

Instruction Manual



TMSPGC PGA370 Single-Ended/Differential Clock Hardware Support

071-0803-01

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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. Connect the probe output to the measurement instrument before connecting the probe to the circuit under test. Disconnect the probe input and the probe ground from the circuit under test before disconnecting the probe from the measurement instrument.

Observe All Terminal Ratings. To avoid fire or shock hazard, observe all ratings and markings 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:

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:

CAUTION indicates a hazard to property including the product.

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



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, switch off the instrument power, then disconnect the power cord from the mains power.

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

This instruction manual contains specific information about the TMSPGC PGA370 microprocessor support package and is part of a set of information on how to operate this product on compatible Tektronix logic analyzers.

If you are familiar with operating microprocessor support packages on the logic analyzer for which the TMSPGC PGA370 support was purchased, you will only need this instruction manual to set up and run the support.

If you are not familiar with operating microprocessor support packages, you will need to supplement this instruction manual with *TMS 115 IA32G5 Software Support* manual and information on basic operations in your online help to set up and run the support.

This manual provides detailed information on the following topics:

- Assembling and configuring the probe adapter
- Connecting the logic analyzer to the system under test
- Applying power and operating the probe adapter

Manual Conventions

This manual uses the following conventions:

- The phrase “information on basic operations” refers to basic information in your Tektronix logic analyzer online help.
- The term Master module refers to the module in the lower-numbered slot and the term Slave module refers to the module in the higher-numbered slot.

The portable logic analyzer has the lower numbered slots on the top and the benchtop logic analyzer has the lower numbered slots on the left.

Contacting Tektronix

Phone	1-800-833-9200*
Address	Tektronix, Inc. Department or name (if known) 14200 SW Karl Braun Drive P.O. Box 500 Beaverton, OR 97077 USA
Web site	www.tektronix.com
Sales support	1-800-833-9200, select option 1*
Service support	1-800-833-9200, select option 2*
Technical support	Email: techsupport@tektronix.com 1-800-833-9200, select option 3* 6:00 a.m. - 5:00 p.m. Pacific time

* **This phone number is toll free in North America. After office hours, please leave a voice mail message. Outside North America, contact a Tektronix sales office or distributor; see the Tektronix web site for a list of offices.**



Getting Started

Getting Started

This section contains information on the TMSPGC PGA370 hardware support package and connecting the logic analyzer to the target system.

Support Package Description

The TMSPGC probe adapter is nonintrusive hardware that allows the logic analyzer to acquire data from a microprocessor in its own operating environment with little affect on that system.

The TMSPGC probe adapter is an interposer design. The probe adapter connects to the target system, and then, the microprocessor connects to the probe adapter. Signals from the microprocessor-based system flow through the probe adapter into the P6434 probes and through the probe cables to the logic analyzer.

Support Software Compatibility

The TMSPGC probe adapter requires a Tektronix microprocessor software support package. This TMSPGC probe adapter is used with the TMS 115 Software Support package.

Logic Analyzer Configuration

To use the TMSPGC PGA370 hardware support package you need a Tektronix logic analyzer equipped with two 102-channel modules. The modules must be in adjacent slots and merged.

References to a 204-channel module include the two 102-channel modules that are merged and any other merged module combination of a minimum of 204-channels (for the merged combination).

You can acquire JTAG and APIC bus activity through the TMSPGC probe adapter. Probing the APIC bus requires the TMS 801 APIC bus support package, a third 102-channel acquisition module, and standard probes. See *Alternate Connections* on page 1-12 for more details.

Requirements and Restrictions



CAUTION. *Forced air cooling must be used to keep the microprocessor from overheating.*

You should review the general requirements and restrictions of microprocessor support packages in the information on basic operations as they pertain to the target system.

You should also review electrical, environmental, and mechanical specifications in *Specifications* on page 3-1 as they pertain to the target system, as well as the following descriptions of other TMSPGC PGA370 hardware support requirements and restrictions.

System Clock Rate

The TMSPGC PGA370 microprocessor support can acquire data from the PGA370 microprocessors operating at speeds of up to 133 MHz.

The operating clock rate specifications were measured at the time of printing. Contact your Tektronix sales representative for current information on the fastest devices supported.

BCLK

The TMSPGC PGA370 hardware support can operate with either a low-voltage differential clock, or with a normal voltage single-ended clock. Refer to the BCLK specifications listed in Table 3-3 and 3-4 beginning on page 3-5, in the *Specifications* chapter.

AGTL

The TMSPGC PGA370 hardware support can operate with either AGTL (1.2 volt) or AGTLT (1.5 volt) logic levels. Refer to the AGTL specifications listed in Table 3-5 on page 3-6.

CMOS

The TMSPGC PGA370 hardware support can operate with only 1.5 volt CMOS logic levels. Refer to the CMOS specifications listed in Table on page .

Target System Power

Whenever you power off the target system, remove power from the probe adapter. Refer to *Applying and Removing Power* on page 1-14.

Labeling P6434 Probes

The TMSPGC PGA370 hardware support package relies on the standard channel mapping and labeling scheme for P6434 probes. Apply labels using the standard method described in the *P6434 Mass Termination Probe Instructions*.

Signals Acquired

The following signals are acquired by the TMSPGC probe adapter:

A20M#	BINIT#	DEP[7:0]#	IERR#	PWRGOOD	STPCLK#
A[35:3]	BNR#	DEFER#	IGNNE#	RESET#	THRMTRP#
ADS#	BP[3:2]#	DID[7:0]#	INIT#	REQ[4:0]	TCK
AERR#	BPM[1:0]#	DRDY#	LOCK#	RP#	TDI
ATTR[7:0]#	BPRI#	EXF[4:0]#	LINT[1:0]	RSP#	TDO
AP[1:0]#	BREQ0#	FLUSH#	PICD[1:0]	RS[2:0]#	TMS
BE[7:0]#	D[63:0]	FERR#	PICCLK	SLP#	TRST#
BERR#	DBSY#	HIT#	PRDY#	SMI#	TRDY#
BCLK		HITM#	PREQ#		

Signals Not Acquired

The following signals are not acquired by the TMSPGC probe adapter:

PGA370 signal name	PGA370 pin number
BSEL[0]	AJ33
BSEL[1]	AJ31
CPUPRES#	C37
NCHCTRL	N37
PLL1	W33
PLL2	U33
RTTCTRL	S35
SLEWCTRL	E27
THRMDN	AL29
THRMDP	AL31
VID25mv	AK36
VID[0]	AL35
VID[1]	AM36
VID[2]	AL37
VID[3]	AJ37
VTT_PWRGD	AK4

Assembling the Probe Adapter

The probe adapter assembly consists of a Logic board, Interposer board, three protective sockets (disassembly, timing analysis, and JTAG debugging), and screws.



CAUTION. To prevent static discharge from damaging the microprocessor, the probe adapter, the probes, and the module, handle components only in a static-free environment.

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

Do the following steps to assemble the probe adapter:

1. To discharge any static electricity, touch the ground connector located on the logic analyzer. Then, before you remove the probe adapter circuit boards from their protective bags, touch each bag to discharge stored static electricity.
2. Align the Logic board connector pins with the Interposer board connector pins, and press firmly to seat the board connector (see Figure 1-1). Both connectors are polarized and only mate in one orientation.

NOTE. To ensure a reliable electrical connection between the Logic board and the Interposer board the 190-pin Mictor connector must be completely seated at both ends (see Figure 1-1).

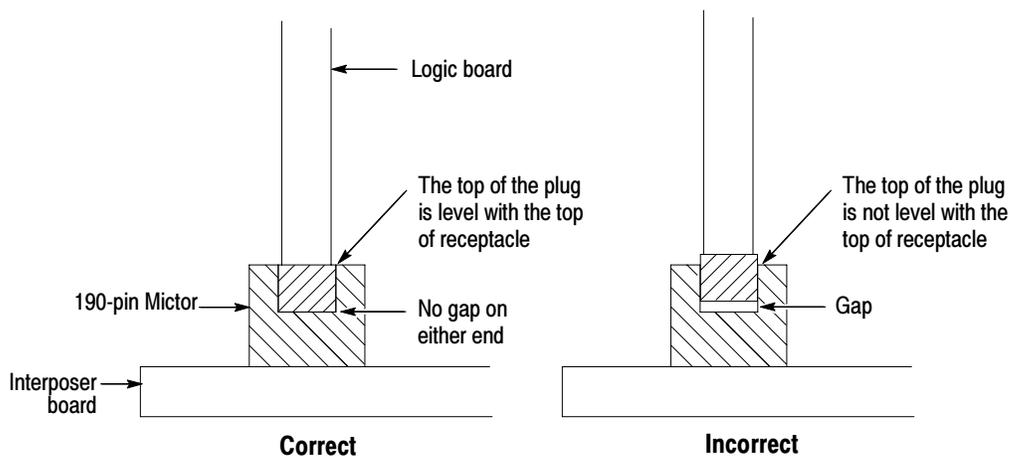


Figure 1-1: Seating the 190-pin Mictor connector

3. Align the mounting brackets on the logic board with the mounting holes on the interposer board, and attach with the provided screws (see Figure 1-2).



CAUTION. To prevent damage to the probe adapter, use the provided screws to secure the logic board to the Interposer board.

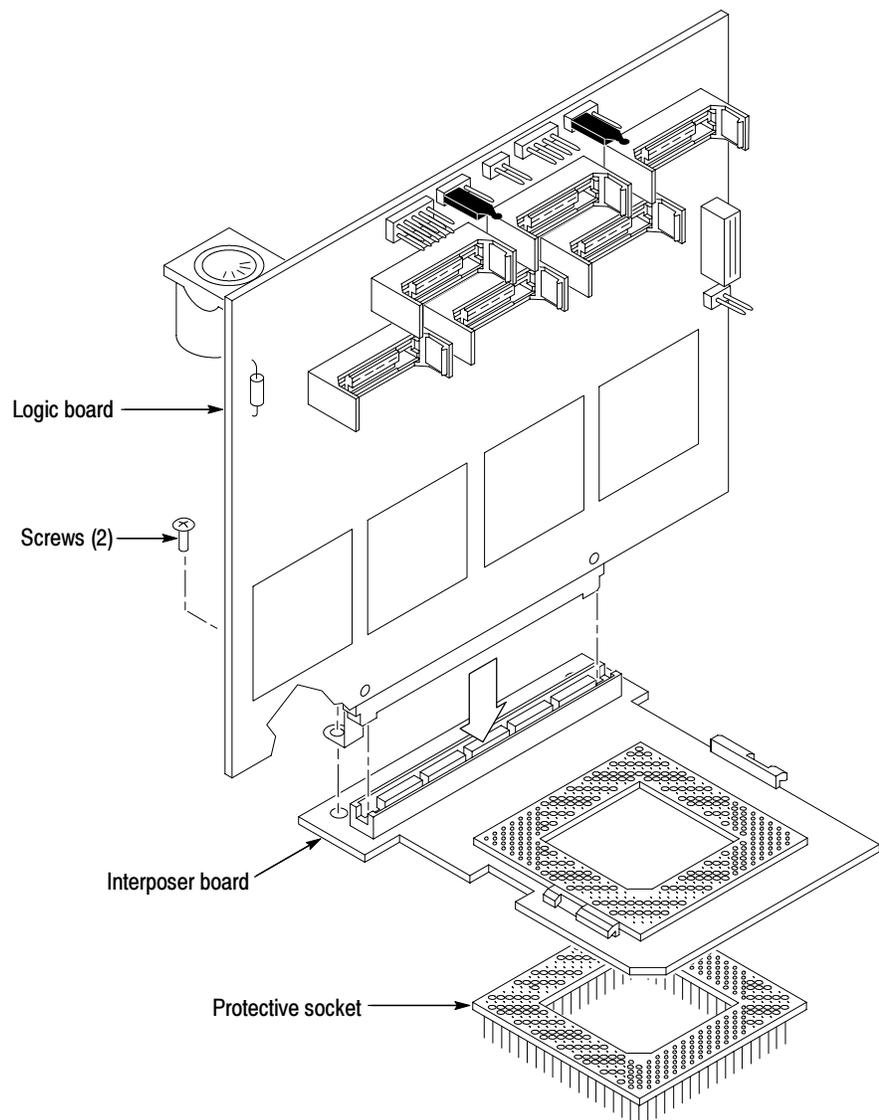


Figure 1-2: Attaching the Logic board to the Interposer board

Connecting the Logic Analyzer to a Target System

Your target system must allow clearance for the probe adapter. Refer to the dimensions on page 3–8 for the required clearances.

To connect the logic analyzer to the target system, follow these steps:

1. Power off the target system. It is not necessary to power off the logic analyzer.



CAUTION. *To prevent static discharge from damaging the microprocessor, the probe adapter, the probes, and the acquisition module, handle the components only in a static-free environment.*

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

2. Follow the procedure from the microprocessor vendor to remove the microprocessor from the PGA370 socket on the target system.

NOTE. *Do not remove the protective socket from the bottom of the probe adapter. Do not install a protective socket without removing all existing sockets from the target system.*

3. Choose the correct protective socket (see Figure 1-3).

When using the TMSPGC probe adapter:

- Use the 363-pin protective socket only when using the JTAG port on the TMSPGC probe adapter.
- Use the 370-pin protective socket at all other times.

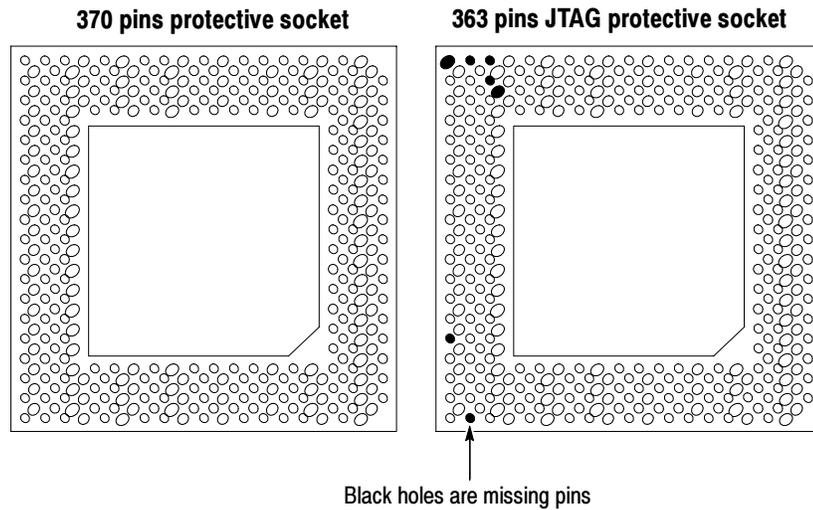


Figure 1-3: TMSPGC probe adapter protective sockets

4. Align the A3 pin indicator on the protective socket with pin A3 of the PGA370 protective socket on the target system.
5. Insert the protective socket into the target system as shown in Figure 1-4.

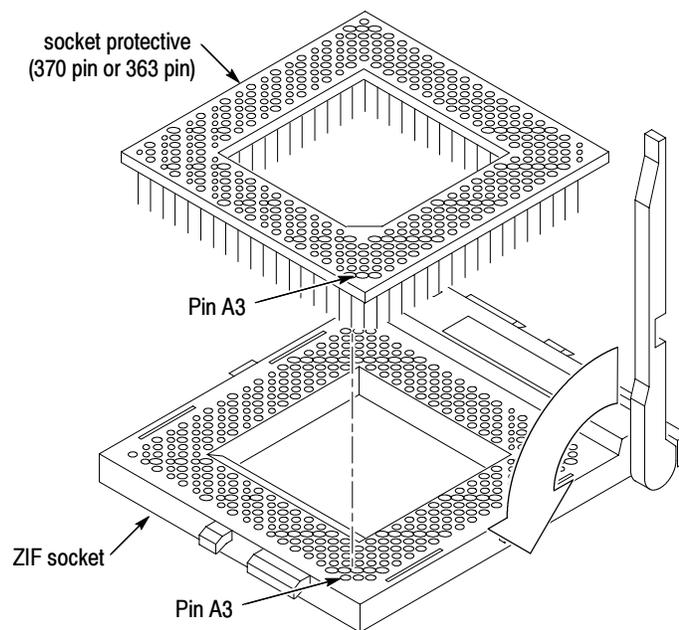


Figure 1-4: Inserting a protective socket into the ZIF socket

6. Align the A3 pin indicator on the probe adapter with the A3 pin indicator on the installed socket.
7. Insert the probe adapter into the installed socket as shown in Figure 1-5.

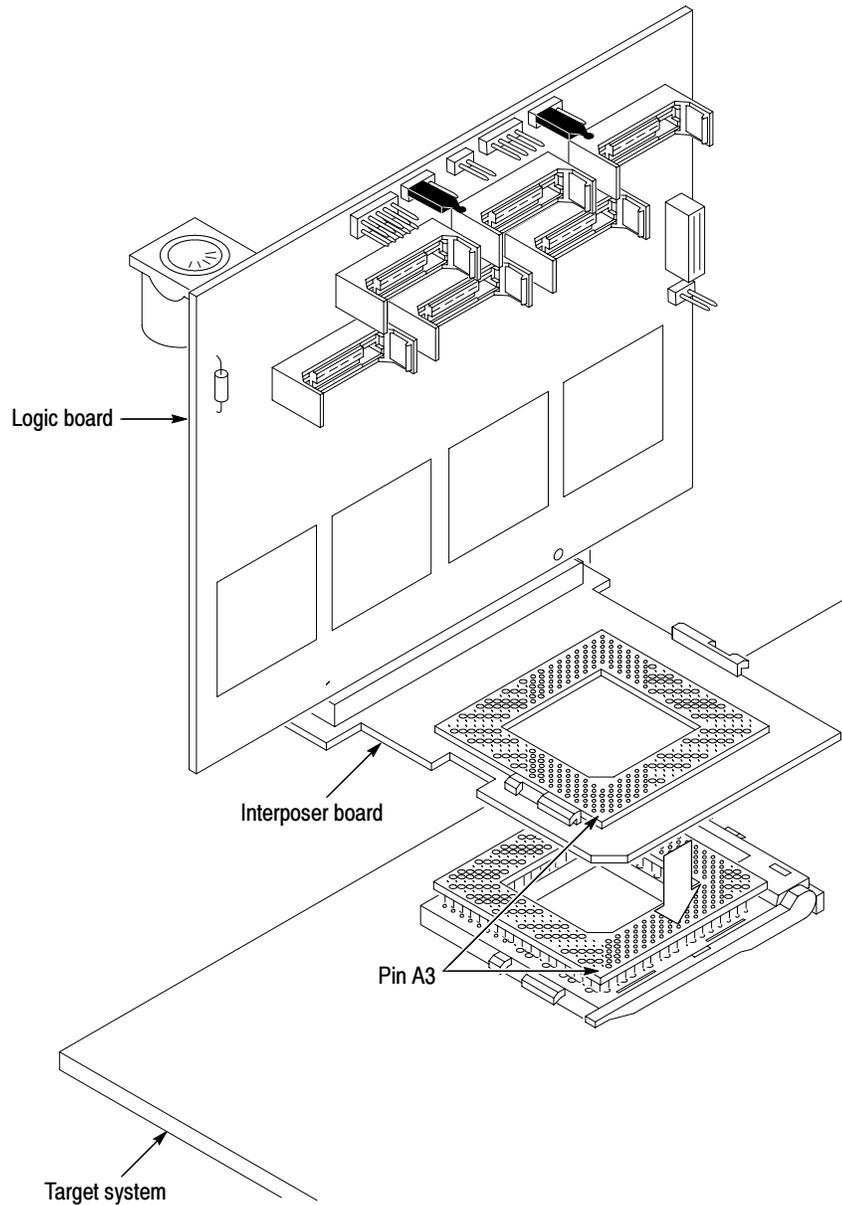


Figure 1-5: Inserting the probe adapter into the socket

8. Insert the microprocessor into the probe adapter as shown in Figure 1-6.

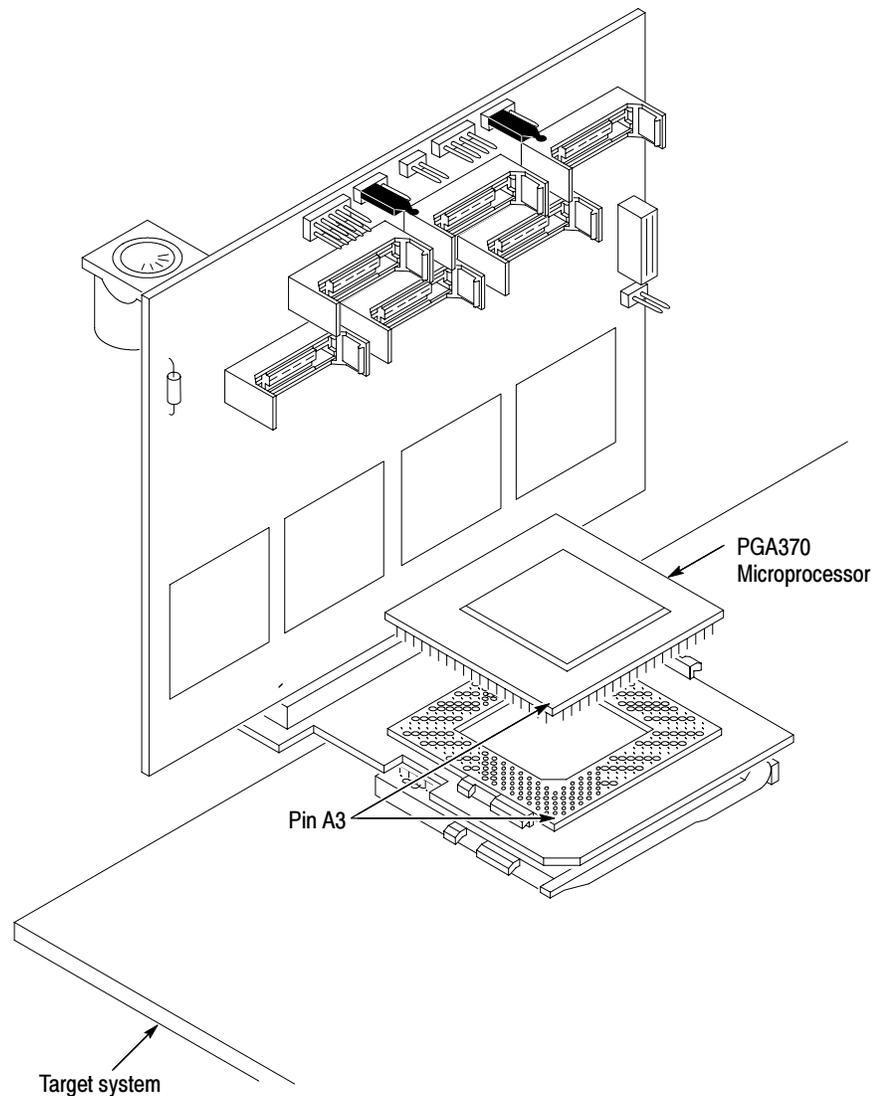


Figure 1-6: Placing the PGA370 microprocessor into the probe adapter

9. Reattach the heat sink from the target system to the probe adapter.

Attach the P6434 probes

After you have connected the probe adapter to the target system, connect three P6434 probes to the Master module and three P6434 probes to the Slave module. The module in the lower-numbered slot is referred to as the Master module and the module in the higher-numbered slot is referred to as the Slave module.

The portable logic analyzer has the lower numbered slots on the top and the benchtop logic analyzer has the lower numbered slots on the left.

1. Match the A, C, and D probes from the Master module with the corresponding M_A, M_C, and M_D probe connectors on the probe adapter. Align the pin 1 indicator on the probe label with the pin 1 indicator of the connector on the probe adapter.



CAUTION. *Incorrect handling of the P6434 probe while connecting it to the probe adapter can result in damage to the probe or to the mating connector on the probe adapter. To avoid damaging the probe and probe adapter, always position the probe perpendicular to the mating connector and gently connect the probe.*

2. Position the probe tip perpendicular to the mating connector and gently connect the probe (see Figure 1-7).
3. When connected, push latch releases in to set the latch on the probe .

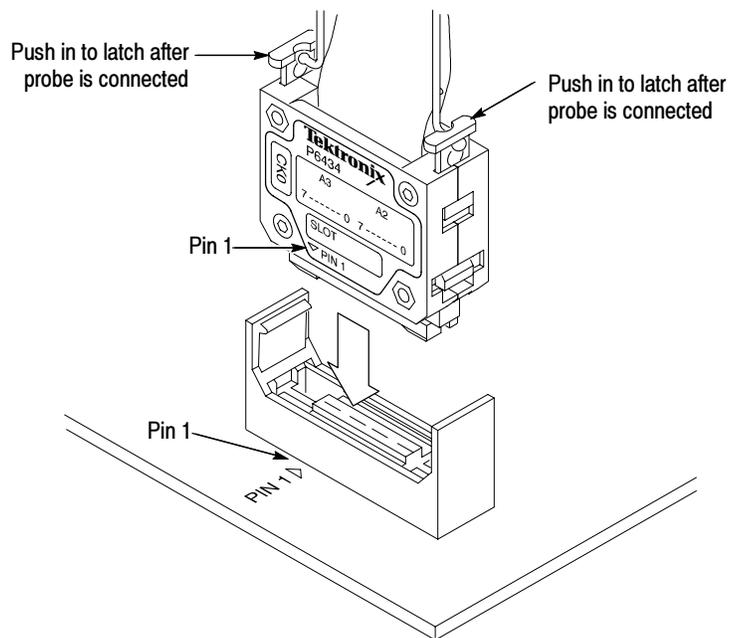


Figure 1-7: Connecting a probe to the probe adapter

4. Match the A, C, and D probes from the Slave module with the corresponding S_A, S_C, and S_D probe connectors on the probe adapter. Align the pin 1 indicator on the probe label with pin 1 of the connector on the probe adapter.
5. Repeat steps 2 and 3.

Configuring the Probe Adapter

The probe adapter uses jumpers to acquire data for disassembly or for timing analysis. Figure 1-8 shows the location of the jumpers.

MODE Jumper Place the MODE select jumper, J140, in the NORMAL position to acquire data for disassembly (IA32G5) or synchronous timing analysis (IA32G5_T) using Custom clocking.

Place the MODE select jumper, J140, in the TRANSPARENT position to acquire data for asynchronous timing analysis with the IA32G5_T setup using Internal clocking.

NOTE. Due to setup/hold requirements, the TRANSPARENT mode is not recommended for synchronous acquisitions. All synchronous timing analysis is done in the NORMAL mode with the IA32G5_T setup.

FREQUENCY Jumper Place the FREQUENCY select jumper J160, in the HI position when operating between 120 and 200 MHz. Place the FREQUENCY select jumper J160, in the LO position when operating between 60 and 140 MHz.

Figure 1-8 shows the location of J140 and J160 on the probe adapter.

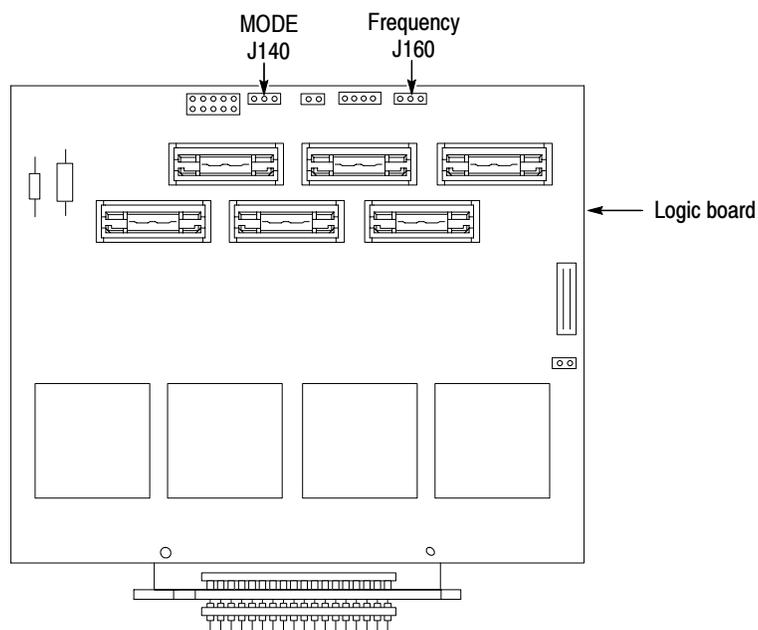


Figure 1-8: Jumper locations on the TMSPGC probe adapter

Alternate Connections

JTAG The TMSPGC probe adapter logic board provides J490 as a way to connect to JTAG debugging hardware. JTAG debugging hardware is not included with the TMSPGC PGA370 hardware support package. Contact your microprocessor vendor for information on how to obtain JTAG debugging hardware.

NOTE. *The JTAG circuitry on the Logic board is active only when the JTAG device is connected to J490. If the JTAG device is disconnected from J490, all JTAG data and control lines on the logic board are tristated.*

Optional System Reset. The JTAG circuitry on the Logic board does not allow external JTAG debugging hardware to induce a system reset through the DBRESET# signal on the JTAG port. If you need to use this feature you must provide the connection from these pins to the target system. The following Table 1-1 lists the signals on the J590.

Table 1-1: DBRESET information

J590 Pin number	JTAG signal name
1	GND
2	DBRESET#

Figure 1-9 shows the location of the DBRESET# and JTAG port on the logic board of the probe adapter.

When using the JTAG port on the TMSPGC probe adapter, use the 363 pin protective socket (see page 1-6). Use the 370 pin protective socket at all other times.

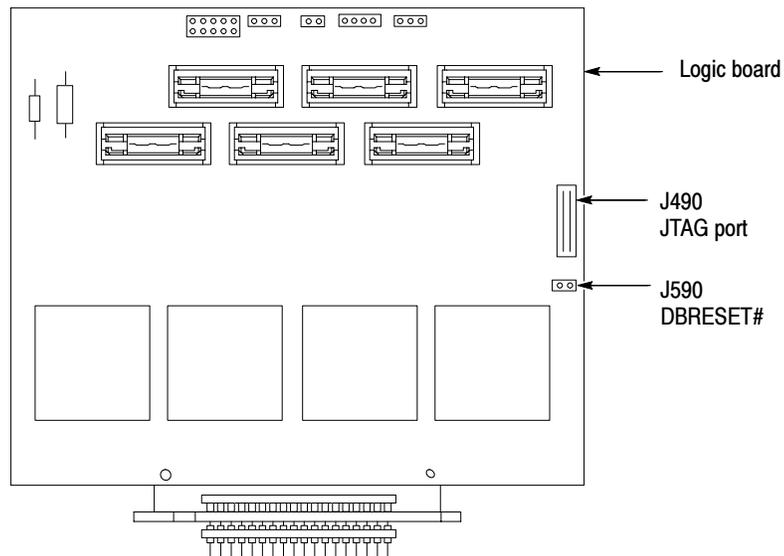


Figure 1-9: JTAG port locations on the probe adapter

APIC Four pins on J150 are provided to connect the TMS801 APIC bus probe adapter to the PICCLK, PICD0, and PICD1 signals for APIC bus support. The TMS801 APIC bus probe adapter is not included with the TMSPGC hardware support package. Contact a Tektronix representative for information on how to obtain the TMS801 APIC bus probe adapter.

Table 1-2: APIC information

J150 Pin number	Microprocessor pin name	Microprocessor signal name
1	GND	-
2	J33	PICCLK
3	L35	PICD1
4	J35	PICD0

Figure 1-10 show the APIC bus signal pins for the TMSPGC probe adapter.

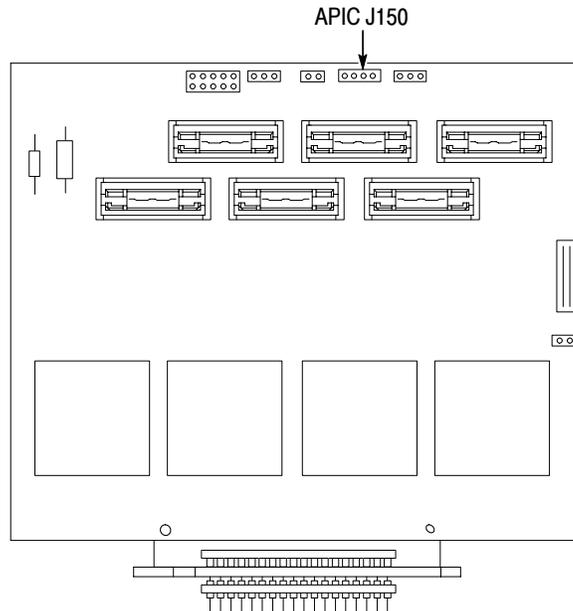


Figure 1-10: APIC pin locations on the probe adapter

Applying and Removing Power

An AC adapter for the TMSPGC probe adapter is included with this TMSPGC PGA370 hardware support. The AC adapter provides +5 volt power to the probe adapter.

NOTE. *Whenever you power off the target system, be sure to remove power from the probe adapter.*

To apply power to the TMSPGC probe adapter and target system, follow these steps:



CAUTION. *Failure to use the +5 V AC adapter provided by Tektronix can permanently damage the probe adapter, PGA370 microprocessor, and target system. Do not mistake another AC adapter that looks similar to the +5 V AC adapter.*

1. Connect the +5 V AC adapter to the jack on the probe adapter. Figure 1-11 shows the location of the jack on the Logic board.

NOTE. Failure to apply power to the probe adapter before applying power to the target system may cause erratic behavior.

2. Plug the AC adapter for the probe adapter into an electrical outlet. When power is present on the probe adapter, an LED lights near the power jack. Also, four green LEDs are lighted on the front side of the Logic board.
3. Power on the target system.

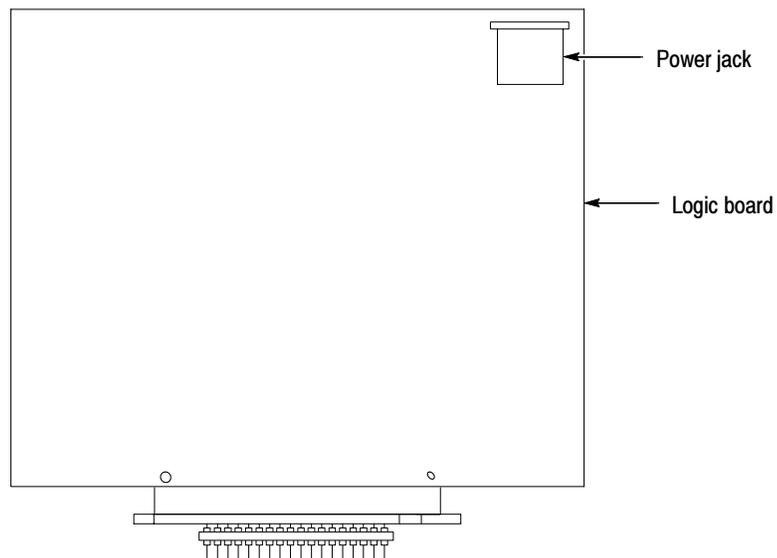


Figure 1-11: Location of the power jack

To remove power from the target system and the probe adapter, follow these steps:

NOTE. Failure to power down the target system before removing power from the probe adapter may cause erratic behavior.

1. Power off the target system.
2. Unplug the AC adapter for the probe adapter from the electrical outlet.



Reference

Reference: Channel Tables

This section lists the channel group tables for disassembly and timing.

Channel Assignments

Channel assignments shown in Tables 2-1 through 2-8 use the following conventions:

- All signals where a CPU pin number is not listed are derived signals.
- A pound sign (#) following a signal name indicates an active low signal.
- The CPU pin number always applies to the IA32G5_T column and to the IA32G5 column, except those signals that are indicated as demuxed during the B phase of a request.

Tables 2-1 and 2-8 list the logic analyzer channel assignments.

Table 2-1: Clock channels assignments

Clock channel	IA32G5 support channel name	IA32G5_T support channel name	CPU pin numbers
M_CLK:3	--	--	---
M_CLK:2	--	TDO	AN37
M_CLK:1	PHASE_D	PHASE_D	---
M_CLK:0	BCLK	BCLK	W37
S_CLK:3	--	RSVD_Y37	Y37
S_CLK:2	--	TDI	AN35
S_CLK:1	--	TCK	AL33
S_CLK:0	--	TMS	AK32

Table 2-2: Qualifier channel assignments

Qualifier channel	IA32G5 support channel name	IA32G5_T support channel name	CPU pin number
M_QUAL:1	--	RSVD_X34	X34
M_QUAL:0	--	RSVD_AF36	AF36
S_QUAL:1	--	RSVD_X4	X4
S_QUAL:0	--	TRST#	AN33

Table 2-3: Master A channel assignments

LA channel	IA32G5 support channel name	IA32G5_T support channel name	CPU pin number
M_A3:7	A31#	A31#	AD4
M_A3:6	A30#	A30#	AA3
M_A3:5	A29#	A29#	Z4
M_A3:4	A28#	A28#	AK6
M_A3:3	A27#	A27#	AA1
M_A3:2	A26#	A26#	Y3
M_A3:1	A25#	A25#	AF6
M_A3:0	A24#	A24#	AB4
M_A2:7	A23#	A23#	AB6
M_A2:6	A22#	A22#	AE3
M_A2:5	A21#	A21#	AJ1
M_A2:4	A20#	A20#	AC3
M_A2:3	A19#	A19#	AG3
M_A2:2	A18#	A18#	Z6
M_A2:1	A17#	A17#	AE1
M_A2:0	A16#	A16#	AN7
M_A1:7	A15#	A15#	AL5
M_A1:6	A14#	A14#	AK14
M_A1:5	A13#	A13#	AL7
M_A1:4	A12#	A12#	AN5
M_A1:3	A11#	A11#	AK10
M_A1:2	A10#	A10#	AH6
M_A1:1	A9#	A9#	AL9
M_A1:0	A8#	A8#	AH10
M_A0:7	A7#	A7#	AL15
M_A0:6	A6#	A6#	AN9
M_A0:5	A5#	A5#	AH8
M_A0:4	A4#	A4#	AH12
M_A0:3	A3#	A3#	AK8

Table 2-3: Master A channel assignments (cont.)

LA channel	IA32G5 support channel name	IA32G5_T support channel name	CPU pin number
M_A0:2	A2#	A2# §	--
M_A0:1	A1#	A1# §	--
M_A0:0	A0#	A0# §	--

§ Forced to inactive state, except in MagniVu

Table 2-4: Master D channel assignments

LA channel	IA32G5 support channel name	IA32G5_T support channel name	CPU pin number
M_D3:7	ATTR7#	BNT_OBS#	--
M_D3:6	ATTR6#	SCNTE_D	--
M_D3:5	ATTR5#	--	--
M_D3:4	ATTR4#	--	--
M_D3:3	ATTR3#	--	--
M_D3:2	ATTR2#	SMI#	AJ35
M_D3:1	ATTR1#	IGNNE#	AG37
M_D3:0	ATTR0#	--	--
M_D2:7	DID7#	RSVD_L33	L33
M_D2:6	DID6#	FERR#	AC35
M_D2:5	DID5#	LINT1	L37
M_D2:4	DID4#	PICD1	L35
M_D2:3	DID3#	PICCLK	J33
M_D2:2	DID2#	BP2#	G33
M_D2:1	DID1#	BPM1#	E35
M_D2:0	DID0#	PRDY#	A35
M_D1:7	BE7#	AER_OBS#	--
M_D1:6	BE6#	RCNTE_D	--
M_D1:5	BE5#	--	--
M_D1:4	BE4#	STPCLK#	AG35
M_D1:3	BE3#	A20M#	AE33
M_D1:2	BE2#	RSVD_AN3	AN3
M_D1:1	BE1#	IERR#	AE35

Table 2-4: Master D channel assignments (cont.)

LA channel	IA32G5 support channel name	IA32G5_T support channel name	CPU pin number
M_D1:0	BE0#	LINT0	M36
M_D0:7	EXF4#	PREQ#	J37
M_D0:6	EXF3#	RESERVED	R2
M_D0:5	EXF2#	RESERVED	N33
M_D0:4	EXF1#	BP3#	E37
M_D0:3	EXF0#	BPM0#	C35
M_D0:2	--	A2_D# §	--
M_D0:1	--	A1_D# §	--
M_D0:0	--	A0_D# §	--

§ Not valid in MagniVu

Table 2-5: Master C channel assignments

LA channel	IA32G5 support channel name	IA32G5_T support channel name	CPU pin number
M_C3:7	ADS#	ADS#	AN31
M_C3:6	DBSY#	DBSY#	AL27
M_C3:5	RPb#	BREQ0#	AN29
M_C3:4	HITM#	HITM#	AL23
M_C3:3	TRDY#	TRDY#	AN25
M_C3:2	AERR#	AERR#	AK24
M_C3:1	REQb4#	BPRI#	AN17
M_C3:0	REQb3#	--	--
M_C2:7	LOCK#	LOCK#	AK20
M_C2:6	REQb2#	--	--
M_C2:5	REQb0#	--	--
M_C2:4	REQb1#	--	--
M_C2:3	BNR#	BNR#	AH14
M_C2:2	APb0#	--	--
M_C2:1	APb1#	--	--
M_C2:0	--	--	--
M_C1:7	RS2#	RS2#	AK28

Table 2-5: Master C channel assignments (cont.)

LA channel	IA32G5 support channel name	IA32G5_T support channel name	CPU pin number
M_C1:6	DRDY#	DRDY#	AN27
M_C1:5	RP#	RP#	AN23
M_C1:4	HIT#	HIT#	AL25
M_C1:3	RS0#	RS0#	AH26
M_C1:2	RS1#	RS1#	AH22
M_C1:1	REQ4#	REQ4#	AL17
M_C1:0	REQ3#	REQ3#	AL19
M_C0:7	DEFER#	DEFER#	AN19
M_C0:6	REQ2#	REQ2#	AH18
M_C0:5	REQ0#	REQ0#	AK18
M_C0:4	REQ1#	REQ1#	AH16
M_C0:3	RSVD_AK30	RSVD_AK30	AK30
M_C0:2	AP0#	AP0#	AL11
M_C0:1	AP1#	AP1#	AN13
M_C0:0	RESET#	RESET#	AH4

Table 2-6: Slave A channel assignments

LA channel	IA32G5 support channel name	IA32G5_T support channel name	CPU pin number
S_A3:7	D42#	D42#	D12
S_A3:6	D49#	D49#	C13
S_A3:5	D27#	D27#	F12
S_A3:4	D48#	D48#	A17
S_A3:3	D57#	D57#	A19
S_A3:2	D63#	D63#	F16
S_A3:1	D46#	D46#	A21
S_A3:0	D54#	D54#	C21
S_A2:7	D50#	D50#	C25
S_A2:6	D53#	D53#	A23
S_A2:5	D62#	D62#	E25
S_A2:4	DEP7#	DEP7#	A29

Table 2-6: Slave A channel assignments (cont.)

LA channel	IA32G5 support channel name	IA32G5_T support channel name	CPU pin number
S_A2:3	DEP6#	DEP6#	E29
S_A2:2	DEP4#	DEP4#	E31
S_A2:1	DEP0#	DEP0#	C33
S_A2:0	DEP3#	DEP3#	A31
S_A1:7	D45#	D45#	C11
S_A1:6	D51#	D51#	A13
S_A1:5	D40#	D40#	C15
S_A1:4	D47#	D47#	A15
S_A1:3	D59#	D59#	C17
S_A1:2	D41#	D41#	D14
S_A1:1	D52#	D52#	D16
S_A1:0	D55#	D55#	C19
A_A0:7	D58#	D58#	C23
S_A0:6	D60#	D60#	A25
S_A0:5	D61#	D61#	A27
S_A0:4	D56#	D56#	C27
S_A0:3	DEP5#	DEP5#	C29
S_A0:2	DEP1#	DEP1#	C31
S_A0:1	BINIT#	BINIT#	B36
S_A0:0	DEP2#	DEP2#	A33

Table 2-7: Slave D channel assignments

LA channel	IA32G5 support channel name	IA32G5_T support channel name	CPU pin number
S_D3:7	D14#	D14#	N3
S_D3:6	D17#	D17#	R4
S_D3:5	D18#	D18#	P4
S_D3:4	D11#	D11#	M4
S_D3:3	D16#	D16#	H4
S_D3:2	D7#	D7#	J1
S_D3:1	D23#	D23#	G3
S_D3:0	D26#	D26#	E1
S_D2:7	D33#	D33#	C1
S_D2:6	D29#	D29#	A3
S_D2:5	D31#	D31#	C5
S_D2:4	D43#	D43#	A7
S_D2:3	D36#	D36#	C9
S_D2:2	D32#	D32#	F6
S_D2:1	D37#	D37#	A9
S_D2:0	D44#	D44#	A11
S_D1:7	D2#	D2#	N1
S_D1:6	D13#	D13#	L1
S_D1:5	D9#	D9#	P6
S_D1:4	D3#	D3#	M6
S_D1:3	D24#	D24#	K6
S_D1:2	D20#	D20#	L3
S_D1:1	D30#	D30#	J3
S_D1:0	D21#	D21#	G1
S_D0:7	D25#	D25#	E3
S_D0:6	D35#	D35#	B2
S_D0:5	D28#	D28#	A5
S_D0:4	D34#	D34#	C7
S_D0:3	D38#	D38#	D8
S_D0:2	D19#	D19#	H6

Table 2-7: Slave D channel assignments (cont.)

LA channel	IA32G5 support channel name	IA32G5_T support channel name	CPU pin number
S_D0:1	D22#	D22#	F8
S_D0:0	D39#	D39#	D10

Table 2-8: Slave C channel assignments

LA channel	IA32G5 support channel name	IA32G5_T support channel name	CPU pin number
S_C3:7	Ab35#	RESERVED	X2
S_C3:6	Ab33#	PICD0	J35
S_C3:5	Ab32#	RSVD_AM2	AM2
S_C3:4	D0#	D0#	W1
S_C3:3	Ab34#	THRMTRP#	AH28
S_C3:2	SLP#	SLP#	AH30
S_C3:1	FLUSH#	FLUSH#	AE37
S_C3:0	RSVD_F10	RSVD_F10	F10
S_C2:7	BERR#	BERR#	V4
S_C2:6	D1#	D1#	T4
S_C2:5	D8#	D8#	S1
S_C2:4	D12#	D12#	Q1
S_C2:3	TRCK_ER_D	TRCK_ER_D	--
S_C2:2	RCNT1_D	RCNT1_D	--
S_C2:1	SCNT0_D	SCNT0_D	--
S_C2:0	SCNT2_D	SCNT2_D	--
S_C1:7	A35#	A35#	AF4
S_C1:6	A33#	A33#	AC1
S_C1:5	A32#	A32#	X6
S_C1:4	--	PWRGOOD	AK26
S_C1:3	A34#	A34#	W3
S_C1:2	INIT#	INIT#	AG33
S_C1:1	RSP#	RSP#	AC37
S_C1:0	D4#	D4#	U1
S_C0:7	D15#	D15#	U3

Table 2-8: Slave C channel assignments (cont.)

LA channel	IA32G5 support channel name	IA32G5_T support channel name	CPU pin number
S_C0:6	D6#	D6#	T6
S_C0:5	D5#	D5#	S3
S_C0:4	D10#	D10#	Q3
S_C0:3	RCNT0_D	RCNT0_D	--
S_C0:2	RCNT2_D	RCNT2_D	--
S_C0:1	SCNT1_D	SCNT1_D	--
S_C0:0	SNOOP_D	SNOOP_D	--



Specifications

Specifications

This section contains information regarding the specifications of the TMSPGC PGA370 microprocessor hardware support.

Circuit Description

The following is a description of Signal Probing and JTAG circuitry.

Signal Probing

The TMSPGC probe adapter uses series isolation resistors on all signals. For most signals (see Figures 3-1 to 3-3), the probe adapter presents an active device load.

JTAG

The TMSPGC probe adapter provides a connection point for JTAG debugging device. In addition to the JTAG (J490) port, the probe adapter contains circuitry to terminate the JTAG control and data signals to their appropriate voltage levels. The JTAG circuitry on the probe adapter supports only 1.5 V CMOS.

When using the JTAG port on the probe adapter, a 363-pin protective socket must be installed on the system under test to isolate the JTAG signals between the system under test and the probe adapter. Isolating the JTAG signals allows the probe adapter to control the JTAG signals on the microprocessor.

The JTAG circuitry on the probe adapter can only control the JTAG signals when an JTAG device is plugged into the JTAG port on the logic board. When the cable is removed, all JTAG data and control lines are tristated.

The 363-pin protective socket must be used only when an JTAG device is plugged into the JTAG port on the Logic board. When using the 363-pin protective socket, connect the JTAG device to the JTAG port on the Logic board, before powering on the system under test.

Probe Adapter Loading Diagrams

Figures 3-1 through 3-5 are provided for loading reference.

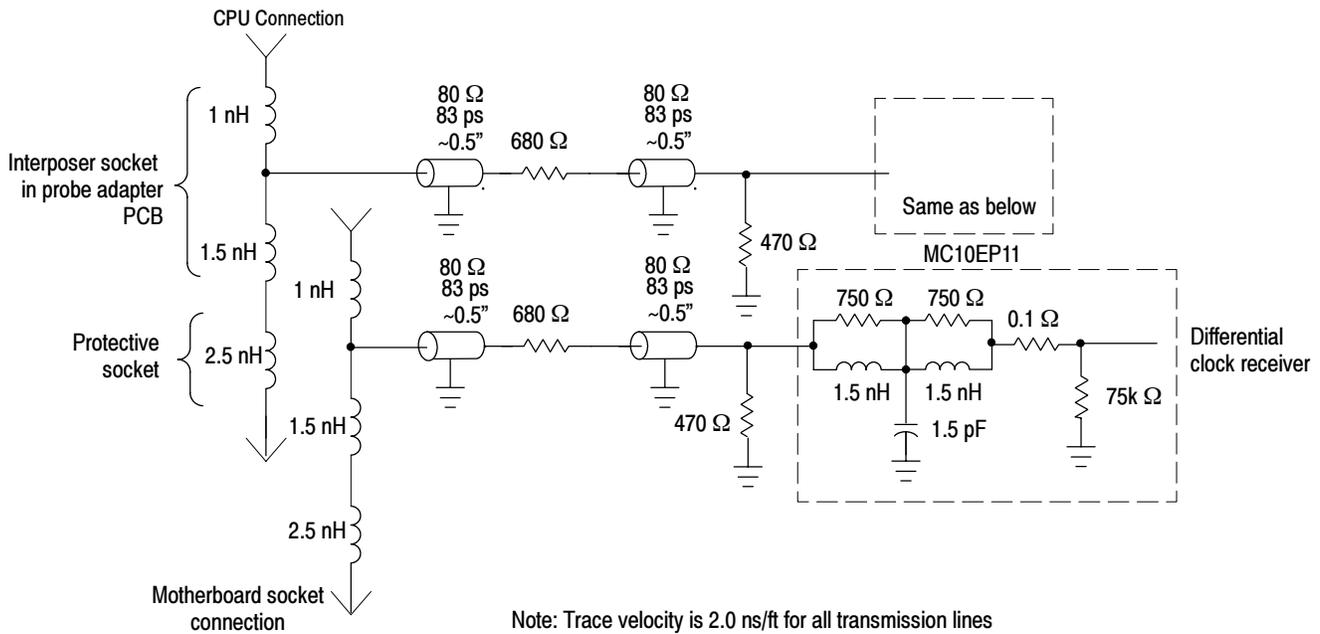


Figure 3-1: BCLK and BCLK# signals with active loads

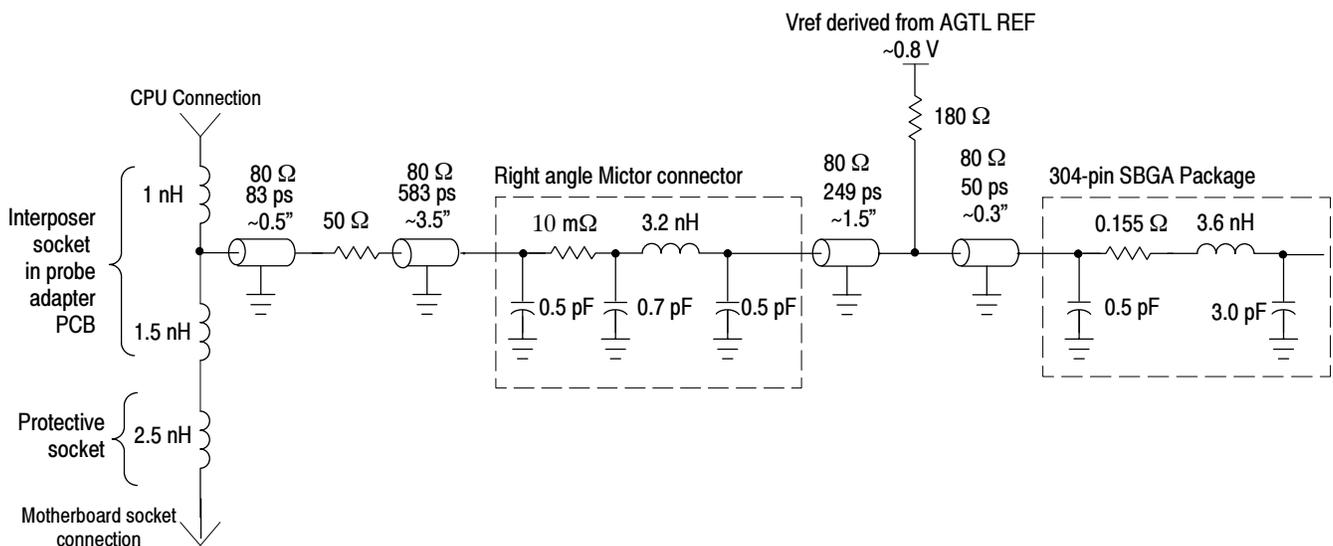


Figure 3-2: AGTL signals with active loads, except RESET#

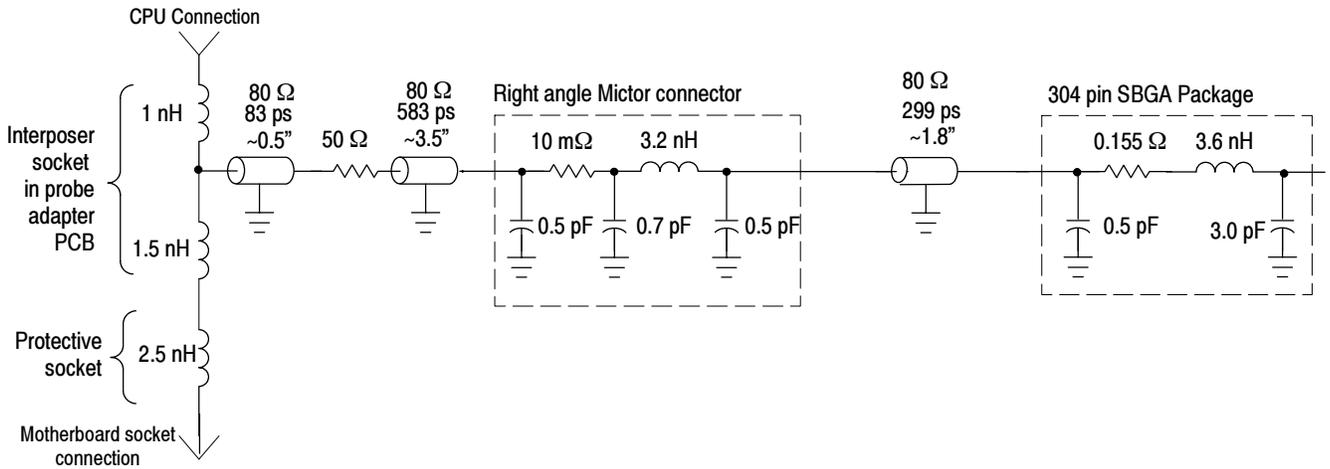


Figure 3-3: CMOS signals with active loads, plus RESET#

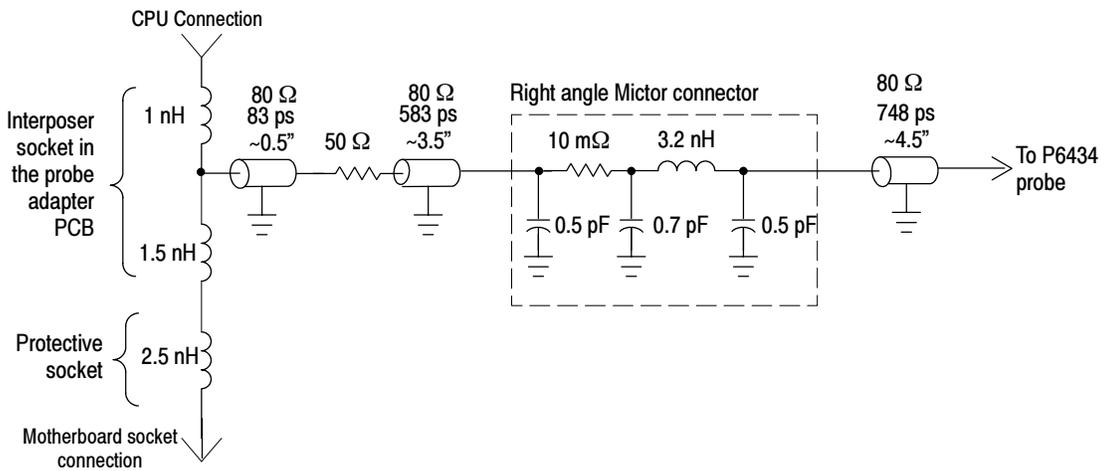


Figure 3-4: JTAG signals without active loads

Figure 3-5 applies only to those signals that do not have an active load.

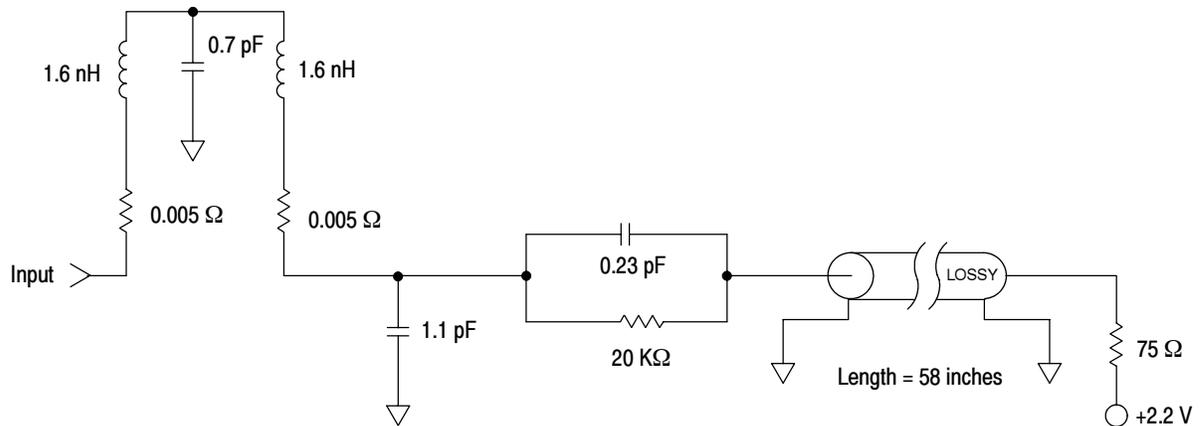


Figure 3-5: Equivalent circuit for the P6434 probe

Table 3-1 shows the values you can use to calculate characteristics of the Lossy delay lines shown in Figure 3-5, which is the equivalent circuit of the P6434 probe.

Table 3-1: Lossy delay line values

Characteristic	Value
C (capacitance)	1.58 pF per inch
L (inductance)	8.9 nH per inch
R (resistance)	.067 Ω per inch
Z ₀ (impedance)	75 Ω

Specification Tables

These specifications are for the TMSPGC probe adapter connected between a Tektronix logic analyzer and a system under test.

Table 3-2 lists the electrical requirements of the system under test. Table 3-7 lists the electrical requirements for the AC adapter that provides power to the TMSPGC probe adapter. Table 3-8 lists the environmental specifications. Table 3-3 lists the BCLK timing restrictions and electrical specifications.

Table 3-2: Electrical specifications for the target system

Characteristics	Requirements
Maximum clock rate	133 MHz
Minimum setup time required, all signals	1.0 ns
Minimum hold time required, all signals	0.4 ns

Table 3-3: BCLK and BCLK# electrical specifications, differential clock

Characteristics	Minimum	Maximum	Units	Notes
V_{in} (low)	0.1	-	V	
V_{in} (high)	-	1.1	V	
Duty Cycle	45	55	%	
t_r	0.3	0.6	ns	Monotonically increasing
t_f	0.3	0.6	ns	Monotonically decreasing
V_{in} (differential)	± 0.3	± 1.0	V	

Table 3-4: BCLK and CLKREF electrical specifications, single-ended clock

Characteristics	Minimum	Maximum	Units	Notes
V_{in} (low)	- 0.15	CLKREF -0.3	V	
V_{in} (high)	CLKREF +0.3	2.50	V	
Duty Cycle	45	55	%	
t_r	0.3	0.6	ns	Monotonically increasing
t_f	0.3	0.6	ns	Monotonically decreasing
CLKREF	1.17	1.33	V	1.25 V 6.5%

Table 3-5: AGTL electrical specifications

Characteristics	Minimum	Maximum	Units	Notes
AGTL(1.2 V)				
V _{in} (low)	-0.15	GTLREF -0.2	V	
V _{in} (high)	GTLREF +0.2	1.20	V	
GTLREF	0.776	0.824	V	0.8 v ±3%
AGTLT(1.5 V)				
V _{in} (low)	-0.15	GTLREF -0.2	V	
V _{in} (high)	GTLREF +0.2	1.50	V	
GTLREF	0.95	1.05	V	1.0 v ±5%

Table 3-6: CMOS electrical specifications (1.5 V)

Characteristics	Minimum	Maximum	Units	Notes
V _{in} (low)	-0.15	CMOSREF -0.2	V	
V _{in} (high)	CMOSREF +0.2	1.50	V	
CMOSREF	0.90	1.10	V	1.0 v ±10%

Table 3-7: Electrical specifications for the AC adapter

Characteristic	Description
Input Voltage rating	100 - 250 VAC CAT II
Input Frequency Rating	47 - 63 Hz
Input Current Rating	1 A Maximum, at 90 VAC
Output Voltage Rating	5 V
Output Current Rating	8 A
Output Power Rating	40 W

Table 3-8: Environmental specifications

Characteristic¹	Description
Temperature	
Maximum operating	+50 °C (+122° F) ²
Minimum operating	0 °C (+32 °F)
Nonoperating	-55 °C to +75 °C (-67 ° to +167 °F)
Humidity	10 to 95% relative humidity, noncondensing
Altitude	
Operating	4.5 km (15,000 ft) maximum
Nonoperating	15 km (50,000 ft) maximum
Electrostatic immunity	The probe adapter is static sensitive

¹ **Designed to meet Tektronix standard 062-2847-00 class 5.**

² **Not to exceed microprocessor thermal considerations. Forced air cooling may be required across the CPU.**

Dimensions Figure 3-6 shows the dimensions of the TMSPGC probe adapter.

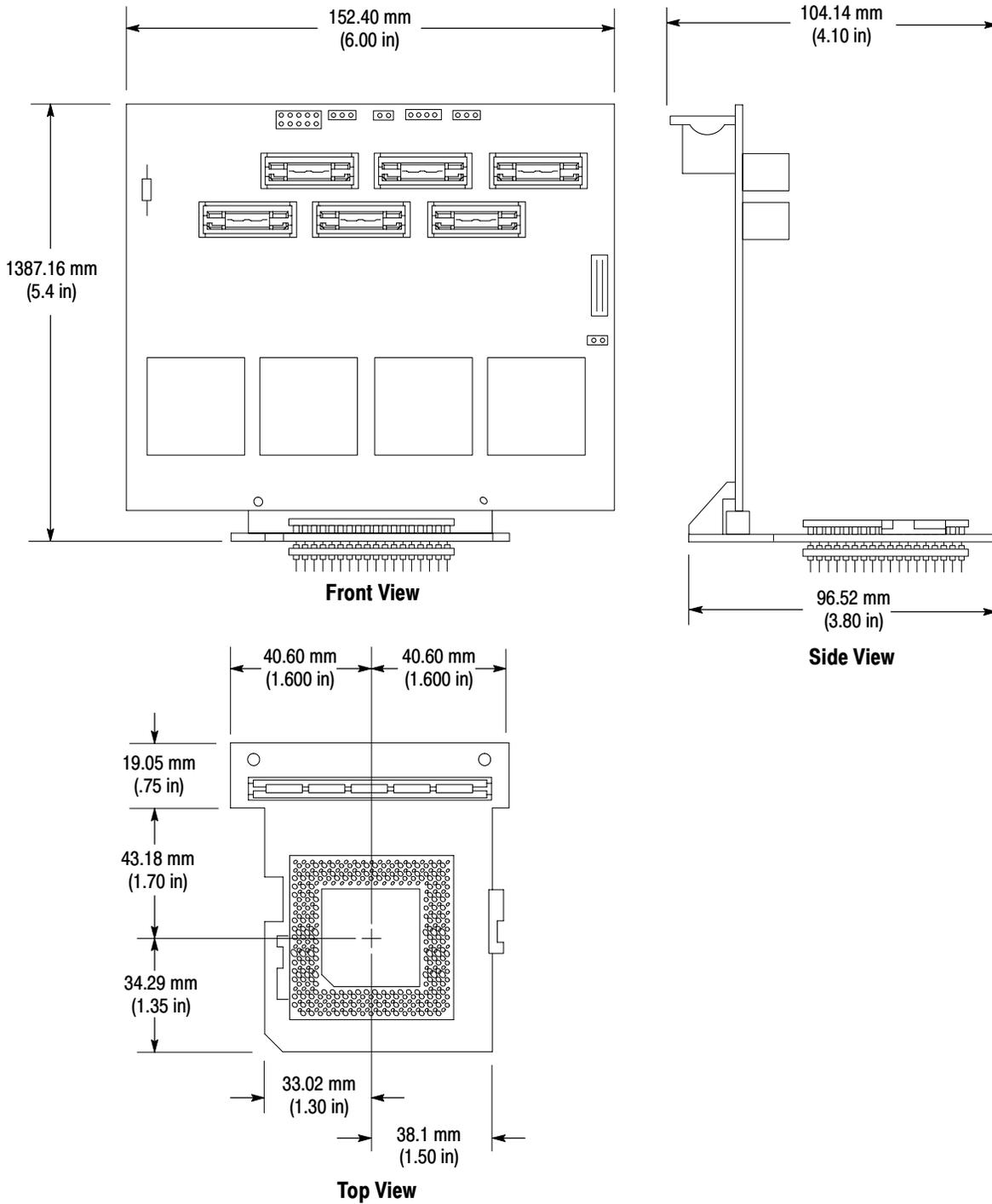


Figure 3-6: Dimensions of the TMSPGC probe adapter



Maintenance

Maintenance

This section contains information on replacing the probe-adapter fuse.

Replacing The Fuse

If the fuse on the probe adapter opens (burns out), you can replace it with a 7 A, 125 V fuse. Figure 4-1 illustrates the location of the fuse on the TMSPGC probe adapter. See the *Replaceable Mechanical Parts* chapter for part descriptions.

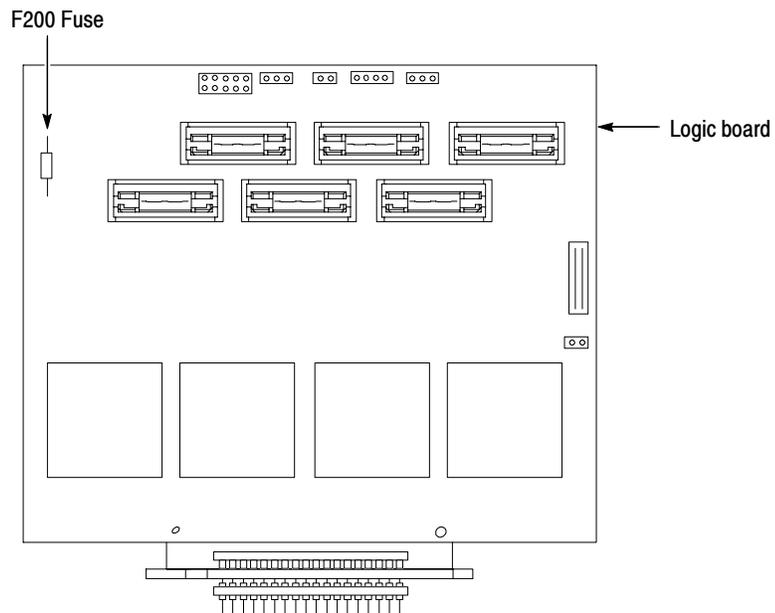


Figure 4-1: Fuse location on the TMSPGC probe adapter



Replaceable Parts List

Replaceable Parts List

This section contains a list of the replaceable components for the TMSPGC PGA370 Hardware support package.

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.

Using the Replaceable Parts List

The tabular information in the Replaceable 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
80009	TEKTRONIX INC	14150 SW KARL BRAUN DR PO BOX 500	BEAVERTON, OR 97077-0001
14310	AULT INC	7105 NORTHLAND TERRACE	MINNEAPOLIS, MN 55428-1534
3N087	MILL-MAX MANUFACTURING CORP	190 PINE HOLLOW RD PO BOX 300	OYSTER BAY, NY 11771
46384	PENN ENGINEERING & MFG CORP	OLD EASTON RD PO BOX 1000	DANBORO, PA 18916
5Y400	TRIAx METAL PRODUCTS INC	1880 SW MERLO DRIVE	BEAVERTON, OR 97006
TK0AT	AMP, INC	7-15-14 ROPPOINGI MINATO-KU	TOKYO JAPAN,
TK2548	XEROX CORPORATION	14181 SW MILLIKAN WAY	BEAVERTON, OR 97005
00779	TYCO ELECTRONICS CORPORATION	CUSTOMER SERVICE DEPT PO BOX 3608	HARRISBURG, PA 17105-3608
07707	POP FASTENERS	510 RIVER RD	SHELTON, CT 06484-4517
26742	METHODE ELECTRONICS INC	7444 WEST WILSON AVE	CHICAGO, IL 60656-4548
50579	SIEMENS COMPONENTS INC	OPTOELECTRONICS DIVISION 1900 HOMESTEAD RD	CUPERTINO, CA 95014
53387	3M COMPANY	ELECTRONICS PRODUCTS DIV 3M AUSTIN CENTER	AUSTIN, TX 78769-2963
59124	KOA SPEER ELECTRONICS INC	BOLIVAR DRIVE PO BOX 547	BRADFORD, PA 16701
60381	PRECISION INTERCONNECT CORP.	16640 SW 72ND AVE	PORTLAND, OR 97224
61429	FOX ELECTRONICS	DIV OF FOX ENTERPRISED INC 5842 CORPORATION CIRCLE	FORT MEYERS, FL 33905
61857	SAN-O INDUSTRIAL CORP	91-3 COLIN DRIVE	HOLBROOK, NY 11741

Replaceable parts list

Fig. & index number	Tektronix part number	Serial no. effective	Serial no. discont'd	Qty	Name & description	Mfr. code	Mfr. part number
5-1-0	010-0643-00 †			1	PROBE ADAPTER:PGA-370,BASE AND LOGIC BOARDS,TMSPGC	80009	010-0643-00
1	671-5298-00			1	CIRCUIT BOARD:LOGIC,TMSPGC,	80009	671-5298-00
2	131-5267-00			1	CONN,HDR:PCB,MALE,STR,2 X 40,0.1 CTR,0.235 MLG X 0.110 TAIL,30GOLD, HIGH TEMP,	00779	104326-4
3	131-4530-00			2	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
4	131-4356-00			2	CONN,SHUNT:SHUNT/SHORTING,FEMALE,1X2,0.1 CTR,0.63 H,BLK,W/HANDLE,JUMPER,30 GOLD,	26742	9618-302-50
5	131-4917-00			2	CONN,HDR:PCB,MALE,STR,1 X 2,0.1 CTR,0.235 MLG X 0.110 TAIL,30 GOLD,TUBE,HIGH TEMP,	00779	104350-1
6	131-2919-01			1	CONN,HDR:PCB,MALE,STR,1 X 4,0.1 CTR,0.235 MLG X 0.112 TAIL,30 GOLD,0.035 DIA PCB,SAFETY	53387	2404-6112TB
7	131-6023-00			1	CONN,BOX:PCB,FEMALE,STR,2 X 15,0.05 X 0.1 CTR,0.350 H X 0.1 TAIL,30 GOLD,SYS 50,	00779	104078-4
8	131-6134-01			6	CONN,RCPT:SMD,MICTOR,FEMALE,STR,38 POS,0.025 CTR,0.240 H,W/0.108 PCB HOLD DOWNS.PALLADIUM	00779	767054-1
9	105-1089-00			6	LATCH ASSY:LATCH HOUSING ASSY,VERTICAL MOUNT,0.48 H X 1.24 L,W/PCB SINGLE CLIP,P6434	60381	105-1089-00
10	131-6465-00			1	CONN,PLUG:SMD/EDGE MOUNT,MICTOR,MALE,RTANG,190 POS,0.025 CTR,0.209 H,PALLADIUM NICKEL,MATC	TK0AT	767039-5
11	131-6466-00			1	CONN,RCPT:SMD,MICTOR,FEMALE,STR,190 POS,0.025 CTR,0.240 H,PALLADIUM NICKEL,IMPEDANCE MATCH	TK0AT	767054-5
12	136-1339-00			1	SOCKET,PGA:PCB,CUSTOMINTERSTITIALPGA,FEMALE,370 POS,STR,OPEN CENTER,0.270 L CONTACTS,30 G	3N087	S587-13-370-1254 05
13	671-5297-00			1	CIRCUIT BOARD:PGA-370,SE DIFF CLK,	01KV9	671-5297-00
14	136-1338-01			2	SOCKET,PGA:PCB,CUSTOMINTERSTITIALPGA,FEMALE,370 POS,STR,OPEN CENTER,0.125 L CONTACTS,30 G	3N087	S596-00-370-00-0 40400
15	136-1340-01			1	SOCKET,PGA:PCB,CUSTOMINTERSTITIALPGA,FEMALE,363 POS,WITH 7 PINS REMOVED,STR,OPEN CENTER,0	3N087	136-1340-01
16	407-4833-00			2	BRACKET:HEAT SINK HOLD DOWN,BRASS,TMSPGC	5Y400	407-4833-00
17	407-4677-00			2	BRACKET:BOARD MOUNT,0.036 CRS	5Y400	407-4677-00
18	220-0230-00			2	NUT,PEM:2-56 X .005 OD,SST	46384	KFS2 (2-56)
19	159-0146-00			1	FUSE,WIRE LEAD:7A,125V,FAST BLOW	61857	SP5-7A
20	131-5449-00			1	CONN,CIRC DIN:PCB,FEMALE,RTANG,5 POS,ON 0.276 PIN CIRCLE,0.73 H X 0.140 TAIL,SHLD W/MTG HOLES,	00779	520842-1
					STANDARD ACCESSORIES		
	071-0803-01				MANUAL,TECH:INSTRUCTION,PGA-370 SINGLE ENDED DIFFERENTIAL CLOCK HARDWARE, TMSPG,DP	TK2548	071-0803-01
	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,	S3109	ORDER BY DESCRIPTION

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
	119-6377-00			1	POWER SUPPLY:40W,5VDC 8A OUT,100 VAC 47-63 HZ IN,DESKTOP,PFC,REGULATED,5.08L X 3.05W X 1.59H,	14310	PW106MA0512Q01
					OPTIONAL ACCESSORIES		
	-----*			6	P6434 MASS TERMINATION PROBE, Opt 21 *	80009	ORDER BY DESCRIPTION
	161-0104-05			1	CA ASSY,PWR:3,1.0MM SQ,250V/10A,2.5 METER,RTANG,IEC320,RCPT,AUSTRALIA,SAFTEY CONTROLLED,	TK1373	161-0104-05
	161-0104-06			1	CA ASSY,PWR:3,1.0MM SQ,250V/10A,2.5 METER,RTANG,IEC320,RCPT,EUROPEAN,SAFTEY CONTROLLED,	TK1373	ORDER BY DESCRIPTION
	161-0104-07			1	CA ASSY,PWR:3,1.0MM SQ,240V/10A,2.5 METER,RTANG,IEC320,RCPT X 13A,FUSED,UK PLUG,(13A FUSE),UK PLUG,(13A FUSE),UNITED KINGDOM,SAFTEY CONTROL	TK2541	ORDER BY DESCRIPTION
	161-0167-00			1	CA ASSY,PWR:3,0.75MM SQ,250V/10A,2.5 METER,RTANG,IEC320,RCPT,SWISS,NO CORD GRIP,SAFTEY CONTR	S3109	ORDER BY DESCRIPTION

* Check the P6434 manual for detailed replaceable part number information.

† The above part numbers apply to the prototype product (TMSPGCP)

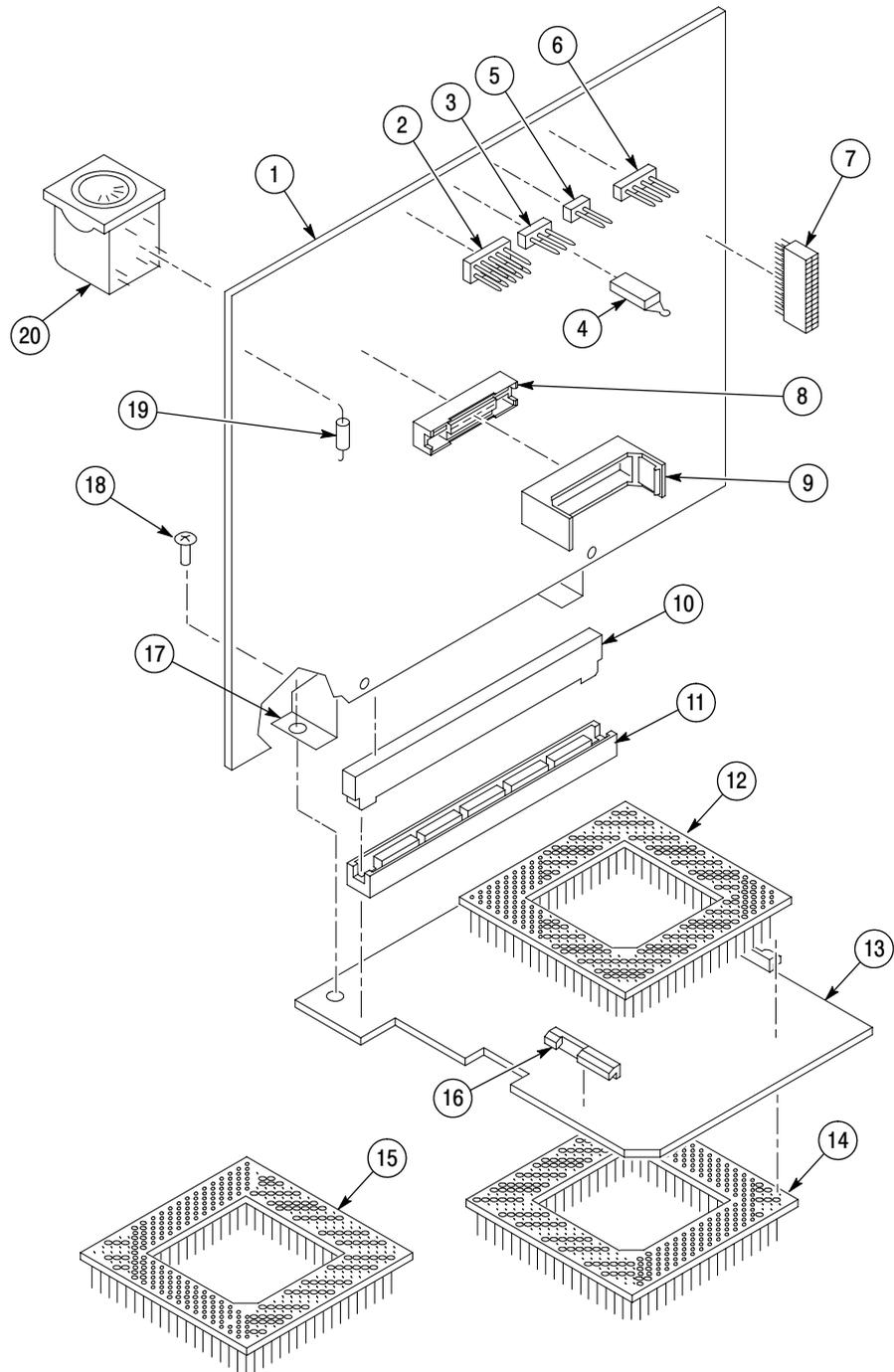


Figure 5-1: Exploded view of the TMSPGC PGA370 probe adapter



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