159–0059–XX			FUSE,WIRE LEAD:5A,125V, (SEE RMPL FIG.1)	61857	SPI-5A
A1J140	–––––––––––			CONN,HDR:PCB,MALE,RTANG,1 X 36,0.1CTR,0.230 MLG X 0.090 TAIL,30 GOLD,STACKABLE (SEE RMPL FIG.1)		
A1J700	–––––––––––			CONN,HDR:PCB,MALE,STR,1 X 36,0.1 CTR,0.230 (SEE RMPL FIG.1)		
A1J710	–––––––––––			CONN,HDR:PCB,MALE,STR,2 X 40,0.1 CTR,0.235 (SEE RMPL FIG.1)		
A1J720	–––––––––––			CONN,HDR:PCB,MALE,STR,2 X 40,0.1 CTR,0.235 (SEE RMPL FIG.1)		
A1J730	–––––––––––			CONN,HDR:PCB,MALE,STR,2 X 40,0.1 CTR,0.235 (SEE RMPL FIG.1)		
A1J740	–––––––––––			CONN,HDR:PCB,MALE,STR,1 X 36,0.1 CTR,0.230 (SEE RMPL FIG.1)		
A1J750	–––––––––––			CONN,HDR:PCB,MALE,STR,2 X 40,0.1 CTR,0.235 (SEE RMPL FIG.1)		

Replaceable electrical parts list (cont.)

Component number	Tektronix part number	Serial no. effective	Serial no. discont'd	Name & description	Mfr. code	Mfr. part number
A1J760	————————			CONN,HDR:PCB,MALE,STR,2 X 40,0.1 CTR,0.235 (SEE RMPL FIG.1)		
A1J770	————————			CONN,HDR:PCB,MALE,STR,2 X 40,0.1 CTR,0.235 (SEE RMPL FIG.1)		
A1J800	————————			CONN,HDR:PCB,MALE,STR,1 X 36,0.1 CTR,0.230 (SEE RMPL FIG.1)		
A1J810	————————			CONN,HDR:PCB,MALE,STR,2 X 40,0.1 CTR,0.235 (SEE RMPL FIG.1)		
A1J820	————————			CONN,HDR:PCB,MALE,STR,2 X 40,0.1 CTR,0.235 (SEE RMPL FIG.1)		
A1J830	————————			CONN,HDR:PCB,MALE,STR,2 X 40,0.1 CTR,0.235 (SEE RMPL FIG.1)		
A1J850	————————			CONN,HDR:PCB,MALE,STR,2 X 40,0.1 CTR,0.235 (SEE RMPL FIG.1)		
A1J860	————————			CONN,HDR:PCB,MALE,STR,2 X 40,0.1 CTR,0.235 (SEE RMPL FIG.1)		
A1J870	————————			CONN,HDR:PCB,MALE,STR,2 X 40,0.1 CTR,0.235 (SEE RMPL FIG.1)		
A1J940	————————			CONN,HDR:PCB,MALE,STR,1 X 36,0.1 CTR,0.230 (SEE RMPL FIG.1)		
A1JR500	————————			JACK,POWER DC:PCB,MALE,RTANG,2.0 MM DIAPIN,7 MM H X 3.3 MM TAIL,3COND,W/SWITCH,MTG POST,DC PWR JACK, 1 AMP@12V (SEE RMPL FIG.1)		
A1R221	321–5006–00			RES,FXD:THICK FILM;100 OHM,1%,0.125W,TC=100	50139	BCK1000FT
A1R230	321–5026–00			RES,FXD:THICK FILM;4.75K OHM,1%,0.125W,TC=100 PPM	50139	BCK4751FT
A1R240	321–5006–00			RES,FXD:THICK FILM;100 OHM,1%,0.125W,TC=100	50139	BCK1000FT
A1R241	321–5006–00			RES,FXD:THICK FILM;100 OHM,1%,0.125W,TC=100	50139	BCK1000FT
A1R242	321–5006–00			RES,FXD:THICK FILM;100 OHM,1%,0.125W,TC=100	50139	BCK1000FT
A1R321	321–5006–00			RES,FXD:THICK FILM;100 OHM,1%,0.125W,TC=100	50139	BCK1000FT
A1R350	321–5026–00			RES,FXD:THICK FILM;4.75K OHM,1%,0.125W,TC=100 PPM	50139	BCK4751FT
A1R420	321–5006–00			RES,FXD:THICK FILM;100 OHM,1%,0.125W,TC=100	50139	BCK1000FT
A1R440	321–5026–00			RES,FXD:THICK FILM;4.75K OHM,1%,0.125W,TC=100 PPM	50139	BCK4751FT
A1R451	321–5006–00			RES,FXD:THICK FILM;100 OHM,1%,0.125W,TC=100	50139	BCK1000FT
A1R460	321–5006–00			RES,FXD:THICK FILM;100 OHM,1%,0.125W,TC=100	50139	BCK1000FT
A1R650	321–5006–00			RES,FXD:THICK FILM;100 OHM,1%,0.125W,TC=100	50139	BCK1000FT
A1R660	321–5006–00			RES,FXD:THICK FILM;100 OHM,1%,0.125W,TC=100	50139	BCK1000FT
A1R700	321–5006–00			RES,FXD:THICK FILM;100 OHM,1%,0.125W,TC=100	50139	BCK1000FT
A1U220	156–5497–00			IC,DIGITAL:FTTL,COUNTER;SYNCH 4–BIT BINARY,	01295	SN74F163AD
A1U230	156–5497–00			IC,DIGITAL:FTTL,COUNTER;SYNCH 4–BIT BINARY,	01295	SN74F163AD
A1U250	156–5619–01			IC,DIGITAL:FTTL,SHIFT REGISTER;8–BIT SIPO,WITH /MR	1CH66	N74F164DT
A1U260	156–5619–01			IC,DIGITAL:FTTL,SHIFT REGISTER;8–BIT SIPO,WITH /MR	1CH66	N74F164DT
A1U320	156–5497–00			IC,DIGITAL:FTTL,COUNTER;SYNCH 4–BIT BINARY,	01295	SN74F163AD
A1U330	156–5497–00			IC,DIGITAL:FTTL,COUNTER;SYNCH 4–BIT BINARY,	01295	SN74F163AD
A1U340	156–6697–00			IC,DIGITAL:ABTCMOS,BUFFER;16–BIT,3–STATE	01295	SN74ABT16244ADL

Replaceable electrical parts list (cont.)

Component number	Tektronix part number	Serial no. effective	Serial no. discont'd	Name & description	Mfr. code	Mfr. part number
A1U350	156–5619–01			IC,DIGITAL:FTTL,SHIFT REGISTER;8–BIT SIPO,WITH /MR	1CH66	N74F164DT
A1U360	156–5619–01			IC,DIGITAL:FTTL,SHIFT REGISTER;8–BIT SIPO,WITH /MR	1CH66	N74F164DT
A1U420	156–5497–00			IC,DIGITAL:FTTL,COUNTER;SYNCH 4–BIT BINARY,	01295	SN74F163AD
A1U430	163–0401–01			IC,DIGITAL:CMOS,PLD;EEPLD,7032,32 M/C,32 I/O,4 IN,7.5NS,PRGM 156–6920–00	80009	163040100
A1U440	156–5055–01			IC,DIGITAL:FTTL,FLIP FLOP;DUAL D–TYPE	01295	SN74F74DR
A1U450	156–5619–01			IC,DIGITAL:FTTL,SHIFT REGISTER;8–BIT SIPO,WITH /MR	1CH66	N74F164DT
A1U460	156–5619–01			IC,DIGITAL:FTTL,SHIFT REGISTER;8–BIT SIPO,WITH /MR	1CH66	N74F164DT
A1U520	156–5497–00			IC,DIGITAL:FTTL,COUNTER;SYNCH 4–BIT BINARY,	01295	SN74F163AD
A1U540	156–5192–01			IC,DIGITAL:FTTL,MUX/ENCODER;QUAD 2–TO–1 MUX	01295	SN74F157ADR
A1U550	156–5619–01			IC,DIGITAL:FTTL,SHIFT REGISTER;8–BIT SIPO,WITH /MR	1CH66	N74F164DT
A1U570	156–5619–01			IC,DIGITAL:FTTL,SHIFT REGISTER;8–BIT SIPO,WITH /MR	1CH66	N74F164DT
A1U620	156–5497–00			IC,DIGITAL:FTTL,COUNTER;SYNCH 4–BIT BINARY,	01295	SN74F163AD
A1U630	156–5192–01			IC,DIGITAL:FTTL,MUX/ENCODER;QUAD 2–TO–1 MUX	01295	SN74F157ADR
A1U635	156–5192–01			IC,DIGITAL:FTTL,MUX/ENCODER;QUAD 2–TO–1 MUX	01295	SN74F157ADR
A1U640	156–5192–01			IC,DIGITAL:FTTL,MUX/ENCODER;QUAD 2–TO–1 MUX	01295	SN74F157ADR
A1U650	156–5619–01			IC,DIGITAL:FTTL,SHIFT REGISTER;8–BIT SIPO,WITH /MR	1CH66	N74F164DT
A1U660	156–5619–01			IC,DIGITAL:FTTL,SHIFT REGISTER;8–BIT SIPO,WITH /MR	1CH66	N74F164DT

Replaceable Mechanical Parts

This chapter contains a list of the replaceable mechanical components for the TMS 801 APIC bus 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
TK0435	LEWIS SCREW CO	4300 S RACINE AVE	CHICAGO IL 60609–3320
TK2427	A/D ELECTRONIC	2121 17TH AVE SE	BOTHELL WA 97021
TK2469	UNITREK CORPORATION	3000 LEWIS & CLARK WAY SUITE #2	VANCOUVER WA 98601
0B445	ELECTRI–CORD MFG CO INC	312 EAST MAIN ST	WESTFIELD PA 16950
14310	AULT INC	7300 BOONE AVENUE NORTH	MINNEAPOLIS MN 55428
22526	BERG ELECTRONICS INC (DUPONT)	857 OLD TRAIL RD	ETTERS PA 17319
52152	MINNESOTA MINING AND MFG CO INDUSTRIAL TAPE DIV	3M CENTER	ST PAUL MN 55144–0001
53387	3M COMPANY ELECTRONIC PRODUCTS DIV	3M AUSTIN CENTER	AUSTIN TX 78769–2963
58050	TEKA PRODUCTS INC	45 SALEM ST	PROVIDENCE RI 02907
61857	SAN–0 INDUSTRIAL CORP	91–3 COLIN DRIVE	HOLBROOK NY 11741
80009	TEKTRONIX INC	14150 SW KARL BRAUN DR PO BOX 500	BEAVERTON OR 97077–0001
85471	BOYD CORP	13885 RAMOMA AVE	CHINO CA 91710

Replaceable 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	010–0587–01			1	PROBE ADAPTER:APIC,BUS;TMS 801	80009	010–0587–01
–1	380–1100–00			1	HOUSING,HALF:UPPER,PLASTIC;TMS 801	80009	380–1100–00
–2	334–8965–00			1	MARKER,IDENT:APIC BUS,PROBE ADAPTER	80009	334–8965–00
–3	211–0152–00			4	SCR,ASSEM WSHR:4–40 X 0.625,PNH,BRS,NP,POZ	TK0435	ORDER BY DESC
–4	174–3477–00			1	CA ASSY SP:DESCRETE,;SDI,4,18 AWG,8.0L,1X5,0.1 CTR,RCPT X 131–1998–XX,BARREL CONTACTS	TK2469	174–3477–00
–5	131–1425–00			1	CONN,HDR:PCB,;MALE,RTANG,1 X 36,0.1CTR,0.230 MLG X 0.090 TAIL,30 GOLD,STACKABLE (J140)	22526	65521–136
–6	671–3564–01			1	CKT BD ASSY:INTEL,APIC BUS	80009	671–3564–01
–7	380–1101–00			1	HOUSING,HALF:LOWER,PLASTIC	80009	380–1101–00
–8	348–0070–01			4	PAD,CUSHIONING:2.03 X 0.69 X 0.18 SI RBR	85471	ORDER BY DESC
–9	348–0910–00			4	FOOT,CKT BD HSG:92A60	52152	SJ5007
–10	131–5267–00			1	CONN,HDR:PCB;MALE,STR,2 X 40,0.1 CTR,0.230 MLG X 0.100 TALE GOLD (J710,J720,J730,JJ750,J760,J770J810,J820,J830,J850,J860,J870)	53387	2480–6122–TB
–11	131–1857–00			2	CONN,HDR:PCB,;MALE,STR,1 X 36,0.1 CTR,0.230 MLG X 0.100 TAIL,GOLD (J700,J800,J740MJ940)	58050	082–3644–SS10
–12	131–5148–00			1	JACK,POWER DC:PCB,;MALE,RTANG,2.0 MM DIAPIN,7 MM H X 3.3 MM TAIL,3COND,W/SWITCH,MTG POST,DC PWR JACK,1 AMP@12V (JR500)	TK2427	ADC–016
–13	159–0059–00			1	FUSE,WIRE LEAD:5A,125V, (F410)	61857	SPI–5A
					STANDARD ACCESSORIES		
	070–9834–00			1	MANUAL TECH: INSTRUCTION,INTEL APIC BUS TMS 801	TK2548	070–9834–00
	070–9803–00			1	MANUAL, TECH:TLA 700 SERIES MICRO SUPPORT INSTALLATION	80009	070–9803–00
	020–1386–00			1	ACCESSORY KIT:PACKAGE OF 12 (206–0364–XX)	80009	ORDER BY DESC
	119–5061–01			1	POWER SUPPLY:25W;5V 5A,CONCENTRIC 2MM	14310	SW106KA002F01
	161–0104–00			1	CA ASSY,PWR:3,18 AWG,98 L,250V/10AMP,98 INCH,RTANG, IEC320,RCPT X STR,NEMA 15–5P,W/CORD GRIP,US	0B445	MC6 –3 CG86
	174–3484–00			1	CA ASSY SP:DESCRETE,;CPD,4,22 AWG,8.0L,2X3,0.1 CTR X 2X8,0.1 CTR,RCPT,POS 1,14,10,12 CONNECTED	TK2469	174–3484–00
	174–3485–00			1	CA ASSY SP:DESCRETE,;CPD,4,22 AWG,8.0L,2X6,0.1 CTR,RCPT X 2X8,0.1 CTR,RCPT,POS 15,2,6,4 CONNECTED	TK2469	174–3485–00

Replaceable parts list (Cont.)

| Fig. & index number	Tektronix part number	Serial no. effective	Serial no. discont'd	Qty	Name & description	Mfr. code	Mfr. part number
					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
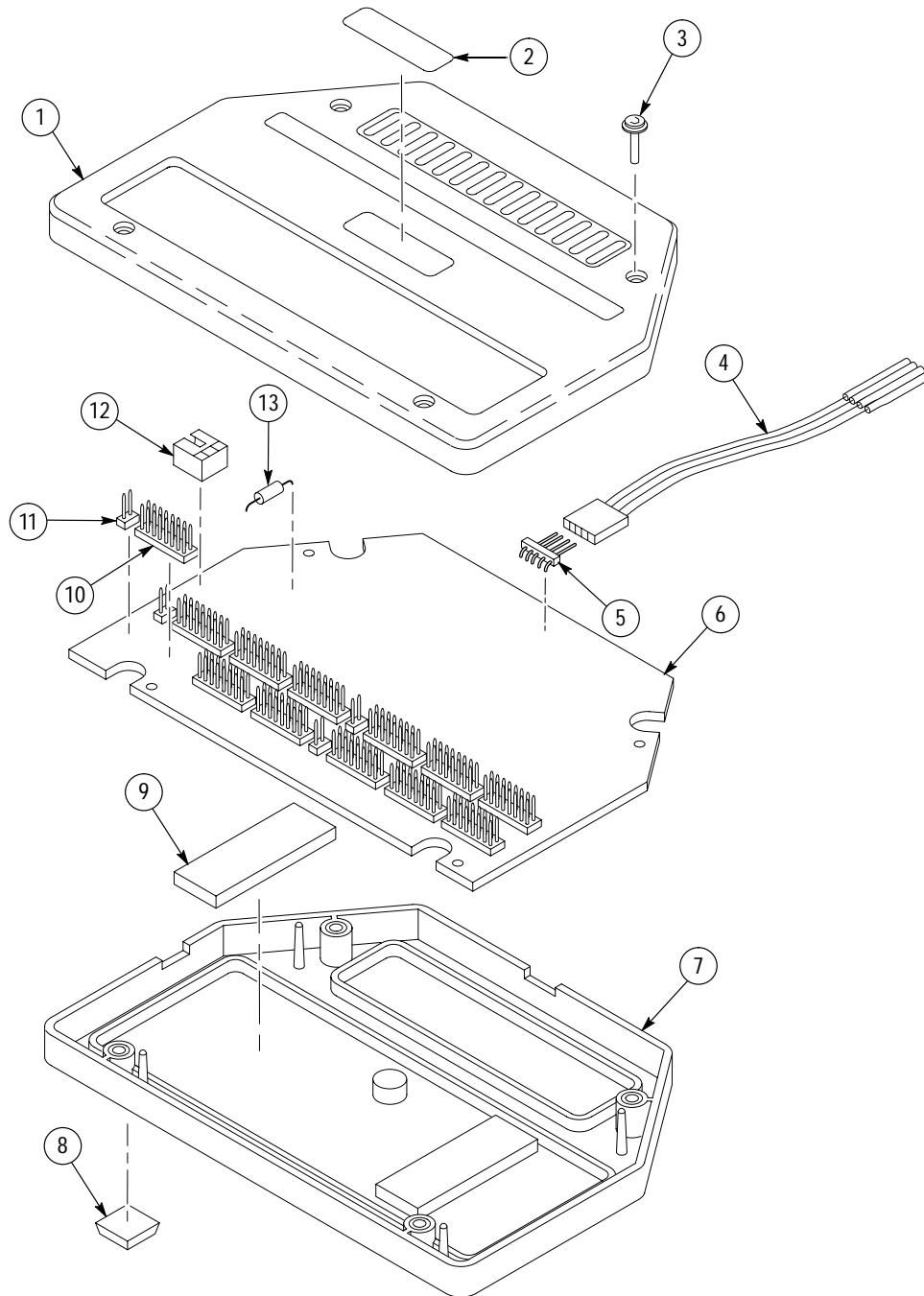
Figure 1: Exploded view probe adapter

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