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Service Manual

Tektronix

TLA 700 Series Logic Analyzer Modules
TLA 7Lx & TLA 7Mx

070-9779-02

This document supports module firmware version 1.00 and above.

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.

CE

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Product installation service[1]	Option IN	Provides initial installation of the product and familiarizes new users with some of its operation features
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Test data	Option D3	Provides test data on delivery and when annual calibration services are provided (three total, requires Option C3)
Three years repair coverage	Option R3	Provides three years of repair coverage for the instrument, including displays and accessories sold with the instrument
One year uplift to on–site service[1,2]	Option S1	Converts the standard one year, “return to depot” warranty to provide service on site for one year
Three year uplift to on-site service[1,2]	Option S3	Converts any C3, D3, and R3 options purchased to on-site services for three years

Tektronix Service Options are available at the time you order your instrument. Contact your local Tektronix Sales Office for more information.

1 Availability of installation and on-site services depends on the type of product and may vary by geography.

2 Uplift options are ordered with the mainframe products and cover individual modules.

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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 instrument.

To Avoid Fire or Personal Injury

Ground the Product. This product is indirectly grounded through the grounding conductor of the mainframe power cord. To avoid electric shock, the grounding conductor must be connected to earth ground. Before making connections to the input or output terminals of the product, ensure that the product is properly grounded.

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.

The common terminal is at ground potential. Do not connect the common terminal to elevated voltages.

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.

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

This is the service manual for the TLA 7Lx/TLA 7Mx Logic Analyzer Module. Read this preface to learn how this manual is structured, what conventions it uses, and where you can find other information related to servicing this product. Read the *Introduction*, which follows this preface, for safety and other important background information needed before using this manual for servicing this product.

Manual Structure

The *TLA 7Lx/TLA 7Mx Logic Analyzer Module Service Manual* is divided into chapters, which are made up of related subordinate topics. These topics can be cross referenced as sections.

Be sure to read the introductions in the sections and subsections because they contain information that you will need to do the service correctly and efficiently.

A brief description of each chapter follows:

- *Specifications* contains a product description of the TLA 7Lx/TLA 7Mx Logic Analyzer Module and tables of the characteristics and descriptions that apply to it.
- *Operating Information* includes basic installation and operating instructions at the level needed to safely operate and service the TLA 7Lx/TLA 7Mx Logic Analyzer Module. For complete installation and configuration procedures, refer to the *TLA 700 Series Installation Manual*. Instructions for shipping the module are also found in this chapter.
- *Theory of Operation* contains circuit descriptions that support general service to the circuit board level.
- *Performance Verification* refers you to the *TLA 700 Series Performance Verification and Adjustment Technical Reference Manual* that contains the performance verification procedures for the TLA 7Lx/TLA 7Mx Logic Analyzer Module and for other major components in the TLA 700 Series Logic Analyzer.
- *Adjustment Procedures* refer you to the *TLA 700 Series Performance Verification and Adjustment Technical Reference Manual* that contains the adjustment procedures for the TLA 7Lx/TLA 7Mx Logic Analyzer Module and for other major components in the TLA 700 Series Logic Analyzer.

- *Maintenance* contains information and procedures for doing preventive and corrective maintenance on the TLA 7Lx/TLA 7Mx Logic Analyzer Module. Included are instructions for cleaning, for removal and installation of replaceable parts, and for troubleshooting to the circuit board level.
- *Options* contains information on servicing any of the factory-installed options that may be available for the TLA 7Lx/TLA 7Mx Logic Analyzer Module.
- *Diagrams* contains block diagrams and interconnection diagrams that are useful when isolating failed circuit boards.
- *Mechanical Parts List* includes a table of all replaceable parts, their descriptions, and their Tektronix part numbers.

Manual Conventions

This manual uses certain conventions that you should become familiar with before attempting service.

Acquisition Board

The acquisition board is one of the circuit boards inside the TLA 7Lx/TLA 7Mx Logic Analyzer Module. The circuit board receives and stores acquisition data from the probes and works with the LPU board to provide logic analysis information to the operator of the TLA 700 Series Logic Analyzer.

Adjustment Procedures

Adjustment procedures check for, and if necessary, correct any adjustment errors discovered when performing functional or performance verification procedures. Adjustment procedures are documented in the *TLA 700 Series Performance Verification and Adjustment Technical Reference Manual*.

Adjustment/Verification Fixture

The adjustment/verification fixture is a test fixture used to perform the adjustment, functional check, and performance verification procedures. Specifications and replaceable parts information are documented in this service manual. The procedures for using the test fixture are documented in the *TLA 700 Series Performance Verification and Adjustment Technical Reference Manual*.

Certification Procedures

Certification procedures are used to certify a product and provide a traceability path to national standards. These procedures are documented in the *TLA 700 Series Performance Verification and Adjustment Technical Reference Manual*.

Daughter Board

The daughter board provides additional channels for the TLA 700 Series Logic Analyzer. Data from these channels is sent to the acquisition board for processing with other data from the acquisition board.

Functional Verification Procedures

Functional verification procedures verify the basic functionality of the mainframe and the module inputs, outputs, and basic logic analyzer actions. These procedures include power-on and extended diagnostics, self calibration, as well as semi-automated or manual check procedures. These procedures can be used as incoming inspection purposes. This manual only provides information on power-on and extended diagnostics and the self calibration. Other functional verification procedures are provided in the *TLA 700 Series Performance Verification and Adjustment Technical Reference Manual*.

LPU Board

The Local Processor Unit (LPU) Board. The LPU board is one of the circuit boards inside the TLA 7Lx/TLA 7Mx Logic Analyzer Module that provides the main communications interface with the TLA 700 Series Logic Analyzer mainframe.

Maintenance Procedures

Maintenance procedures are used for fault isolation and repair to the circuit board level or to the replaceable part level.

Modules

Throughout this manual, the term *module* refers to a TLA 700 Series Logic Analyzer or DSO unit that mounts inside a TLA 700 Series Portable or Benchtop Mainframe. A module is composed of circuit cards, interconnecting cables, and a user-accessible front panel.

Performance Verification Procedures

Performance verification procedures confirm that a product meets or exceeds the performance requirements for each of the published specifications. These procedures are documented in the *TLA 700 Series Performance Verification and Adjustment Technical Reference Manual*.

Replaceable Parts

This manual refers to any field-replaceable assembly or mechanical part specifically by its name or generically as a replaceable part. In general, a replaceable part is any circuit board or assembly, such as the hard disk drive, or a mechanical part, such as the I/O port connectors, that is listed in the replaceable parts list.

Safety

Symbols and terms related to safety appear in the *Safety Summary* found at the beginning of this manual.

Related Manuals

The following manuals are available as part of the TLA 700 Series Logic Analyzer documentation set. (See *Standard Accessories* and *Optional Accessories* on page 10–20 for part numbers.)

The procedures and information in this manual assumes that service personnel have access to all manuals listed in the following table, except for the TLA 7QS (Quick Start) manuals.

Manual Name	Description	Service Use
The *TLA 700 Series Installation Manual*	Provides the basic installation instructions for the TLA 700 Series Logic Analyzer.	Installation and removal of DSO, Logic Analyzer, and Benchtop-Controller Modules Replacing individual podlet cables in the logic analyzer probes Reformatting the hard disk Reinstallation of Windows 95 and TLA 700 software
The *TLA 700 Series Performance Verification and Adjustment Technical Reference Manual*	Provides performance verification, certification, and adjustment procedures for the TLA 700 Series Logic Analyzer.	Performing periodic or after-repair functional or performance verifications, or calibration and certification Performing periodic or after-repair adjustment
The *TLA 700 Series User Manual* and *TLA 700 Online Help*	Provides operating information on the TLA 700 Series Logic Analyzer.	Augments operating information found in chapter 2 of this manual.
The *TLA 711 Color Benchtop Chassis Service Manual*	Provides service information for the benchtop chassis.	Isolating and correcting failures in the benchtop chassis
The *TLA 711 Color Benchtop Controller Service Manual*	Provides service information for the slot 0 controller in the benchtop chassis.	Isolating and correcting failures in the benchtop controller
The *TLA 704 Color Portable Mainframe Service Manual*	Provides service information for the portable mainframe.	Isolating and correcting failures in the portable mainframe
The *TLA 7Dx/TLA 7Ex Digitizing Oscilloscope Service Manual*	Provides service information for the digitizing oscilloscope modules.	Isolating and correcting failures in the DSO module
The *TLA 7QS Training Manual*	Provides examples of using the TLA QuickStart training board with TLA 700 Series Logic Analyzers.	None
The *TLA 7QS Technical Reference Manual*	Provides service information and technical information for the TLA QuickStart Training board.	Servicing the TLA Quickstart Training board only.

Introduction

This manual contains information needed to properly service the TLA 7Lx/ TLA 7Mx Logic Analyzer Module, as well as general information critical to safe and effective servicing.

To prevent personal injury or damage to the TLA 7Lx/TLA 7Mx Logic Analyzer Module, consider the following requirements before attempting service:

- The procedures in this manual should be performed only by a qualified service person.
- Read the *General Safety Summary* and *Service Safety Summary* found at the beginning of this manual.
- Read the *Preface* beginning on page *xi*.
- Read *Operating Information* beginning on page 2–3.

When using this manual for servicing, be sure to follow all warnings, cautions, and notes.

Adjustment and Certification Interval

Generally, you should perform the adjustments and certification (calibration) described in the *TLA 700 Series Performance Verification and Adjustment Technical Reference Manual* once per year or following repairs that affect adjustment or calibration.

Strategy for Servicing

This manual contains the information needed for periodic maintenance and service of the TLA 7Lx/TLA 7Mx Logic Analyzer Module.

This manual also supports and contains information for corrective maintenance of this product:

- supports isolation of faults to the failed circuit board or assembly level shown in the replaceable parts list
- supports removal and replacement of those boards or assemblies
- supports removal and replacement of fuse, knobs, chassis, and other mechanical parts listed in the replaceable parts list

This manual does *not* support component-level fault isolation and replacement.

Service Offerings

Tektronix provides service to cover repair under warranty as well as other services that are designed to meet your specific service needs.

Whether providing warranty repair service or any of the other services listed below, Tektronix service technicians are well equipped to service the TLA 7Lx/TLA 7Mx Logic Analyzer Module. Tektronix technicians train on Tektronix products; they have access to the latest information on improvements to the TLA 7Lx/TLA 7Mx Logic Analyzer Module as well as the latest new product upgrades. *Services are provided at Tektronix Services Centers and on-site at your facility, depending on your location.*

Warranty Repair Service

Tektronix warrants this product for one year from date of purchase. (The warranty appears behind the title page in this manual.) Tektronix technicians provide warranty service at most Tektronix service locations worldwide. The Tektronix product catalog lists all service locations worldwide or you can visit us on our *Customer Services World Center* web site at http://www.tek.com/Measurement/Service. See our latest service offerings and contact us by email.

Calibration and Repair Service

In addition to warranty repair, Tektronix Service offers calibration and other services which provide cost-effective solutions to your service needs and quality-standards compliance requirements. Our instruments are supported worldwide by the leading-edge design, manufacturing, and service resources of Tektronix to provide the best possible service.

The following services can be tailored to fit your requirements for calibration and/or repair of the TLA 7Lx/TLA 7Mx Logic Analyzer Module.

Service Options. Tektronix Service Options can be selected at the time you purchase your instrument. You select these options to provide the services that best meet your service needs. These service options are listed on the *Tektronix Service Options* page following the title page of this manual.

Service Agreements. If service options are not added to the instrument purchase, then service agreements are available on an annual basis to provide calibration services or post-warranty repair coverage for the TLA 7Lx/TLA 7Mx Logic Analyzer Module. Service agreements may be customized to meet special turn-around time and/or on-site requirements.

Service on Demand. Tektronix also offers calibration and repair services on a “per-incident” basis that is available with standard prices for many products.

Self Service. Tektronix supports repair to the replaceable-part level by providing for circuit board exchange.

Use this service to reduce down-time for repair by exchanging circuit boards for remanufactured ones. Tektronix ships updated and tested exchange boards. Each board comes with a 90-day service warranty.

When you exchange some circuit boards, such as the LPU board, you must supply the following information. This will allow the board to be preconfigured to the proper PowerFlex level for your logic analyzer. Alternatively, you can return the repaired module (with the necessary information) to your local service center for configuration.

- Model number
- Serial number
- PowerFlex option upgrade number
- Firmware level

For More Information. Contact your local Tektronix service center or sales engineer for more information on any of the Calibration and Repair Services just described.

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

Specifications

This chapter provides a general description of the logic analyzer module and a list of specifications under Characteristic Tables beginning on page 1–2.

Product Description

The logic analyzer module is designed to be used with either the benchtop mainframe or portable mainframe in a TLA 700 Series Logic Analyzer. The logic analyzer module is used as a test and measurement tool for high-speed digital timing and state acquisition across several channels.

Some of the key features of the logic analyzer module include the following:

- Standard channel widths and memory depths as listed in Table 1–1

Table 1–1: Logic analyzer module variations

Product	Number of channels	Memory depth
TLA 7L1	34	32 K[1]
TLA 7L2	68	32 K[1]
TLA 7L3	102	32 K[1]
TLA 7L4	136	32 K[1]
TLA 7M1	34	512 K
TLA 7M2	68	512 K
TLA 7M3	102	512 K
TLA 7M4	136	512 K

[1] **PowerFlex configurable to 128 K**

- 100 MHz synchronous acquisition with a programmable setup and hold window (PowerFlex configurable to 200 MHz)
- 250 MHz asynchronous full depth selections with selectable sampling rates
- 2 GHz asynchronous acquisition into a 2 K high resolution timing buffer
- 250 MHz trigger capability, plus special setup and hold violation triggering and glitch triggering
- Data correlation with other modules

Characteristic Tables

This section lists the specifications for the logic analyzer module. All specifications are guaranteed unless noted *Typical*. Specifications that are marked with the ✓ symbol are checked directly (or indirectly) in the *TLA 700 Series Performance Verification and Adjustment Technical Reference Manual*. The specifications apply to all versions of the logic analyzer module unless otherwise noted.

The performance limits in this specification are valid with these conditions:

- The logic analyzer module must have been calibrated/adjusted at an ambient temperature between +20° C and +30° C.
- The logic analyzer module must be in an environment with temperature, altitude, humidity, and vibration within the operating limits described in these specifications.
- The logic analyzer module must have had a warm-up period of at least 30 minutes.
- The logic analyzer module must have had its signal-path-compensation routine (self calibration) last executed after at least a 30 minute warm-up period.

Table 1–2: Channel width and depth

Characteristic	Description	
Number of channels	Product	Channels
	TLA 7L1 and TLA 7M1	32 data and 2 clock
	TLA 7L2 and TLA 7M2	64 data and 4 clock
	TLA 7L3 and TLA 7M3	96 data, 4 clock, and 2 qualifier
	TLA 7L4 and TLA 7M4	128 data, 4 clock, and 4 qualifier
Acquisition memory depth	Product	Memory depth
	TLA 7L1, TLA 7L2, TLA 7L3, TLA 7L4	32 K[1]
	TLA 7M1, TLA 7M2 ,TLA 7M3, TLA 7M4	512 K

1 **PowerFlex configurable to 128 K**

Table 1–3: Clocking

Characteristic	Description	
Asynchronous clocking		
✓ Internal sampling period[1]	4 ns to 50 ms in a 1–2–5 sequence	
✓ Minimum recognizable word[2] (across all channels)	Channel-to-channel skew + sample uncertainty Example: for a P6417 Probe and a 4 ns sample period = 1.6 ns + 4 ns = 5.6 ns	
Synchronous clocking		
Number of clock channels[3]	Product	Clock channels
	TLA 7L1 and TLA 7M1	2
	TLA 7L2 and TLA 7M2	4
	TLA 7L3 and TLA 7M3	4
	TLA 7L4 and TLA 7M4	4
Number of qualifier channels	Product	Qualifier channels
	TLA 7L1 and TLA 7M1	0
	TLA 7L2 and TLA 7M2	0
	TLA 7L3 and TLA 7M3	2
	TLA 7L4 and TLA 7M4	4
✓ Setup and hold window size (data and qualifiers)	Maximum window size = Maximum channel-to-channel skew + (2 x sample uncertainty) + 0.4 ns Maximum setup time = User interface setup time + 0.6 ns Maximum hold time = User interface hold time + 0.4 ns Maximum setup time for slave module of merged pair = User Interface setup time + 0.8 ns Maximum hold time for slave module of merged pair = User Interface hold time + 0.7 ns Example: for P6417 Probe and user interface setup & hold of 2.0/0.0 typical Maximum setup time = 2.0 ns + 0.6 ns = 2.6 ns Maximum hold time = 0.0 ns + 0.4 ns = 0.4 ns	
Setup and hold window size (data and qualifiers) (*Typical*)	Channel-to-channel skew (*typical*) + (2 x sample uncertainty) Example: for P6417 Probe = 1 ns + (2 x 500 ps) = 2 ns	
Setup and hold window range	The setup and hold window can be moved for each channel group from +8.5 ns (Ts) to –7.0 ns (Ts) in 0.5 ns steps (setup time). Hold time follows the setup time by the setup and hold window size.	
✓ Maximum synchronous clock rate[4]	200 MHz in full speed mode (5 ns minimum between active clock edges) 100 MHz in half speed mode (10 ns minimum between active clock edges)	

Table 1–3: Clocking (Cont.)

Characteristic	Description
Demux clocking	
Demux Channels (TLA 7L3 ,TLA 7L4, TLA 7M3, TLA 7M4)	Channels multiplex as follows: A3(7:0) to D3(7:0) A2(7:0) to D2(7:0) A1(7:0) to D1(7:0) A0(7:0) to D0(7:0)
(TLA 7L1, TLA 7L2, TLA 7M1, TLA 7M2)	Channels multiplex as follows: A3(7:0) to C3(7:0) A2(7:0) to C2(7:0) A1(7:0) to D1(7:0) TLA 7L2 and TLA 7M2 only A0(7:0) to D0(7:0) TLA 7L2 and TLA 7M2 only
Time between DeMux clock edges[4] (*Typical)*	5 ns minimum between DeMux clock edges in full-speed mode 10 ns minimum between DeMux clock edges in half-speed mode
Time between DeMux store clock edges[4] (*Typical)*	10 ns minimum between DeMux master clock edges in full-speed mode 20 ns minimum between DeMux master clock edges in half-speed mode
Clocking state machine	
Pipeline delays	Each channel can be programmed with a pipeline delay of 0 through 3 active clock edges.

1 It is possible to use storage control and only store data when it has changed (transitional storage).

2 Applies to asynchronous clocking only. Setup and hold window specification applies to synchronous clocking only.

3 Any or all of the clock channels may be enabled. For an enabled clock channel, either the rising, falling, or both edges can be selected as the active clock edges. The clock channels are stored.

4 Full and half speed modes are controlled by PowerFlex options and upgrade kits.

Table 1–4: Trigger system

Characteristic	Description
Triggering Resources	
Word/Range recognizers	16 word recognizers. The word recognizers can be combined to form full width, double bounded, range recognizers. The following selections are available: 16 word recognizers — 0 range recognizers 13 word recognizers — 1 range recognizer 10 word recognizers — 2 range recognizers 7 word recognizers — 3 range recognizers 4 word recognizers — 4 range recognizers
Range recognizer channel order	From most-significant probe group to least-significant probe group: C3 C2 C1 C0 E3 E2 E1 E0 A3 A2 D3 D2 A1 A0 D1 D0 Q3 Q2 Q1 Q0 CK3 CK2 CK1 CK0 Missing channels for modules with fewer than 136 channels are omitted. When merged, the range recognition extends across the two modules; the master module contains the most-significant groups.
Glitch detector[1,2]	Each channel group can be enabled to detect a glitch
Minimum detectable glitch pulse width (*Typical)*	2.0 ns (single channel with P6417 probe)
Setup and hold violation detector[1,3]	Each channel group can be enabled to detect a setup and hold violation. The range is from 8 ns before the clock edge to 8 ns after the clock edge. The range can be selected in 0.5 ns increments. The setup and hold violation of each window can be individually programmed.
Transition detector[1, 4]	Each channel group can be enabled or disabled to detect a transition between the current valid data sample and the previous valid data sample.
Counter/Timers[5,6]	2 counter/timers, 51 bits wide, can be clocked up to 250 MHz. Maximum count is 2^{51} Maximum time is 9.007^{6} seconds or 104 days
Signal In 1	A backplane input signal
Signal In 2	A backplane input signal
Trigger In	A backplane input signal that causes the main acquisition and the MagniVu acquisition to trigger if they are not already triggered.
Active trigger resources[7]	16 maximum (excluding counter/timers)
Trigger States	16
✓ Trigger State sequence rate	Same rate as valid data samples received, 250 MHz maximum
Trigger Machine Actions	
Main acquisition trigger	Triggers the main acquisition memory
Main trigger position	Trigger position is programmable to any data sample (4 ns boundaries)
Increment counter	Either of the two counter/timers used as counters can be incremented.
Start/Stop timer	Either of the two counter/timers used as timers can be started or stopped.

Table 1–4: Trigger system (Cont.)

Characteristic	Description
Reset counter/timer	Either of the two counter/timers can be reset. When a counter/timer used as a timer and is reset, the timer continues in the started or stopped state that it was in prior to the reset.
Signal out	A signal sent to the backplane to be used by other modules
Trigger out	A trigger out signal sent to the backplane to trigger other modules
Storage Control	
Global storage	Storage is allowed only when a specific condition is met. This condition can use any of the trigger machine resources except for the counter/timers. Storage commands defined in the current trigger state will override the global storage control. Global storage can be used to start the acquisition with storage initially turned on (default) or turned off.
By event	Storage can be turned on or off; only the current sample can be stored. The event storage control overrides any global storage commands.
Block storage[8]	When enabled, 31 samples are stored before and after the valid sample.
Glitch violation storage	The acquisition memory can be enabled to store glitch violation information with each data sample when asynchronous clocking is used. The probe data storage size is reduced by one half (the other half holds the violation information). The fastest asynchronous clocking rate is reduced to 10 ns.

1 **Each use of a glitch detector, setup and hold violation detector, or transition detector requires a trade-off of one word recognizer resource.**

2 **Any glitch is subject to pulse width variation of up to the channel-to-channel skew specification + 0.5 ns.**

3 **Any setup value is subject to variation of up to 1.6 ns; any hold value is subject to variation of up to 1.4 ns.**

4 **This mode can be used to create transitional storage selections where all channels are enabled.**

5 **Counters can be used as setable, resetable, or testable flags and have zero reset latency.**

6 **Timers can be used as testable flags with TLA 7Lx and TLA 7Mx Modules with serial numbers B020000 and higher and TLA 700 Series Software Version 1.10 or higher.**

7 **Word recognizers are traded off one-by-one as Signal In 1, Signal In 2, glitch detection, setup and hold detection, or transition detection resources are added.**

8 **Block storage is disallowed when glitch storage or setup and hold violation is enabled.**

Table 1–5: Input parameters (with P6417 Probe)

Characteristic	Description
✓ Threshold Accuracy	±100 mV
Threshold range and step size	Setable from +5 V to –2 V in 50 mV steps
Threshold channel selection	16 threshold groups assigned to channels. Each probe has two threshold settings, one for the clock/qualifier channel and one for the data channels.
✓ Channel-to-channel skew	≤ 1.6 ns maximum (When merged, add 0.5 ns for the slave module.)
Channel-to-channel skew (*Typical)*	≤ 1.0 ns typical (When merged, add 0.3 ns for the slave module.)
Sample uncertainty	
Asynchronous:	Sample period
Synchronous:	500 ps
Probe input resistance (*Typical*)	20 kΩ
Probe input capacitance (*Typical*)	2 pF maximum
Minimum slew rate (*Typical*)	0.2 V/ns
Maximum operating signal	6.5 V_{p-p} –3.5 V absolute input voltage minimum 6.5 V absolute input voltage maximum
Probe overdrive	±250 mV or ±25% of signal swing minimum required beyond threshold, whichever is greater ±4 V maximum beyond threshold
Maximum nondestructive input signal to probe	±15 V
Minimum input pulse width signal (single channel) (*Typical*)	2 ns
Delay time from probe tip to input probe connector (*Typical*)	7.33 ns

Table 1–6: MagniVu feature

Characteristic	Description
MagniVu memory depth	2016 samples per channel
MagniVu sampling period	Data is asynchronously sampled and stored every 500 ps in a separate high resolution memory; there are no clocking options.

Table 1–7: Merged modules

Characteristic	Description
Number of modules that can be merged together	Two adjacent modules regardless of channel widths and memory depths (TLA 7L3, TLA 7L4, TLA 7M3, TLA 7M4 only)
Number channels after merge	The sum of the data channels of both modules plus the CLK/QUAL channels (active clocks for the merge system) of the master module plus the CLK/QUAL channels (nonactive stored clock channels to the merge system)
Merge system acquisition depth	Channel depth is equal to the smaller depth of the two modules.
Number of clock and qualifier channels after merge	Same number of clock and qualifier channels on the master module. The clock and qualifier channels on the slave module have no effect on clocking and are only stored.
Merge system triggering resources	Triggering resources are the same as a single module except that the widths of the word/range recognizers, setup and hold violation detector, glitch detector, and transition detector are increased to the merged channel width.

Table 1–8: Data handling

Characteristic	Description
Nonvolatile memory retention time (*Typical*)	Battery is integral to the NVRAM. Battery life is > 10 years.

Table 1–9: Atmospherics

Characteristic	Description
Altitude	
Operating	To 15,000 ft. (4570 m) provided maximum ambient temperature is derated by 1° C/1000 ft. above 1000 ft.
Nonoperating	40,000 ft. (12190 m)
Temperature	
Operating	0° C to 50° C (32° F to +122° F) for exterior air when operated in an appropriate mainframe. Maximum operating temperature is derated by 1° C/1000 ft. above 1000 ft.
Nonoperating	–40° to +71° C (–40° F to +160° F)
Humidity	
Operating and nonoperating	To 95% relative humidity at or below 30° C (86° F) To 45% relative humidity up to 50° C (122° F)

Table 1–10: Mechanical

Characteristic	Description
Construction material	
Chassis parts	Aluminum alloy
Front panel	Plastic laminate
Circuit boards	Glass laminate
Cabinet	Aluminum
Weight	5 lbs 10 oz. (2.55 kg) for TLA 7L4 or TLA 7M4 8 lbs (3.63 kg) for TLA 7L4 or TLA 7M4 packaged for domestic shipping
Overall dimensions	
Height	10.32 in. (26.2 cm.)
Width	2.39 in. (6.1 cm.)
Depth	14.7 in. (37.3 cm.)
Probe cables	
P6417 length	6 ft. (1.8 m.)
Mainframe interlock	1.4 ECL keying is implemented

Table 1–11: Certifications and compliances

EC Declaration of Conformity – EMC	Meets intent of Directive 89/336/EEC for Electromagnetic Compatibility. Compliance was demonstrated to the following specifications as listed in the Official Journal of the European Communities:	
	EN 55011	Class A Radiated and Conducted Emissions
	EN 50081-1 Emissions:	
	EN 60555-2	AC Power Line Harmonic Emissions
	EN 50082-1 Immunity:	
	IEC 801-2	Electrostatic Discharge Immunity
	IEC 801-3	RF Electromagnetic Field Immunity
	IEC 801-4	Electrical Fast Transient/Burst Immunity
	IEC 801-5	Power Line Surge Immunity

Operating Information

This chapter provides brief operating information for performing maintenance. The operating information is limited to the functions you need to perform the procedures found in this document. You can find more detailed operating instructions in the *TLA 700 Series User Manual* and in the online help.

This chapter is divided into the following sections:

- *Installation* provides pointers to the *TLA 700 Series Installation Manual* which contains most of the installation procedures for the TLA 700 Series Logic Analyzer. This section also includes information not found in the installation manual.
- *Operating Information* beginning on page 2–3 describes the front panel connectors and indicators, side and rear panel connectors, and the self calibration procedures.

Installation

The basic installation instructions are contained in the *TLA 700 Series Installation Manual*. This section contains additional information not listed in the installation manual.

Setting the Logical Address

Every module in the logic analyzer must have a unique logical address; no two modules can have the same address. On the logic analyzer module, two rotary switches on the rear panel select the logical address. Refer to Figure 2–1 for the switch locations.

The factory default recommended switch setting (FF) allows the controller to assign a logical address to the logic analyzer module. This is called Dynamic Auto Configuration. You can also select static addresses between 01 and FE hexadecimal (1 to 254 decimal). Read the following descriptions before setting the logical address.

NOTE. *Do not set the logic analyzer module logical address to 00. Logical address 00 is reserved for the controller.*

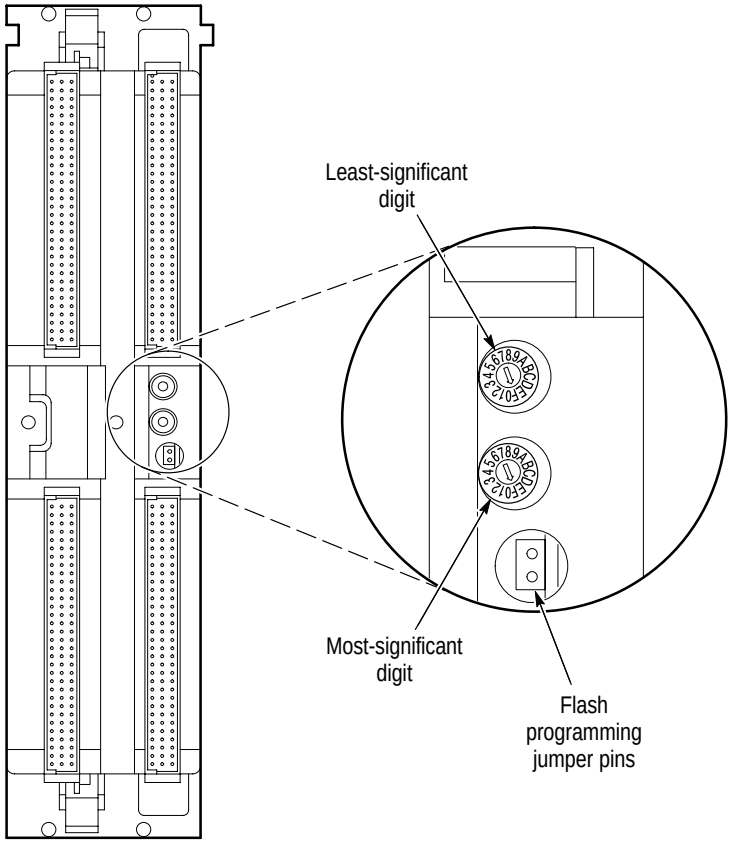


Figure 2–1: Logical address switches

Dynamic Auto Configuration (Recommended). With Dynamic Auto Configuration selected (hexadecimal FF or decimal 255), the logic analyzer automatically sets the address to an unused value. For example, if there are modules set to addresses 01 and 02 already in your system, the resource manager will automatically assign the logic analyzer module an address other than 01 or 02.

Static Logical Address. Static logical address selections set the address to a fixed value. A static logical address ensures that the logic analyzer module address remains fixed for compatibility with modules that require a specific address value. Remember that each module within the logic analyzer must have a unique address to avoid communication problems.

Merging Modules

You can combine two logic analyzer modules to create a single two-wide module. This process is called merging modules. The procedures for merging modules is described in the *TLA 700 Series Installation Manual*.

Operating Information

This section provides the information you will need to operate the logic analyzer module when performing the procedures in this manual. The following operating information is provided:

- Front panel connectors and indicators
- Merge cable connectors
- Rear panel connectors
- Probes
- Online help
- Diagnostics
- Self calibration
- Menu overview

Front Panel Connectors and Indicators

Figure 2–2 on page 2–4 shows the connectors and indicators on the front panel of a 136 channel logic analyzer module. The 102, 68, and 34 channel versions look and operate the same, but without the additional probe connectors. Descriptions of each connector and indicator follow the illustration.

Injector/Ejector Handles. The injector/ejector tabs are used to seat and unseat the modules in the mainframe.

Probe Connectors. The probe connectors are color-coded to match the labels on the probes. Table 2–1 on page 2–5 summarizes the probe connectors and data channels available for each version of the logic analyzer module.

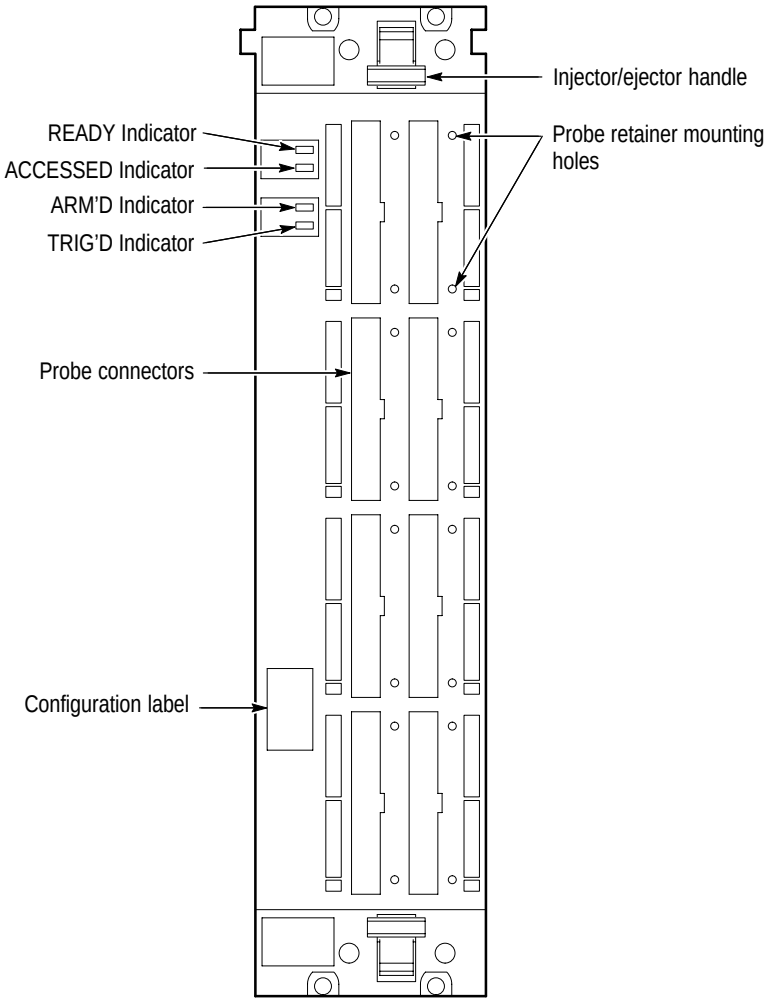


Figure 2–2: Front panel of the logic analyzer module

Table 2–1: Logic analyzer module variations

Product	Memory depth	Number of channels	Channels at the probe connectors
TLA 7L1	32 K[1]	34	A2, A3, CK0, C2, C3, CK3
TLA 7L2	32 K[1]	68	D0, D1, CK2, A0, A1, CK1, A2, A3, CK0, C2, C3, CK3
TLA 7L3	32 K[1]	102	D2, D3, Q0, A2, A3, CK0, D0, D1, CK2, A0, A1, CK1, C0, C1, Q1, C2, C3, CK3
TLA 7L4	32 K[1]	136	E0, E1, Q2, E2, E3, Q3, D2, D3, Q0, A2, A3, CK0, D0, D1, CK2, A0, A1, CK1, C0, C1, Q1, C2, C3, CK3
TLA 7M1	512 K	34	A2, A3, CK0, C2, C3, CK3
TLA 7M2	512 K	68	D0, D1, CK2, A0, A1, CK1, A2, A3, CK0, C2, C3, CK3
TLA 7M3	512 K	102	D2, D3, Q0, A2, A3, CK0, D0, D1, CK2, A0, A1, CK1, C0, C1, Q1, C2, C3, CK3
TLA 7M4	512 K	136	E0, E1, Q2, E2, E3, Q3, D2, D3, Q0, A2, A3, CK0, D0, D1, CK2, A0, A1, CK1, C0, C1, Q1, C2, C3, CK3

[1] **PowerFlex configurable to 128 K**

READY Indicator. The READY indicator lights continuously after the logic analyzer module successfully completes the power-on process. If the indicator fails to light within five seconds of power-on, an internal module failure may be present.

ACCESSED Indicator. The ACCESSED indicator lights anytime the controller accesses the logic analyzer module.

ARM'D Indicator. The ARM'D indicator lights when the logic analyzer module is armed during an acquisition.

TRIG'D Indicator. The TRIG'D indicator lights when the logic analyzer module triggers and stays on until the module finishes acquiring data.

Configuration Label. The configuration label indicates the speed and memory depth of the logic analyzer module.

Probe Retainer Mounting Holes. The threaded probe retainer mounting holes provide a means of securely holding the probes in place.

Merge Cable Connectors

The merge cable connectors (not shown) are located on the sides of the logic analyzer module. The connectors are used to merge two logic analyzer modules together to create a two-wide logic analyzer module. When merged, the master module is the module to the left (lower numbered slot) and the slave module is on the right.

Slave Merge Cable Connector. The slave merge cable connector is located on the left side panel of the module. When the module is used by itself the merge cable is stored inside the cover. When you want to merge two modules together, you must set up the merge connector so that it mates with the master merge connector in an adjacent logic analyzer module. Instructions for merging two modules are described in the *TLA 700 Series Installation Manual*.

Master Merge Connector. The master merge connector is located on the right side of the module. It connects to the slave module merge cable connector when two modules are merged together.

Rear Panel Connectors

Four rear panel connectors (see Figure 2–1 on page 2–2) connect the logic analyzer module to the backplane of the mainframe. The module receives power, processor communication, and intermodule communication through these four connectors.

Logical Address Switches. Figure 2–1 on page 2–2 shows the location of the logical address switches. Refer to the discussion of the address switches beginning on page 2–1.

Flash Programming Jumper Pins. Figure 2–1 on page 2–2 shows the location of the two pins that are used when updating the firmware of the logic analyzer module. You must jumper the pins when updating the flash image. The logic analyzer module is shipped without a jumper installed on these pins. Refer to the *TLA 700 Series Installation Manual* for instructions on upgrading the firmware.

Probes

Depending on the channel width of the logic analyzer module, there may be up to eight (8) P6417 acquisition probes with each module. Each probe has 16 data channels and one clock/qualifier channel.

Online Help

Most user information for operating the logic analyzer module is available through the online Help within the TLA 700 Series application.

Diagnostics

The logic analyzer module performs the power-on diagnostics each time you power on the mainframe. The Calibration and Diagnostics property sheet appears at power-on if one of the module diagnostics fails. You can also access the diagnostics from the System menu.

In addition to the power-on diagnostics, you can also run the extended diagnostics or the self calibration. Refer to *Power-On Diagnostics* beginning on page 6–34 for detailed information on the power-on and extended diagnostics.

NOTE*. For best results, only run the diagnostics with probes disconnected from the module.*

Self Calibration

Self calibration is an internal routine that optimizes performance. No external equipment or user actions are needed to complete the procedure. The logic analyzer module saves data generated by the self calibration in nonvolatile memory.

NOTE*. Performing the self calibration does not guarantee that all logic analyzer module parameters operate within limits. Operation within limits is achieved by performing the* Adjustment Procedures*, described in the* TLA 700 Series Performance Verification and Adjustment Technical Reference Manual. *Proper operation may be confirmed by performing the performance verification procedures in this same manual.*

When to Perform the Self Calibration. You can run the self calibration at any time during normal operation. To maintain measurement accuracy, perform the self calibration if more than one year has elapsed since the last self calibration.

You can check the status of the self calibration in the Calibration and Diagnostics property sheet.

If the logic analyzer module loses power during the self calibration, rerun the self calibration following the next power-on. The self calibration data generated before power was interrupted must be replaced with a complete set of new data. For best results, always perform the self calibration after at least a 30 minute warm-up.

Running the Self Calibration. The logic analyzer module may require several minutes to run the self calibration depending on the number of channels. Select Calibration and Diagnostics property sheet from the System menu. Select the Self Calibration tab page and select the logic analyzer module. Click on the Run button to start the self calibration. Upon completing the self calibration the logic analyzer module menu selection changes from Running to Calibrated.

Menu Overview

The logic analyzer is controlled by interactive windows through the TLA 700 Series Windows 95 application. The TLA 700 Series application consists of the following windows:

- System window. This window provides an overview of the entire logic analyzer. Use this window to navigate through the logic analyzer. Figure 2–3 shows an example of the system window.

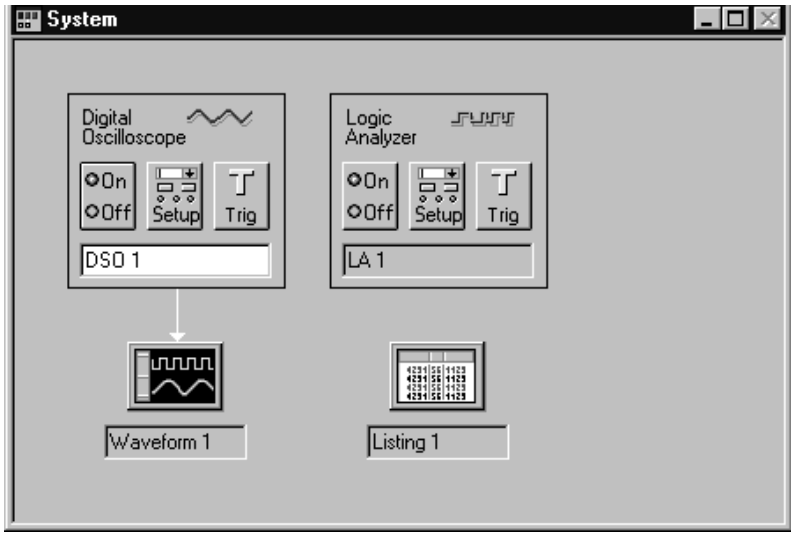


Figure 2–3: Typical system window

The center of the System window displays icons which represent hardware modules installed in the logic analyzer. The icons are links to the other windows in the logic analyzer.

- Setup Window. A setup window exists for each module in the logic analyzer. It contains all of the setup information for the logic analyzer module such as clocking, memory depth, threshold information, and channel information. Menus and dialogs contain information to set up the window as needed.

For the DSO the Setup Window contains setup information for each DSO channel such as input voltage ranges, bandwidth, coupling, and termination. It also contains horizontal setup information and a link to the DSO Trigger window.

- Trigger Window. The Trigger window provides access to the logic analyzer module or DSO module trigger setups. For either module, you can specify various trigger events and trigger actions to help you capture the data that you are interested in.
- Listing Data Window. The Listing Data Window displays acquired data as tabular text. Each column of data represents one group of data or other logical data information, such as timestamps. Each row of data represents a different time that the data was acquired; newer samples of data display below older samples.
- Waveform Data Window. The Waveform Data Window displays acquired data as graphical waveforms. All defined channel groups display as busforms for the logic analyzer and as individual analog channels for the DSO module.
- On/Off buttons. These buttons enable or disable the operation of the modules. Click on the appropriate button to enable or disable the modules.

Refer to the online help for more information on the individual menus, icons, and fields within each window. You may also want to refer to the *TLA 700 Series Logic Analyzer User Manual* for additional information.

Theory of Operation

This chapter describes the general operation of the logic analyzer module. The information supports fault isolation to the probe or to the circuit board level. It supplements the diagnostic information in the *Troubleshooting* section beginning on page 6–29.

The following *Block Level Description* describes circuit operation to the functional block level. The block diagrams are located in the *Diagrams* chapter beginning on page 9–1.

Block Level Description

The block level description provides an overview of each functional circuit within the logic analyzer module. Except for the number of channels, the basic operation is the same for each model.

The basic logic analyzer module consists of two main circuit boards: the Local Processor Unit (LPU) board and the Acquisition board. The logic analyzer modules with 102 or 136 channels also have one and two (respectively) Comparator Daughter boards present. Up to eight probes acquire data from a system-under-test and send it to the logic analyzer module for processing.

A single 102-channel or 136-channel logic analyzer module can be merged with a second module to create a two-module-wide logic analyzer. Lower channel count modules do not support merging.

Local Processor Unit Board

The Local Processor Unit board controls instrument hardware, signal acquisition, power conditioning, and communications functions. Two 100-pin ribbon cables provide interconnections with the Acquisition board for power supplies, data, and control signals.

The Local Processor Unit board contains the following circuits:

- Processor System
- Communications Interface
- Power Supplies

Processor System. The Processor System contains a 68330 microprocessor that controls the entire instrument. Commands and data sent to the instrument through the mainframe pass through the Communications Interface, which resides on the 68330 bus. The 68330 bus also routes data between the Main Processor System and the Acquisition board.

The Processor System includes the instrument firmware. To facilitate upgrades the firmware resides in Flash ROM. The system also includes the nonvolatile RAM (NVRAM) used for the calibration constants, module serial numbers, and the PowerFlex configuration information.

Communications Interface. The Communications Interface transfers commands and data between the mainframe and the slot 0 controller. Signals pass between the instrument and the mainframe through the rear connectors.

Power Supplies. The Power Supplies receive +5 V, –5.2 V, ± 12 V, and ± 24 V from the mainframe through the rear connectors to power the logic analyzer module. Fuses protect the mainframe from over-current conditions. Voltage converters produce additional +5 V and +3.5 V supplies for use on the Acquisition board. The power connections to the Acquisition board are made through one of the 100-pin ribbon cables and from the backplane.

Local Processor Unit Board Fuses. Table 3–1 lists the fuses on the Local Processor Unit board and briefly describes their functions.

Table 3–1: Local Processor Unit board fuses

Fuse	Voltage	Purpose
F1780	+5 V	Supplies the 5 V-to-3.5 V DC to DC converter. The converter powers the 3 V PALS and the 3 V ASICs on the Acquisition board. The converter also enables the ±24 V-to-5V DC to DC converter.
F1881	+5 V	Supplies the microprocessor and the supporting circuitry.
F1681	+12 V	Supplies the Control IC and MOSFET drivers for the 5 V-to-3.5 V DC to DC converter.
F1983	–24 V	Supplies the ±24 V-to-5 V DC to DC converter. This +5 V output powers the acquisition RAM on the Acquisition board.
F1981	+24 V	Supplies the ±24 V-to-5 V DC to DC converter. This +5 V output powers the acquisition RAM on the Acquisition board.

Acquisition Board

The Acquisition board accepts input signals from the probes and converts them to digital information. Two 100-pin ribbon cables provide interconnections with the Local Processor Unit board; one cable provides power supplies, while the other provides data, and control signals.

The Acquisition board contains the following circuits:

- Clock circuitry
- Probe interface (also contained on the Daughter boards)
- Acquisition system
- Trigger and storage control circuitry
- Acquisition memory
- Backplane interface
- Local Processor Unit interface

Clock Circuitry. The system clock is 125 MHz and has both edges active. The system clock is derived from the 10 MHz clock (from the backplane) through a phase-locked loop. The acquisition run circuitry is integrated with the clock circuitry to support time correlation.

Probe Interface. Acquisition data passes from the probe input circuitry to the probe receivers. The probe receivers convert these signals into digital signals. Each probe receiver receives 16 data signals and one clock/qualifier signal.

Two threshold voltages are generated for each probe input circuit (one for the clock/qualifier signal and one for the 16 data signals). The threshold output voltages are sent to the probe receiver. The threshold adjustment procedure, performed by software, guarantees the accuracy of the reference voltages provided to the probe receivers to achieve the desired low/high logic level detection. Refer to the *TLA 700 Series Performance Verification and Adjustment Technical Reference Manual* for instructions on performing the threshold adjustment procedure.

Acquisition System. Acquired data from the probe interface is sent to the data recognition circuitry. The data recognition circuitry analyzes the acquired data and determines which data to qualify and send to the acquisition memory. It also sends trigger event signals to the trigger and storage circuitry.

Trigger and Storage Control Circuitry. The trigger and storage control circuitry works with the data recognition circuitry. The trigger circuitry determines when to store data and when to trigger, controls counter/timers, and drives intermodule signals. The storage circuitry receives information from the trigger circuitry to determine when to start storing data and when to stop storing data.

Acquisition Memory. The acquisition memory stores acquired data. The acquisition memory can be set up to contain all data samples or it can be split to contain data samples and glitch information.

When the acquisition memory is split, half of the memory depth is lost and the logic analyzer module can only run at half speed. Each stored data sample takes up two memory locations, one to store the actual data sample and the other to store the corresponding glitch information. Glitch recognition can only be enabled while using asynchronous clocking.

Backplane Interface. The backplane interface provides the interface with the mainframe and the Acquisition board. The interface contains intermodule signals that communicate with other modules. It also provides the 10 MHz reference clock.

Local Processor Unit Interface. The Local Processor Unit interface provides the interface between the Local Processor Unit circuit board and the Acquisition board through two 100-pin ribbon cables (W100 and W200).

Acquisition Board Fuses. Table 3–2 lists the fuses on the Acquisition board and briefly describes their functions.

Table 3–2: Acquisition board fuses

Fuse	Voltage	Purpose
F2508	+5 V	Powers the probe receivers, digital to analog converter (DAC) circuitry, and the Local Processor Unit board interface.
F2506	–5 V	Powers the clock circuitry.
F2500	+12 V	Powers the clock circuitry and the digital to analog converter circuitry.
F2504	–12 V	Powers the clock circuitry and the digital to analog converter circuitry.
F2903	–24 V	Supplies the –24 V to the Local Processor Unit board. The –24 V combines with the –24 V from the Acquisition board. The voltages power ±24 V-to-5 V DC to DC converter. The +5 V powers the acquisition RAM.
F2901	+24 V	Supplies the +24 V to the Local Processor Unit board. The +24 V combines with the +24 V from the Acquisition board. The voltages power ±24 V-to-5 V DC to DC converter. The +5 V powers the acquisition RAM.

Daughter Boards

Each Comparator Daughter board passes 32 data signals and two (2) clock/qualifier signals from the probes through two probe receiver ICs to the Acquisition board. Each probe receiver also receives two threshold voltages (four threshold signals total) from the Acquisition board. This results in 72 signal pins connecting each Daughter board to the Acquisition board.

The 136-channel logic analyzer modules have two Daughter boards; the 102-channel logic analyzer modules have only one Daughter board. No Daughter boards are present in 68-channel or 34-channel logic analyzer module; the probe input circuitry for these modules is present on the Acquisition board.

Probes

Each P6417 probe acquires 17 channels (16 data channels and one clock or qualifier) of data.

Merged Modules

A merged module consists of a Master module and a Slave module connected together by a merge cable connector and by signals on the local bus of the mainframe backplane. The local bus sends the system clock of the Master module to the Slave module. The two merged modules must be located in adjacent slots.

The Merge Cable Connector passes 26 signals between the two modules (16 trigger event signals, two storage control signals, four valid sample clock identification signals, and four data-login control signals).

Performance Verification Procedures

The performance verification and calibration (certification) procedures for the TLA 7Lx/TLA 7Mx Logic Analyzer Module are located in the *TLA 700 Series Performance Verification and Adjustment Technical Reference Manual*.

You must use the adjustment/verification fixture to complete the performance verification and adjustment procedures.

Adjustment Procedures

The TLA 7Lx/TLA 7Mx Logic Analyzer Module has no manual adjustments. All adjustments are controlled by software and by a Adjustment/Verification test fixture. Refer to the *TLA 700 Series Performance Verification and Adjustment Technical Reference Manual* for the adjustment procedures.

You must use the adjustment/verification fixture to complete the performance verification and adjustment procedures.

Maintenance

This chapter contains the information needed for periodic and corrective maintenance of the TLA 7Lx/TLA 7Mx Logic Analyzer Module. The following sections are included:

- The *Maintenance* section provides general information on preventing damage to internal circuit boards when doing maintenance, procedures for inspecting the logic analyzer module, and cleaning external and internal circuit boards.
- The *Removal and Installation Procedures* (page 6–7) provide procedures for removing and installing circuit boards.
- *Troubleshooting* (page 6–29) provides information for isolating faulty circuit boards and probes.
- *Repackaging Instructions* (page 6–43) provides packaging information for shipment or storage.

Related Maintenance Procedures

The *TLA 700 Series Installation Manual* contains maintenance procedures not included in this manual. Refer to the *TLA 700 Series Installation Manual* for the following information:

- Refer to the *Upgrades* chapter for instructions on upgrading the software or firmware in the logic analyzer module.
- Refer to *Replacing Podlets* in the *In Case of Problems* chapter for instructions on replacing individual podlet channels in the logic analyzer probes.
- Refer to *Merging Modules* for instructions on merging two logic analyzer modules to create a wider module.

Preventing ESD

When performing any service which requires internal access to the logic analyzer module, adhere to the following precautions to avoid damaging internal modules and their components due to electrostatic discharge (ESD).



CAUTION. *Static discharge can damage any semiconductor component in the logic analyzer module.*

1. Minimize handling of static-sensitive modules.
2. Transport and store static-sensitive modules in their static protected containers or on a metal rail. Label any package that contains static-sensitive modules.
3. Discharge the static voltage from your body by wearing a grounded antistatic wrist strap while handling these modules. Service static-sensitive modules only at a static-free work station.
4. Nothing capable of generating or holding a static charge should be allowed on the work station surface.
5. Handle circuit boards by the edges when possible.
6. Do not slide the modules over any surface.
7. Avoid handling modules in areas that have a floor or work-surface covering capable of generating a static charge.

Inspection and Cleaning

This section describes how to inspect for dirt and damage, and how to clean the logic analyzer module. Inspection and cleaning are done as preventive maintenance. Preventive maintenance, when done regularly, may prevent malfunctions and enhance reliability.

Preventive maintenance consists of visually inspecting and cleaning the logic analyzer module, and using general care when operating it. How often to do maintenance depends on the severity of the environment in which the logic analyzer module is used. A proper time to perform preventive maintenance is just before performing adjustments on the module.

General Care

The side cover keeps dust out of the module and should be in place during normal operation.

Inspection and Cleaning Procedures

Inspect and clean the logic analyzer module as often as operating conditions require. Collection of dirt on internal components can cause them to overheat and breakdown. Dirt acts as an insulating blanket, preventing efficient heat dissipation. Dirt also provides an electrical conduction path that can cause failures, especially under high-humidity conditions.



CAUTION. *Avoid using chemical cleaning agents that might damage the plastics and external labels used in the logic analyzer module. Use a cloth dampened with water to clean external surfaces. To clean internal surfaces, use a 75% isopropyl alcohol solution as a cleaner and rinse with deionized water. Before using any other type of cleaner, consult your Tektronix Service Center or representative.*

Inspection — Exterior. Inspect the outside of the module for damage, wear, and missing parts. Use Table 6–1 as a guide. Instruments that appear to have been dropped or otherwise abused should be checked thoroughly to verify correct operation and performance. Immediately repair defects that can cause personal injury or lead to further damage to the logic analyzer module or mainframe where it is used.

Table 6–1: External inspection check list

Item	Inspect for	Repair action
Front panel and side cover	Cracks, scratches, deformations, missing or damaged retainer screws, ejector handles, or EMI shields.	Replace defective or missing mechanical parts.
Front panel connectors	Broken shells, cracked insulation, and deformed contacts. Dirt in connectors.	Replace defective parts. Clear or wash out dirt.
Rear connectors	Cracked or broken shells, damaged or missing contacts. Dirt in connectors.	Replace defective parts. Clear or wash out dirt.
Accessories	Missing items or parts of items, bent pins, broken or frayed cables, and damaged connectors.	Replace damaged or missing items, frayed cables, and defective modules.



CAUTION. *To prevent damage to electrical components from moisture during external cleaning, use only enough liquid to dampen the cloth or applicator.*

Cleaning Procedure — Exterior. To clean the exterior, perform the following steps:

1. Remove loose dust on the outside of the logic analyzer module with a lint free cloth.
2. Remove remaining dirt with a lint free cloth dampened with water. Do not use abrasive cleaners.

Inspection — Interior. Remove the module cover (see page 6–11) to access the inside of the logic analyzer module for inspection and cleaning.

Inspect the internal portions of the logic analyzer module for damage and wear using Table 6–2 as a guide. Defects found should be repaired immediately. If you replace any electrical circuit board, refer to Table 6–6 on page 6–40 to determine which procedures you must perform to ensure proper operation of the logic analyzer module.

Table 6–2: Internal inspection check list

Item	Inspect for	Repair action
Circuit boards	Loose, broken, or corroded solder connections. Burned circuit boards. Burned, broken, or cracked circuit-run plating.	Remove failed circuit board and replace with a new circuit board.
Resistors	Burned, cracked, broken, blistered condition.	Remove failed circuit board and replace with a new circuit board.
Solder connections	Cold solder or rosin joints.	Resolder joint and clean with isopropyl alcohol.
Capacitors	Damaged or leaking cases. Corroded solder on leads or terminals.	Remove failed circuit board and replace with a new circuit board.
Semiconductors	Damaged parts or distorted pins.	Replace circuit board if parts are damaged.
Wiring and cables	Loose plugs or connectors. Burned, broken, or frayed wiring.	Firmly seat connectors. Repair or replace circuit boards with defective wires or cables.



CAUTION. *To prevent damage from electrical arcing, ensure that circuit boards and components are dry before applying power to the logic analyzer module.*

Cleaning Procedure — Interior. To clean the interior, perform the following steps:

1. Blow off dust with dry, low-pressure, deionized air (approximately 9 psi).
2. Remove any remaining dust with a lint free cloth dampened in isopropyl alcohol (75% solution) and rinse with warm deionized water. (A cotton-tipped applicator is useful for cleaning in narrow spaces and on circuit boards.)

NOTE. *If, after performing steps 1 and 2, a module is clean upon inspection, skip the remaining steps.*

If steps 1 and 2 do not remove all the dust or dirt, the module may be spray washed using a solution of 75% isopropyl alcohol (see steps 3 through 7).

3. Gain access to the parts to be cleaned by removing easily accessible shields and panels (see *Removal and Installation Procedures* on page 6–7).
4. Spray wash dirty parts with the isopropyl alcohol and wait 60 seconds for the majority of the alcohol to evaporate.
5. Use hot (48.9° C to 60° C/120° F to 140° F) deionized water to thoroughly rinse the parts.
6. Dry all parts with low-pressure, deionized air.
7. Dry all components and assemblies in an oven or drying compartment using low-temperature (51.7° C to 65.6° C/125° F to 150° F) circulating air.

Lubrication. There is no periodic lubrication required.

Removal and Installation Procedures

This section describes how to remove and install the major mechanical and electrical modules. The procedures in this section assume that you already have removed the module from the mainframe. This section provides the following information:

- *List of Circuit Boards* describes where to locate a list of replaceable circuit boards.
- *Summary of Procedures* on page 6–8 lists the procedures for removing and installing circuit boards.
- *Tools Required* on page 6–8 describes the tools needed to perform the procedures.
- Beginning with *Injector/Ejector Handles* on page 6–9, detailed procedures describe the removal and installation of circuit boards.

Preparation — Please Read

Please read the following warning statement. Then read the following general instructions before removing a circuit board.



WARNING. *Before doing this or any other procedure in this manual, read the* General Safety Summary *and* Service Safety Summary *found at the beginning of this manual. Also, to prevent possible injury to service personnel or damage to electrical components, read* Preventing ESD *on page 6–2.*

1. Read the *Summary of Procedures* on page 6–8 to understand how the procedures are grouped. Then read *Tools Required* on page 6–8 for a list of tools needed to remove and install circuit boards in the TLA 7Lx/TLA 7Mx Logic Analyzer Module.
2. If you are disassembling the TLA 7Lx/TLA 7Mx Logic Analyzer Module for cleaning, refer to the *Inspection and Cleaning* procedure on page 6–2 for cleaning instructions.

List of Circuit Boards

The *Mechanical Parts List* section provides a list of all replaceable circuit boards.

Summary of Procedures

The procedures are listed below in the order in which they appear in this section:

- *Injector/Ejector Handles* on page 6–9 describes how to replace the Injector/ejector handles.
- *Cover* on page 6–11 describes how to replace the cover.
- *Daughter Boards* on page 6–14 describes how to replace the daughter boards.
- *Local Processor Unit Board* on page 6–16 describes how to replace the Local Processor Unit board.
- *Acquisition Board* on page 6–19 describes how to replace Acquisition board.
- *Fuses* on page 6–25 describes how to replace fuses on the Local Processor Unit board and on the Acquisition board.
- *Rear EMI Gaskets* on page 6–26 describes how to replace the EMI gaskets at the rear of the module

Tools Required

Most circuit boards in the TLA 7Lx/TLA 7Mx Logic Analyzer Module can be removed using a screwdriver handle mounted with size T-10 Torx® screwdriver bits. Table 6–3 lists the tools needed to replace circuit boards in the TLA 7Lx/ TLA 7Mx Logic Analyzer Module. All tools required to remove and install each circuit board are listed before the procedure.

Table 6–3: Tools required for circuit board replacement

Item number	Name	Description
1	Torque screwdriver handle	Accepts Torx® driver bits
2	T-10 Torx tip	Torx® driver bit for T-10 size screw heads
3	Soldering iron	Standard tool
4	Solder wick	Standard tool
5	1/4-inch nut driver	Standard tool

Injector/Ejector Handles

You will need a screwdriver with a size T-10 Torx® tip (Table 6–3, items 1 and 2) to replace the injector/ejector handles.

Removal

Use the following procedure and Figure 6–1 to remove the injector/ejector handles.

1. Place the module on the right side (see Figure 6–1).
2. Remove the two screws that secure the injector/ejector handle to the chassis.
3. Remove the injector/ejector handle from the module.

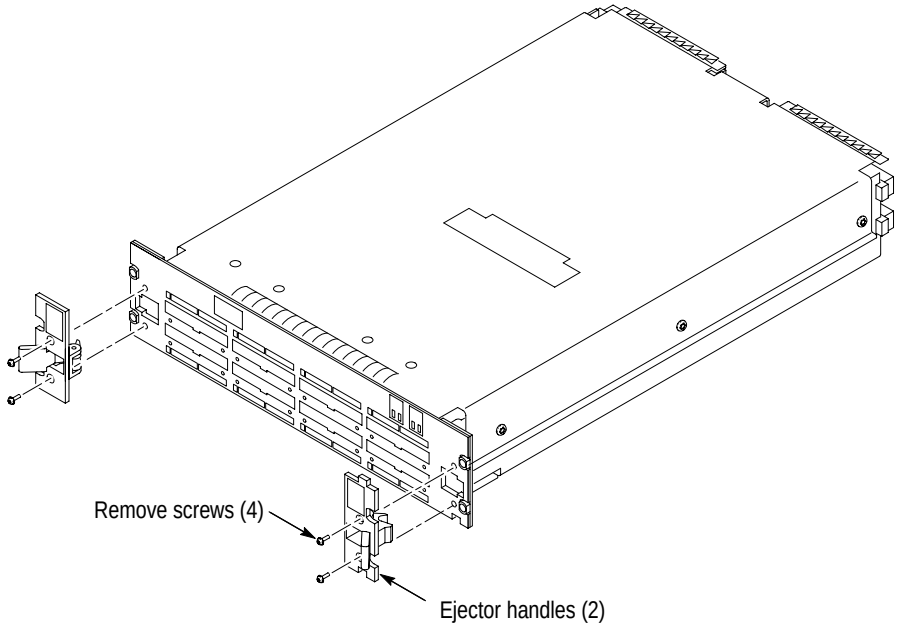


Figure 6–1: Injector/ejector handle replacement

Installation

Use the following procedure and Figure 6–1 to install the injector/ejector handles.

NOTE*. The top and bottom injector/ejector handles are not interchangeable. The top injector/ejector handle assembly has a notch on right side and a tab on the left side; the bottom injector/ejector handle assembly does not have a notch or a tab.*

1. Install the injector/ejector handle through the front panel cutout onto the mounting post.
2. Install the screws to secure the injector/ejector handle to the chassis.
3. Apply the proper replacement label.

Cover

You will need a screwdriver with a size T-10 Torx® tip (Table 6–3, items 1 and 2) to replace the cover.

Removal

Use the following procedure and Figure 6–2 to remove the cover.

1. Place the module on the right side.
2. Remove two (2) screws on the rear of the chassis and two (2) top and bottom rear screws that secure the rear panel to the chassis. Set the rear panel aside.
3. Remove two (2) top screws and two (2) bottom screws that secure the cover to the chassis.
4. If you have a 102-channel module or a 136-channel module, remove the flat-head screws near the front of the module.
5. If the merge cable is connected to the merge cable bracket, remove the two screws holding the cable and then remove the bracket.
6. Slide the cover back to disengage the tab and lift the cover from the chassis (guide the merge cable through the center hole while removing the cover).

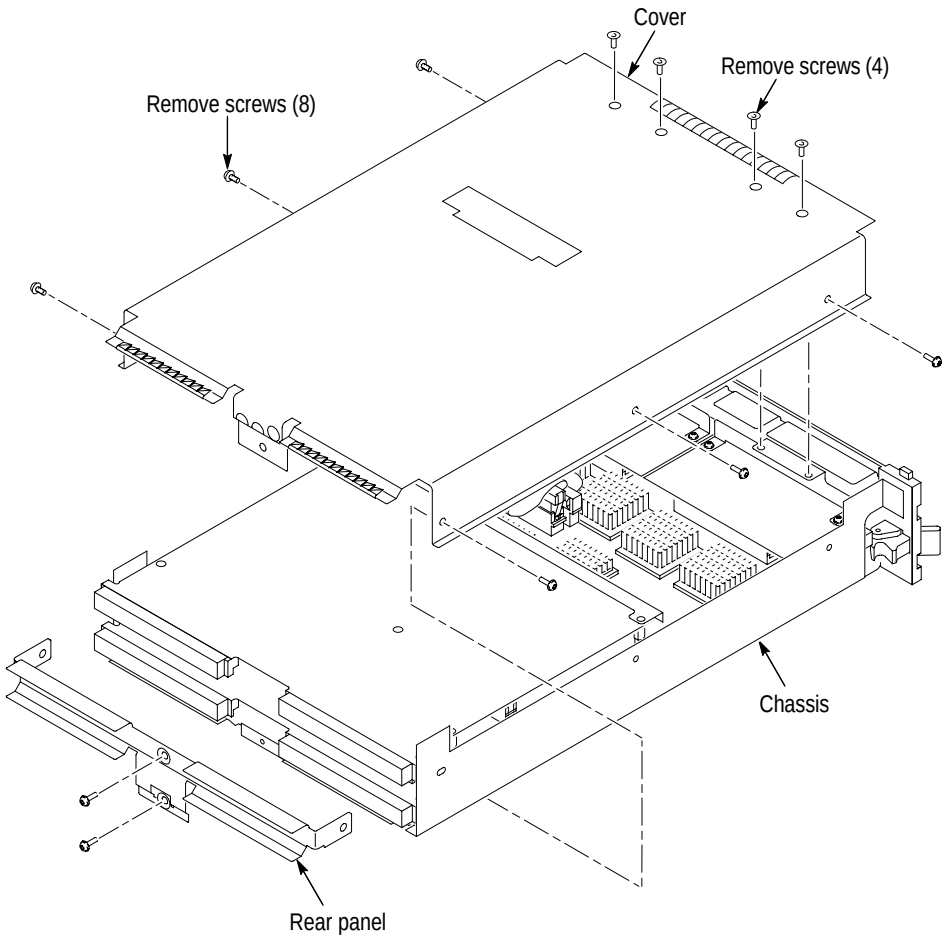


Figure 6–2: Cover removal

Installation

Use the following procedure and Figure 6–2 and Figure 6–4 to install the cover.

NOTE. *Install the cover tightly against the chassis. This will ensure that the module fits into adjacent slots in the mainframe.*

1. Place the module on its right side.
2. Place the cover onto the chassis.
3. If you are replacing the cover of the slave module in a merged module pair, refer to Figure 6–3 to feed the merge cable through the cover and then install the merge cable bracket as shown.

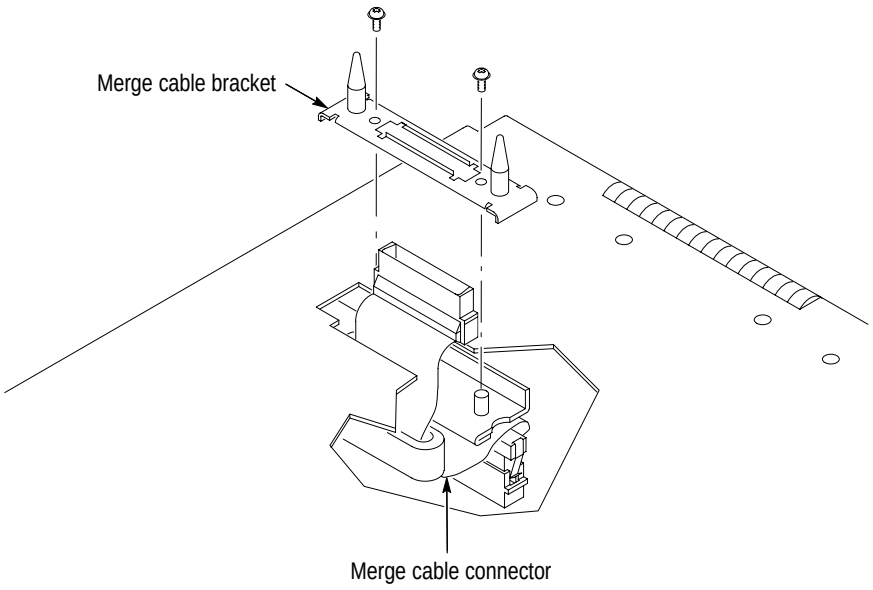


Figure 6–3: Feeding the merge cable through the cover

CAUTION. *To prevent damage to the module during the installation process, reinstall the cover exactly as described in steps 4 through 8. If the cover is not properly seated, the module can be damaged when you install it in a mainframe or it will not meet EMC requirements.*

4. Push forward on the cover so the tab on the front edge of the cover inserts into the rear of the front subpanel. Make sure that the cover is fully seated (no gaps) against the front and rear chassis flanges (see Figure 6–4).

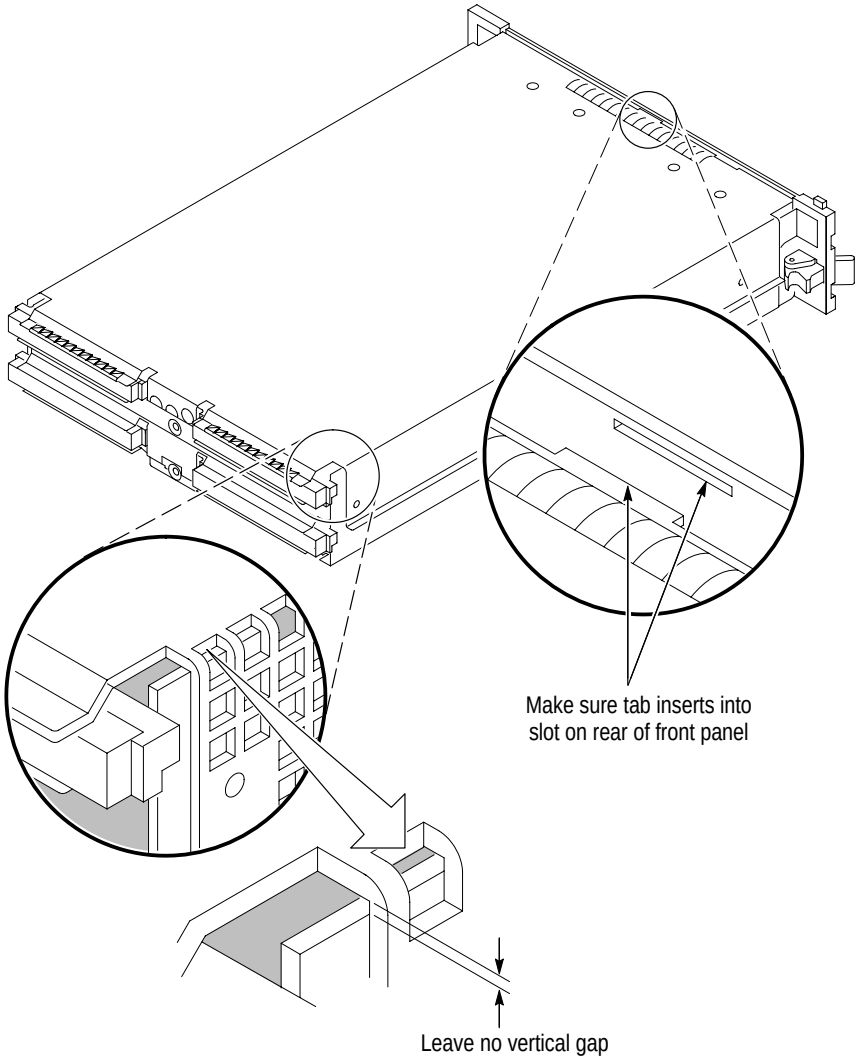


Figure 6–4: Seating the cover on the chassis

5. While holding the cover in place, install the four (4) screws nearest the front of the module (two on the top and two on the bottom), to secure the cover to the chassis. Tighten the screws to 4 in lbs.

6. If you have a 102-channel module or a 136-channel module, install the flat-head screws near the front of the module. Tighten the screws to 4 in lbs.

7. Slide the rear panel on the chassis and install the two rear panel screws.

8. Install the top and bottom rear screws.

9. Check and tighten all screws to 4 in lbs.

Daughter Boards

You will need a screwdriver with a size T-10 Torx® tip (Table 6–3, items 1 and 2) to replace the Daughter boards.

The 136-channel modules have two Daughter boards; the 102-channel modules have one Daughter board, and the 68-channel and 34-channel modules have no Daughter boards. The illustrations in this section show 136-channel modules with two Daughter boards installed.

It is not necessary to remove the Local Processor Unit board to access the Daughter boards.

NOTE. *After replacing the Daughter boards refer to Table 6–6 on page 6–40 and to Table 6–7 on page 6–41 to determine the proper procedures to perform post-repair adjustments and to verify proper operation of the logic analyzer module.*

Removal

Use the following procedure and Figure 6–5 to remove the Daughter boards.

1. Perform the *Cover* removal procedure (see page 6–11).
2. Remove the two (2) screws that secure each EMI bracket and Daughter board to the Acquisition board.
3. Lift the Daughter board straight up to disconnect it from the Acquisition board connector.

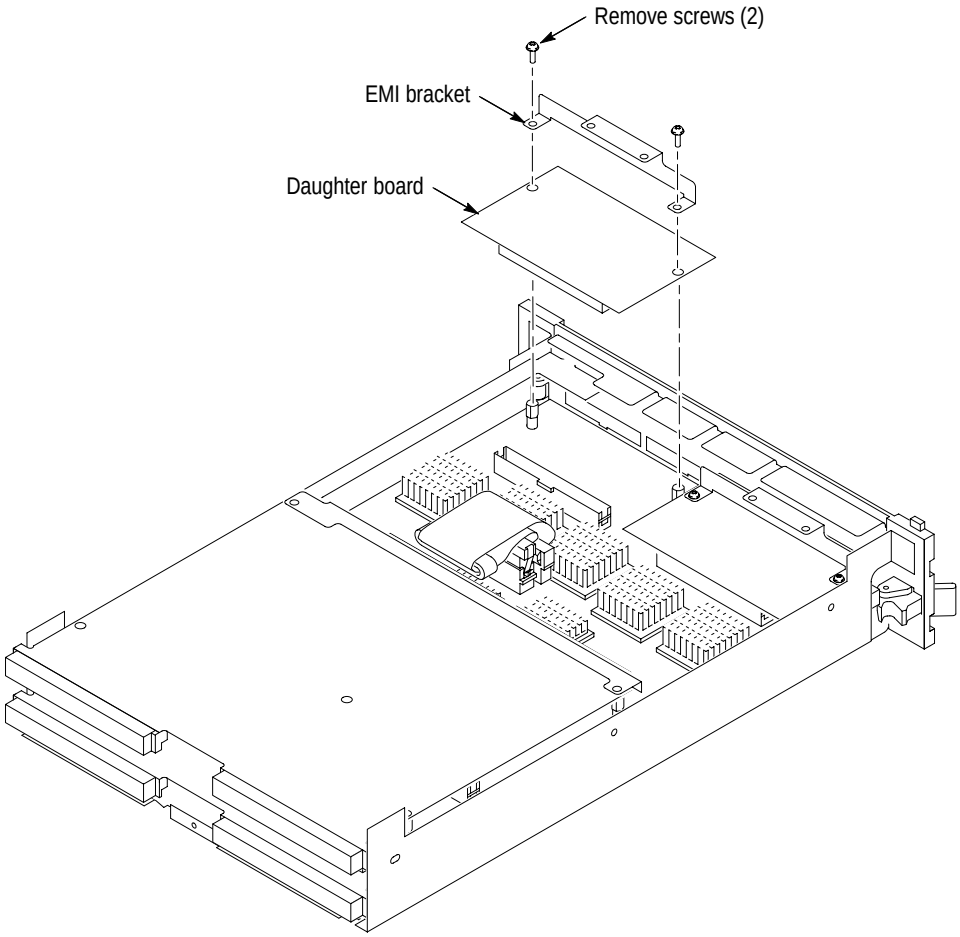


Figure 6–5: Daughter board replacement

Installation

Use the following procedure and Figure 6–5 to install the Daughter boards.

1. Line up the Daughter board over the circuit board connector on the Acquisition board and gently press down until the Daughter board fully seats in the connectors.
2. Place the EMI bracket on the Daughter board.
3. Install the two (2) screws that secure the EMI bracket and the Daughter board to the Acquisition board.
4. Perform the *Cover* installation procedure (see page 6–12).

Local Processor Unit Board

You will need a screwdriver with a size T-10 Torx® tip (Table 6–3, items 1 and 2) to replace the Local Processor Unit (LPU) board.

NOTE. *When placing an order for a replacement LPU board or an LPU exchange board from the Tektronix Exchange Center, you must supply the following information: Model number, serial number, PowerFlex Option upgrade number, and firmware level.*

Removal

Use the following procedure and Figure 6–6 to remove the LPU board.

1. Perform the *Cover* removal procedure (see page 6–11).
2. Remove five (5) screws that secure the LPU board to the chassis.
3. Remove the cable bracket and unplug two 100-pin ribbon cables from J1330 and J1630.
4. For 102-channel modules or 136-channel modules, remove the two screws that secure the top EMI bracket to the chassis.
5. Remove the top EMI bracket to gain access to the front of the LPU board.



CAUTION. *Handle the LPU board gently to avoid breaking the front panel LED extension.*

6. Carefully move the LPU board away from the front panel until the tabs (Figure 6–6) clear the front subpanel.
7. Lift the LPU board above the chassis.

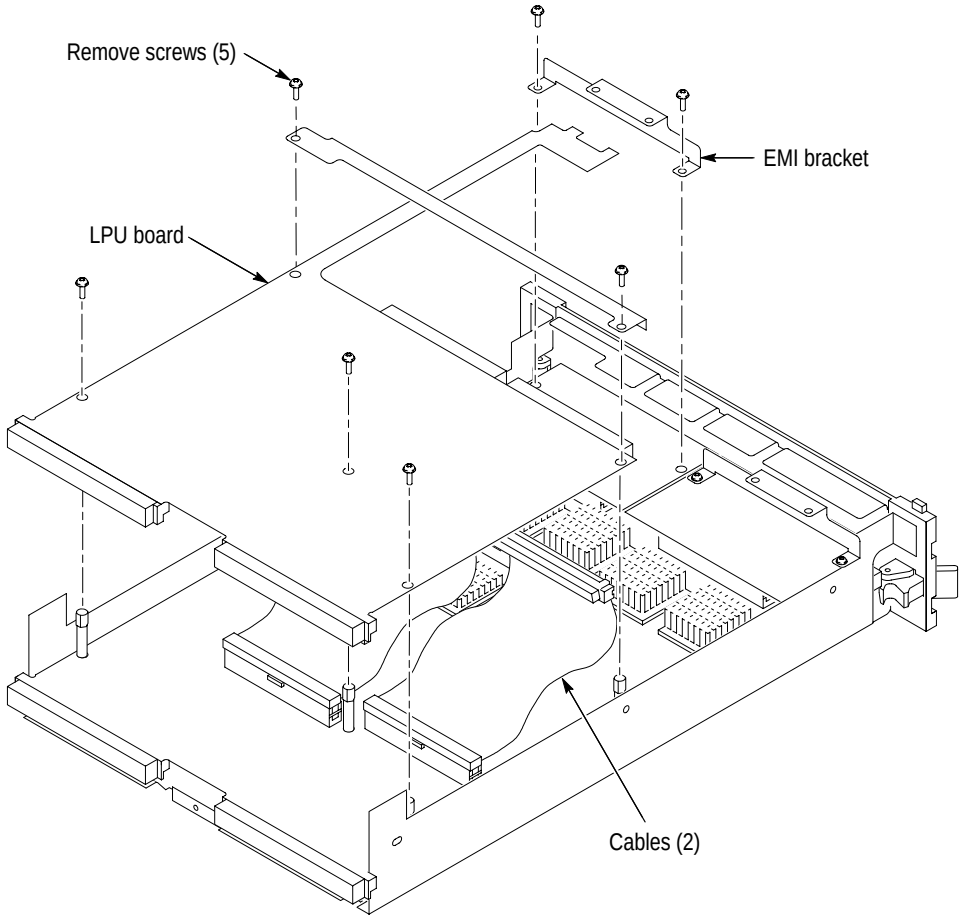


Figure 6–6: LPU board removal

Installation

Use the following procedure and Figure 6–6 to install the LPU board.

***NOTE**. After replacing the LPU board, you must verify the proper PowerFlex level. The PowerFlex configuration information is listed on the side panel of the logic analyzer module.*

If the PowerFlex level does not match the information on the side panel label, you must return the entire logic analyzer module to your local Tektronix service center.

Refer to Table 6–6 on page 6–40 and to Table 6–7 on page 6–41 to determine the proper procedures to run to verify proper operation of the logic analyzer module.

1. Insert the tabs on the LPU board into the front subpanel as shown in Figure 6–7. Then set the LPU board in place on the chassis.
2. Push forward on the LPU board rear connector while aligning the LPU board until the LPU board is even with the acquisition board.
3. Reinstall the top EMI bracket, if you removed it in step 4 on page 6–16; reinstall and tighten the two screws holding the EMI bracket in place.

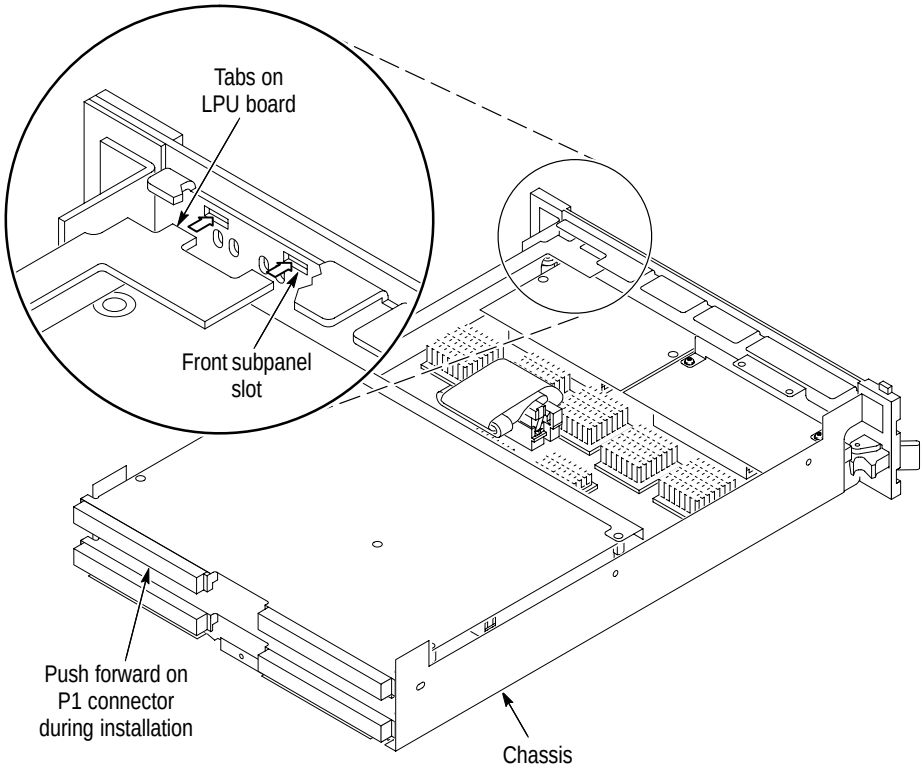


Figure 6–7: Inserting LPU board tabs into front subpanel

4. Crimp and fold the two 100-pin ribbon cables as shown in Figure 6–8 and then connect them to the LPU board at J1330 and J1630.

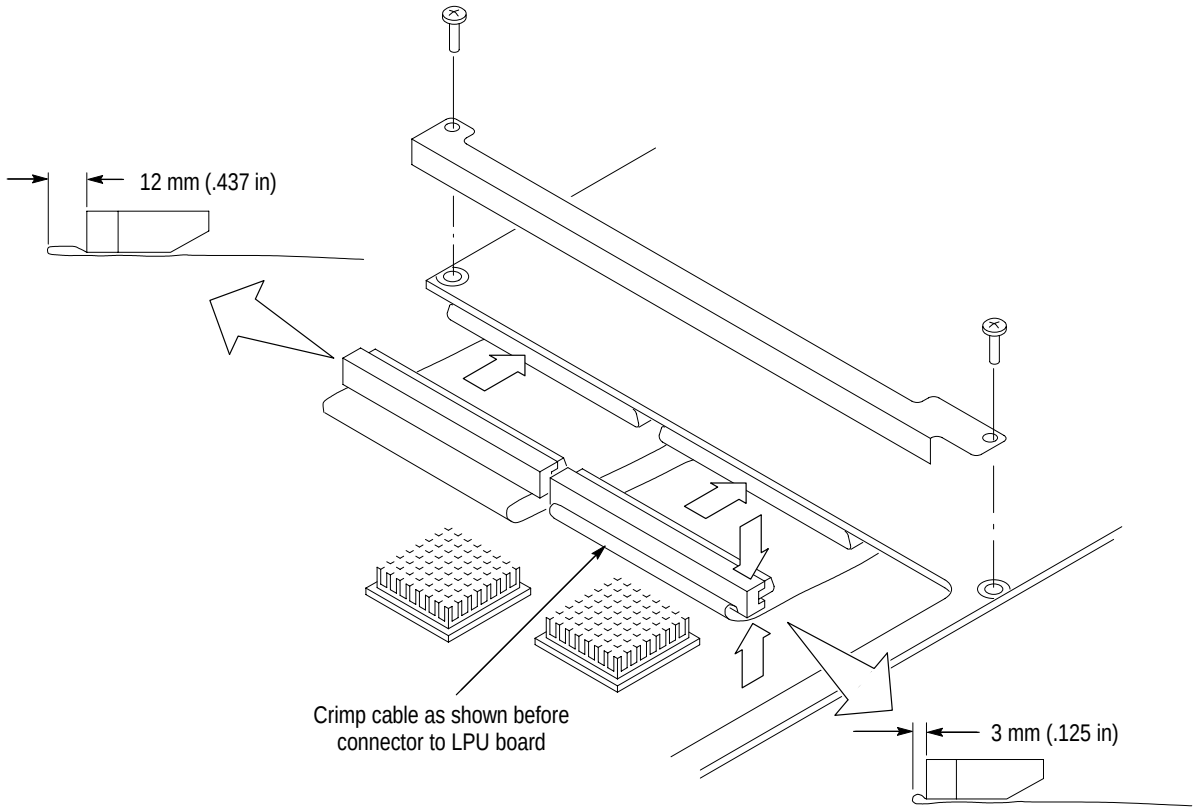


Figure 6–8: Crimping the interconnect cables

5. While holding the LPU board in place, install the cable bracket and the five (5) screws that secure the board to the chassis.
6. Perform the *Cover* installation procedure (see page 6–12).

Acquisition Board

You will need a screwdriver with size T-10 Torx® tip and a 1/4 inch nut driver (Table 6–3, items 1, and 2) to replace the Acquisition board.

NOTE. *The 34-channel and 68-channel modules do not have a Merge cable or Merge Cable connector. For these modules; ignore the steps dealing with the Merge cable and the Merge Cable connector.*

NOTE. *After replacing the Acquisition board refer to Table 6–6 on page 6–40 and to Table 6–7 on page 6–41 to determine the proper procedures to run to verify proper operation of the logic analyzer module.*

Removal

Use the following procedure and Figure 6–9 to remove the Acquisition board.

1. Perform the *Cover* removal procedure (see page 6–11).
2. If there are Daughter boards installed in the module, perform the *Daughter Board* removal procedure (see page 6–14).
3. Perform the *Local Processor Unit Board* removal procedure (see page 6–16).
4. Unplug two (2) 100-pin ribbon cables from J1270 and J1420 as follows:
   a. Grasp and squeeze the metal cable retainers (Figure 6–9) to unlock each cable from the connector.
   b. Unplug the cables from the Acquisition board and set them aside.

NOTE. *It may be necessary to remove the spacer post between the two cables to unlock the cables from the connector.*

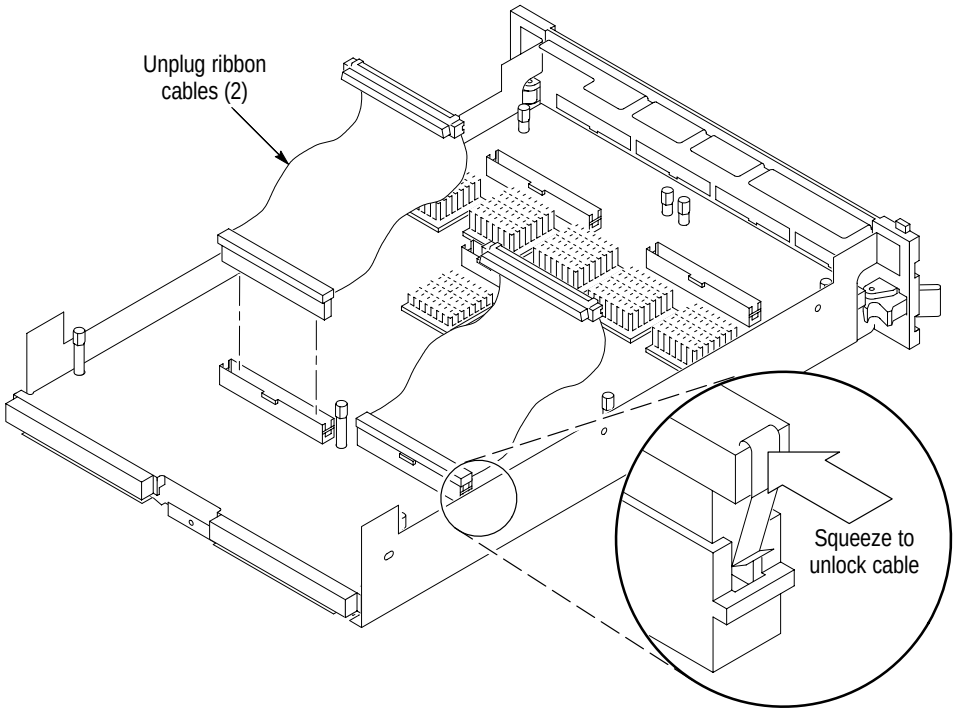


Figure 6–9: Removing the cables from the Acquisition board

5. Turn the chassis over.

6. Using the screwdriver with a T-10 Torx® tip, remove the two screws that secure the merge cable connector to the chassis (see Figure 6–10).

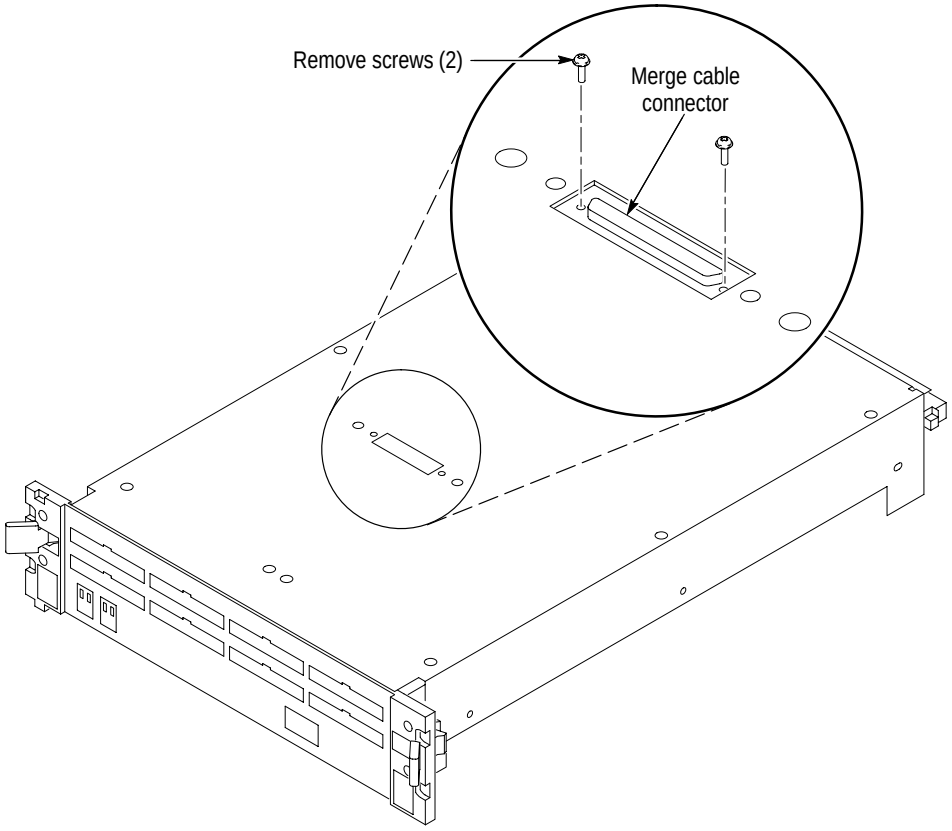


Figure 6–10: Removing the Merge cable connector from the chassis

7. Using a 1/4 inch nut driver, remove nine (9) spacer posts that secure the Acquisition board to the chassis (see Figure 6–11).

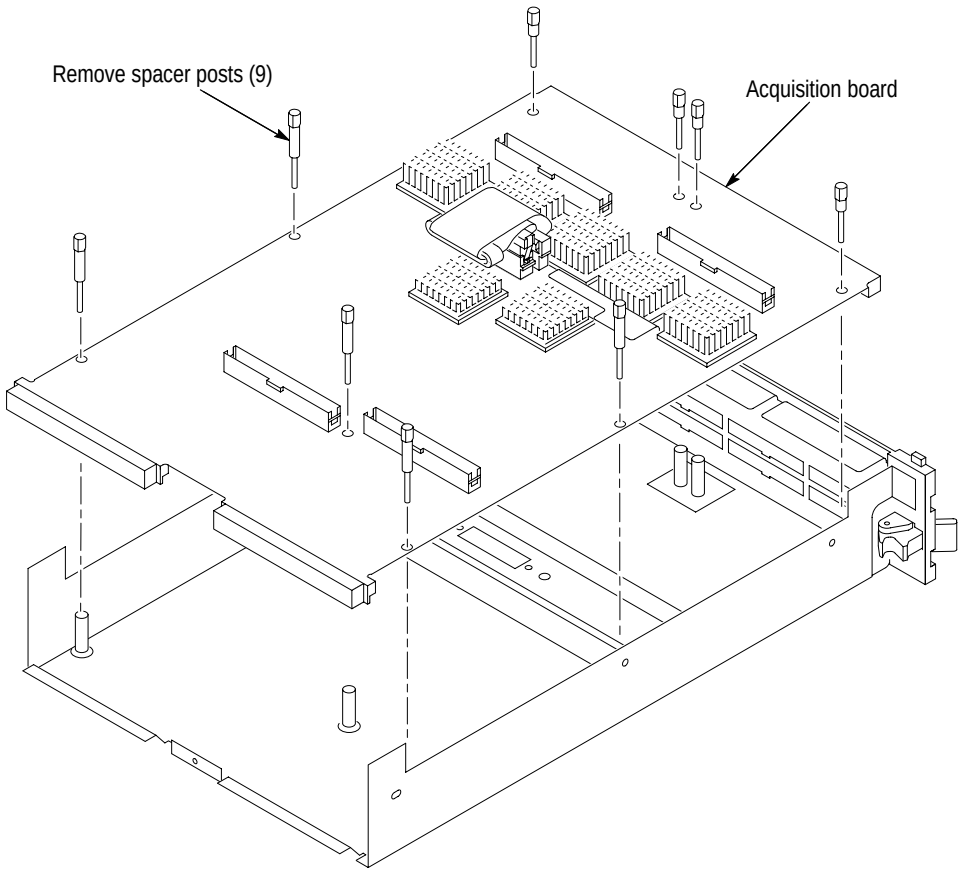


Figure 6–11: Removing the Acquisition board from the chassis

8. Carefully slide the Acquisition board away from the front panel until the probe connectors clear the front panel. Then lift the circuit board from the chassis.

9. Disconnect the Merge cables from the Acquisition board.

Installation

Use the following procedure to install the Acquisition board.

***NOTE**. After replacing the Acquisition board refer to Table 6–6 on page 6–40 and to Table 6–7 on page 6–41 to determine the proper procedures to run to verify proper operation of the logic analyzer module.*

1. Connect the Merge cables to the Acquisition board.
2. Refer to Figure 6–11 on page 6–23 and carefully slide the Acquisition board into the chassis while making sure that the Merge Cable connector lines up with the slot in the chassis.
3. Using the screwdriver with a T-10 Torx® tip, install two (2) screws on the Merge Cable connector.
4. Gently push forward on the Acquisition board rear connector while aligning the Acquisition board so that the mounting holes line up with the stand-offs on the chassis.
5. Using a 1/4 inch nut driver, install nine (9) spacer posts that secure the Acquisition board to the chassis. Be sure to install the four (4) short spacer posts toward the front of the chassis (see Figure 6–11).
6. Dress the top Merge cable as shown in Figure 6–11 (if the module will not be merged).
7. Perform the *Daughter Board* installation procedure (see page 6–16).
8. Perform the *Local Processor Unit Board* installation procedure (see page 6–17).
9. Perform the *Cover* installation procedure (see page 6–12).

Fuses

All fuses are located on the component side of the LPU board or on the Acquisition board (for information on the fuses see the *Theory of Operation* chapter beginning on page 3–1).

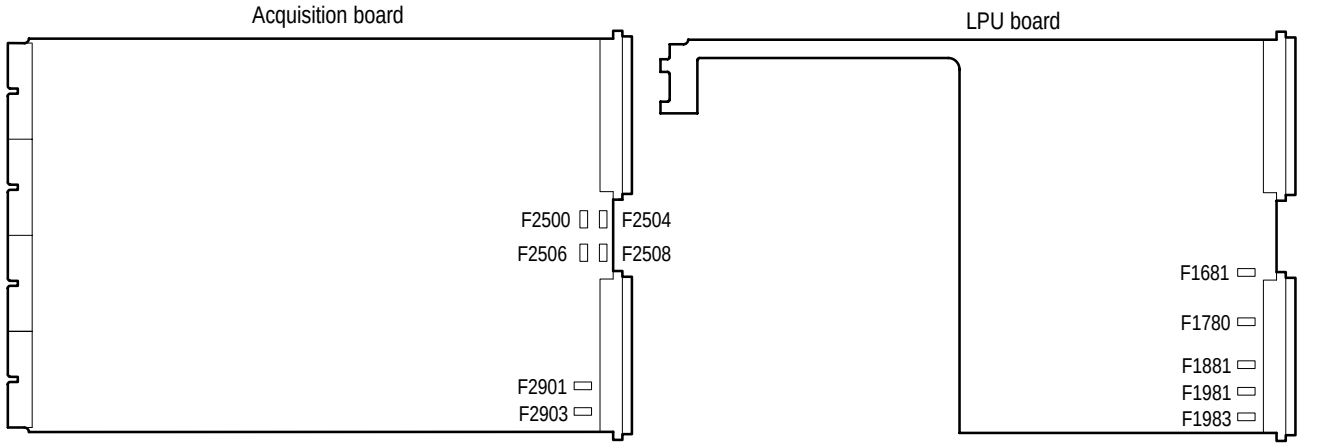
CAUTION. *To avoid damage to the module, use only replacement fuses that match the type, voltage, and current rating of the original fuse. See the* Mechanical Parts List *section for the part number of replacement fuses.*

You will need a screwdriver with a size T-10 Torx® tip, a soldering iron, and solder wick (Table 6–3, items 1, 2, 3, and 4) to replace the fuses.

Removal

Use the following procedure and Figure 6–12 to remove the fuses.

1. Perform the *Local Processor Unit Board* removal procedure (see page 6–16).
2. Use Figure 6–12 to locate the fuse to be replaced on the component side of the boards. For fuses mounted on the back side of the Acquisition board, perform the *Acquisition Board* removal procedure (see page 6–19).
3. Using a soldering iron and solder wick, unsolder and discard the fuse.



Circuit number	Circuit board	Supply
F2500	Acquisition board	+12 V
F2504	Acquisition board	–12 V
F2506	Acquisition board	–5 V
F2508	Acquisition board	+5 V
F2901	Acquisition board	+24 V
F2903	Acquisition board	–24 V

Circuit number	Circuit board	Supply
F1681	LPU board	+12 V
F1780	LPU board	+5 V
F1881	LPU board	+5 V
F1981	LPU board	+24 V
F1983	LPU board	–24 V

Figure 6–12: Fuse replacement

Installation

Use the following procedure and Figure 6–12 to install the fuses.

CAUTION. *To avoid damage to the module, use only replacement fuses that match the type, voltage, and current rating of the original fuse. See the* Mechanical Parts List *section for the part number of replacement fuses.*

1. Using a soldering iron, solder the new fuse into place.
2. If you removed the Acquisition board, perform the *Acquisition Board* installation procedure (page 6–24).
3. Perform the *Local Processor Unit Board* installation procedure (see page 6–17).
4. Perform the *Cover* installation procedure (see page 6–12).

P6417 Probe Podlet Replacement

Refer to *Replacing Probe Podlets* in the *TLA 700 Series Installation Manual* for instructions on replacing the individual probe podlets.

Rear EMI Gaskets

NOTE*. Use both hands to replace the four rear EMI Gaskets.*

Removal

Use the following procedure and Figure 6–13 to remove the rear EMI gaskets.

1. Perform the *Cover* removal procedure (see page 6–11).
2. For the two rear gaskets on the chassis, perform the *Daughter Boards* removal procedure (page 6–15), the *Local Processor Unit Board* removal procedure (page 6–16), and the *Acquisition Board* removal procedure (page 6–20).
3. Lift the gasket fingers and rotate the gasket off (see Figure 6–13).

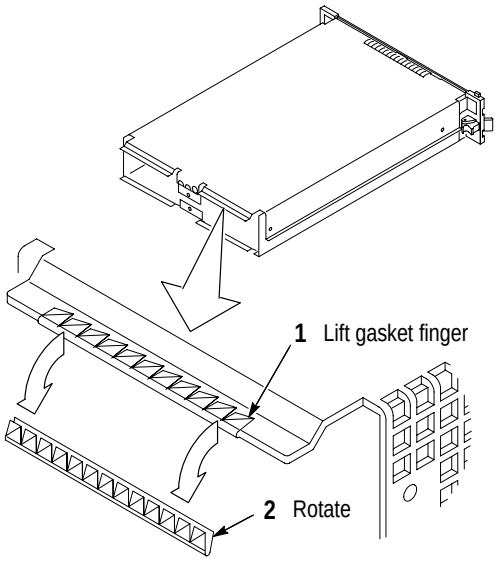


Figure 6–13: Rear EMI gasket removal

Installation

Use the following procedure and Figure 6–14 to install the rear EMI gaskets.

1. Position each gasket so the gasket fingers face the outside of the module.
2. Pick up each gasket at the end where the gasket finger is formed up. Then rotate the gasket on. As you do this, lift up any fingers that bind to the chassis or cover.
3. Slide each gasket gently from side to side to ensure that the gasket snaps in place.

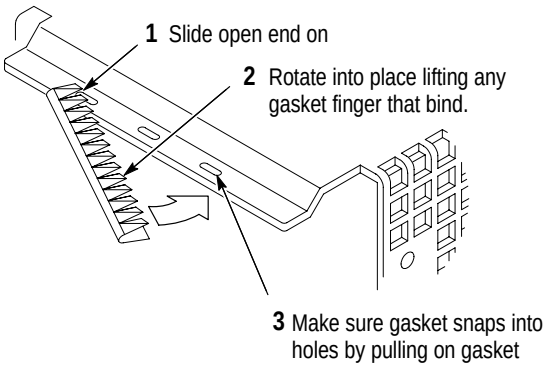


Figure 6–14: Rear EMI gasket replacement

4. Perform the *Acquisition Board* installation procedure (see page 6–24).

5. Perform the *Daughter Boards* installation procedure (see page 6–16).
6. Perform the *Local Processor Unit Board* installation procedure (see page 6–17).
7. Perform the *Cover* installation procedure (see page 6–12).

Troubleshooting



WARNING. *Before doing this or any other procedure in this manual, read the* General Safety Summary *and* Service Safety Summary *found at the beginning of this manual. Also, to prevent possible injury to service personnel or damage to electrical components, read* Preventing ESD *on page 6–2.*

This section contains information and procedures designed to help you isolate faults to within the TLA 7Lx/TLA 7Mx Logic Analyzer Module. The process is as follows:

- Do *Check for Common Problems* on page 6–30 to eliminate easy to find problems first.
- Do *Eliminate Other Problem Sources* on page 6–32 to eliminate the mainframe, probes, and other modules as the fault(s) source next.
- Do *Troubleshoot the Logic Analyzer Module*, beginning on page 6–33, to isolate locate the failed replaceable part within the module.

If you have replaced a faulty circuit board or assembly found using these procedures, you must follow any verification and adjustment procedures identified in Table 6–6 on page 6–40 for the replaced board.

Service Level

This section supports isolation of faults within the logic analyzer module to the replaceable-part level that's reflected in the replaceable parts list in Chapter 10. In most cases, faults are isolated to circuit boards or assemblies, but not to individual components on those boards. (See *Strategy for Servicing* on page xv.) Fault isolation is supported to the following circuit boards and replaceable parts:

- LPU board (A10)
- Acquisition board (A11, A12, A16, A17, A18, A19, A20, A21)
- Daughter boards (A13)
- Power supply fuses
- Interconnect cables

Required Documents

Other TLA 700 manuals may be required to help you isolate faults; other manuals and other sections in this manual contain instructions you will need to complete repairs after locating a faulty part. See the table that follows.

Manual or Section	Purpose
TLA 704 Portable Mainframe or TLA 711 Benchtop Chassis and *TLA 711 Benchtop Control*	To eliminate benchtop or portable mainframe as problem source (whichever configuration is in use)
TLA 700 Series Performance Verification and Adjustment Procedures	To check and adjust after circuit board or assembly replacement
TLA 700 Series Installation	To remove and reinstall modules in mainframe; to reinstall Windows95 or TLA 700 Software when required
Removal and Replacement Instructions (in this manual)	To remove and reinstall failed replaceable parts.
Replaceable Parts List (in this manual)	To order replaceable parts

For a list of all manuals available for the TLA 700 Logic Analyzer, see *Related Manuals* on page xiv of the *Preface* to this manual.

Check for Common Problems

Use Table 6–4 to quickly isolate possible failures. The table lists problems related to the logic analyzer module and possible causes. The list is not exhaustive, but it may help you eliminate a problem that’s quick to fix, such as a blown fuse or loose cable.

Table 6–4: Failure symptoms and possible causes

Symptom	Possible Cause(s)
Mainframe does not power on	■ Power connection faulty; check or substitute power cord ■ Fuse blown; check line fuse ■ Mainframe power supply failure; contact local Tektronix service center
Mainframe does not boot	■ Non-system disk or floppy in external drive; make sure logic analyzer boots from hard drive (Refer to the *TLA 700 Series Installation Manual* for software reinstallation procedures.) ■ Hard drive failure or corrupted files on hard drive; contact local Tektronix service center
Modules not recognized	■ Modules not fully inserted; make sure front of module is flush with front panel ■ Flash jumper installed on rear of module ■ Mainframe power supply failure; contact local Tektronix service center ■ Open fuses on logic analyzer module LPU board ■ Corrupted module firmware; reinstall firmware. Refer to *Upgrading Module Firmware* in the *TLA 700 Series Installation Manual*
Controller does not power on	■ Module not fully inserted; make sure front of module is flush with front panel ■ Module failure; contact local Tektronix service center
Module does not pass the normal power on diagnostics (READY indicator not green)	■ Module not fully inserted; make sure front of module is flush with front panel ■ Module failure; see *Troubleshoot the Logic Analyzer Module*, or contact local Tektronix service center ■ Open fuses on logic analyzer module LPU board or Acquisition board
Module loses settings when power is turned off	■ Module failure; see *Troubleshoot the Logic Analyzer Module*, or contact local Tektronix service center ■ NV RAM failure; refer to page 6–16 for Local Processor Unit Board replacement instructions
Module will not acquire data or the acquired data is incorrect	■ Module failure; see *Troubleshoot the Logic Analyzer Module*, or contact local Tektronix service center ■ Faulty probe or leadset

Eliminate Other Problem Sources

The TLA Logic Analyzer Module is part of the TLA 700 Series Logic Analyzer, which comprises modules installed in one of two mainframes (benchtop or portable). The following procedures will help you eliminate the mainframe and other modules as possible sources of the failure(s) that you troubleshoot.

Substitute a Good Module

If you have available a known-good logic analyzer module, perform the following procedure:

1. Remove the suspect logic analyzer module from the mainframe.
2. Install a known-good logic analyzer module in the same slot as the suspected module (verify that address switches on the rear of the module are set to same address as the module that you are replacing).
3. Power-on the logic analyzer and check for normal operation.
4. If the failure symptoms are still present with the known-good logic analyzer module installed, the problem most likely is in the Portable or Benchtop Mainframe, not in the logic analyzer module. Refer to the *Troubleshooting* section in Chapter 6 of your *Portable Mainframe* or *Benchtop Controller and Mainframe Service Manuals*.

NOTE. *Viewing the diagnostic window from the TLA 700 Logic Analyzer application may help you isolate failures to individual modules or to the mainframe.*

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5. If your TLA 700 Series Logic Analyzer operates normally with the known-good logic analyzer module installed, the suspect logic analyzer module needs to be repaired. Refer to *Troubleshoot the Logic Analyzer Module* on page 6–33 for the troubleshooting procedures you need to locate faults within the logic analyzer module.

Check the Mainframe

If you do not have a known-good module and are not sure the problem is in the TLA Logic Analyzer module, perform the following procedure to make sure the mainframe is not the source of the failure:

- Remove all plug-in modules from the mainframe (except the controller for the Benchtop mainframe).
- Perform the troubleshooting procedures in either the *TLA 704 Portable Mainframe Service Manual* or those in the *TLA 711 Benchtop Controller* and *Benchtop Chassi*s manuals, depending on in which mainframe the logic analyzer module is installed.

Probe-Level Troubleshooting

If the fault is that the logic analyzer module acquires no data or faulty data, the probe may be at fault. Do the following procedure to isolate such faults to a probe or to the logic analyzer module.

NOTE. *The procedure below requires that the logic analyzer is functional and operates normally when the modules are installed. Procedures to functionally verify the probes are located in the TLA 700 Series Performance Verification and Adjustment Technical Reference Manual.*

1. Verify that the probe is correctly connected to the module and to the system-under-test; check for loose or disconnected probe channels.
2. Move the suspected probe to another probe connector and observe if the problem follows the probe. If the problem does not follow the probe, the module may be faulty.
3. Substitute the suspected probe with a known good probe and observe if the problem is still present. If the problem still occurs, the module may be faulty. Refer to *Troubleshoot the Logic Analyzer Module* to isolate the problems within that module.
4. If you have determined that the probe is faulty, try to isolate the problem to an individual channel. A faulty channel may indicate a faulty probe podlet. Isolate faulty podlets by switching single podlets and observing if the problem tracks with the suspected podlet. Refer to the instructions in the *TLA 700 Series Installation Manual* for replacing faulty probe podlets.

Troubleshoot the Logic Analyzer Module

Follow the procedure in this section to identify the failed part within the logic analyzer module.

This procedure requires that the module is installed in a fully functional mainframe. If you have not determined that the mainframe is functional, or if you suspect the problem might be in a probe or in another module, refer to *Eliminating Other Problem Sources* on page 6–32.

Equipment Required

The basic troubleshooting procedures require minimal test equipment. There are no accessible test points to measure voltages. An ohmmeter is recommended for checking fuses.

Testing and adjustments might be required to correct some faults. Under those circumstances, you will need the test equipment listed in the *TLA 700 Series Performance Verification and Adjustment Technical Reference Manual*.

Preparation

The fault isolation procedure requires that you:

- recognize codes flashed by the front–panel LEDs during power up.
- be familiar with the power-on diagnostics.
- know how to run extended diagnostics and self calibration.

To fill these requirements, read the topics below before performing the *Fault Isolation Procedure* on page 6–35.

Front-Panel LEDs. The READY, ACCESSED, ARM'D, and TRIG'D front panel LEDs provide information about the TLA 7Lx/TLA 7Mx Logic Analyzer Module at power-on.

LED behavior follows:

- The green READY LED indicates that the module has passed the power-on diagnostics and is ready to communicate with the controller.
- The ACCESSED LED turns on any time the controller accesses the logic analyzer module.
- The ARM'D LED turns on when the logic analyzer module is armed during an acquisition.
- The TRIG'D LED turns on when the logic analyzer module triggers during an acquisition.

Self Calibration. Use self calibration to calibrate the installed modules. Run the self calibration after a minimum of a 30 minute warm-up and prior to running the extended diagnostics. For more information on when to run the self calibration, refer to *Running the Self Calibration* on page 2–7.

Power-On Diagnostics. Power-on diagnostics check basic functionality of the logic analyzer at every power on. If any failures occur at power on, the screen displays the calibration and diagnostics property sheet.

If there are no diagnostic failures when you power on the logic analyzer, you can display and run the calibration and diagnostics property sheet by selecting Calibration and Diagnostics from the System menu.

Extended Diagnostics. The extended diagnostics execute more thorough tests than the power-on diagnostics. Using the extended diagnostics, you can do the following tasks:

- Run tests individually or as a group
- Run tests once or continuously
- Run tests until a failures occur

NOTE*. For best results, run the diagnostics with probes disconnected from the module.*

To run the extended diagnostics, do the following steps:

1. Start the TLA 700 Series application if it is not already running.
2. Select the System menu, and point to Calibration and Diagnostics.
3. Select the extended diagnostics property page.
4. Select the individual tests, group of tests, or all tests.
5. Run the tests.

While the tests are executing, the word Running displays adjacent to the tests. When the tests are complete, the tests display either a Pass or Fail indication.

Fault Isolation Procedure

The Primary Troubleshooting Tree (Figure 6–15 on page 6–37) provides troubleshooting steps that test the logic analyzer module. Use the following procedure with that tree.

To determine if module is recognized, perform the following steps:

1. Install the logic analyzer module into a known-good mainframe.
2. Before you power on the mainframe, look at the READY, ACCESSED ARM'D, and TRIG'D front panel indicators.
3. Power on the mainframe and note how the front panel indicators respond.
   a. Verify that the green READY indicator turns on while the diagnostics are being checked. If the green READY indicator does not turn on, the module is not being recognized which indicates possible problems on the Local Processor Unit board.
   b. Verify that after a few seconds the ACCESSED indicator turns on. The indicator stays on while the module is accessed by the controller. After the System window displays, the indicator blinks anytime the controller accesses the module.

4. If a and b are verified, the module is recognized; if not verified, the module is not recognized. Proceed as the troubleshooting tree instructs.

5. If diagnostic failures occur, replace the board indicated by the tree. For further confirmation, you can correlate the failed test displayed with a board using Table 6–5 on page 6–38. *You should also first check the "special cases" of diagnostic failures below:*

   - Note from the tree, that if all the diagnostics pass, but self calibration fails, replace the Acquisition board.
   - If any of the Kernel test groups fail (ROM check, LPU RAM, LPU Address decode, etc.) replace the LPU board.
   - The At-Speed Threshold Acquire check tests the functionality of the daughter boards (TLA 7L3, TLA 7L4, TLA 7M3, or TLA 7M4 only) and the Acquisition board. If this test fails for modules with daughter boards, and the DAC and both of the At-Speed Async Acquire pass, replace the daughter board; otherwise, replace the Acquisition board. Also, ensure that the probes are disconnected from the module before running the diagnostics.
   - If multiple tests fail, the problem could be power-supply related problems on the Local Processor Unit board, faulty cables, or the mainframe. If replacing the Acquisition board does not remedy the failures, try replacing the Local Processor Unit board or the cables between the Local Processor Unit board and the Acquisition board.

NOTE*. Due to the module design, there are no accessible test points on the module to connect test equipment, such as an oscilloscope or digital voltmeter, to help isolate faults to an individual circuit board.*

6. Use the *Removal and Installation Procedures* that begin on page 6–7 to replace the faulty circuit board.

NOTE*. Before replacing modules, be sure to inspect all associated cables and connectors for damage and proper installation.*

7. Refer to Table 6–6 on page 6–40 after module replacement and perform ALL verification and adjustment procedures identified in that table for the replaced board.

Primary Troubleshooting Chart

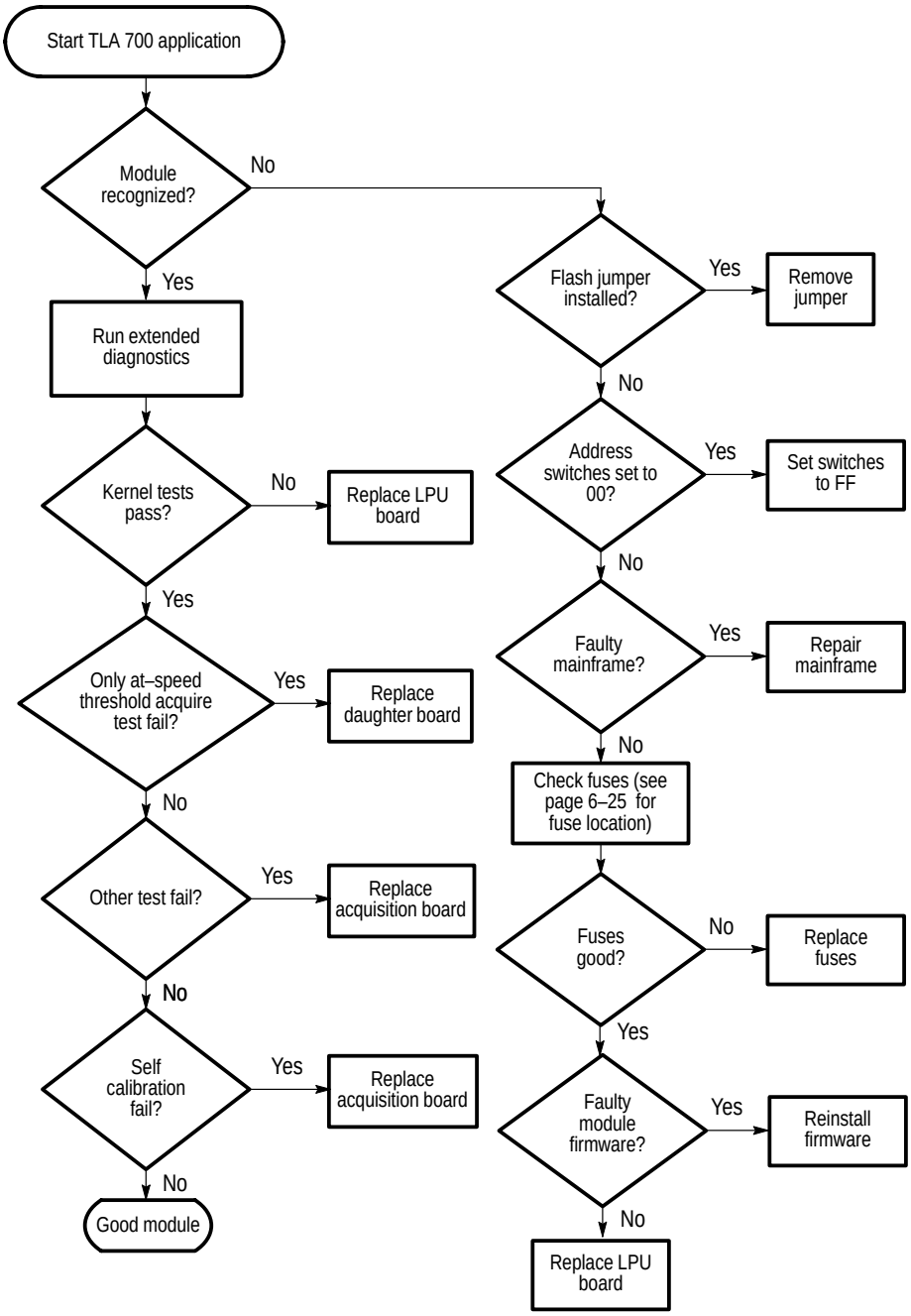


Figure 6–15: Primary troubleshooting chart

Diagnostic Tests Table

Table 6–5 can help you isolate problems to one of the three circuit boards in the module (use the *Removal and Installation Procedures* beginning on page 6–7 to replace the faulty circuit board):

Table 6–5: Diagnostic tests

Circuit board	Group & Test	Power on	Extended
LPU board	Kernel		
	ROM Check	✓	✓
	LPU RAM	✓	✓
	Address Decode	✓	✓
	NVRAM Check	✓	✓
Acquisition board	Timestamp		
	Address/Data Bus	✓	✓
	Memory Address Rollover	✓	✓
	Timestamp Rollover	✓	✓
	Timestamp Fast Clock		✓
	Acquisition RAM Data Bus	✓	✓
	Acquisition RAM Address Bus	✓	✓
	Timestamp Acquire		✓
	Store Signals	✓	✓
Acquisition board	Clock		
	Address/Data Bus	✓	✓
	Qualifier/Combiner RAM	✓	✓
	Clock State Machine RAM	✓	✓
	MagniVu RAM	✓	✓
	Acquisition RAM Data Bus	✓	✓
	Acquisition RAM Address Bus	✓	✓
	Store Signals	✓	✓
	Flag Bus		✓
	Acquisition Data Path		
	Address/Data Bus	✓	✓
	Hi-Resolution RAM	✓	✓
	Acquisition RAM Data Bus	✓	✓
	Acquisition RAM Address Bus	✓	✓
	Store Signals	✓	✓
	Bin & Log Busses	✓	✓

Table 6–5: Diagnostic tests (Cont.)

Circuit board	Group & Test	Power on	Extended
Acquisition board	Trigger		
	Address/Data Bus	✓	✓
	Internal RAM	✓	✓
	Data Events		✓
	Clock Events		✓
	Log_G Signal	✓	✓
	Trigger Crossbar	✓	✓
	Signal/Trigger Lines	✓	✓
	Acquisition RAM		
	RAM Selection	✓	✓
	Acquisition Data RAM 3		✓
	Acquisition Data RAM 2		✓
	Acquisition Data RAM 1		✓
	Acquisition Data RAM 0		✓
	Clock RAM		✓
	Timestamp RAM		✓
	Miscellaneous		
	DAC	✓	✓
	Acquisition Address Decode	✓	✓
	At-speed Threshold Acquire[1]		✓
	At-speed Async Acquire		✓
	At-speed Sync Acquire		✓
Daughter board (TLA 7L3, TLA 7L4, TLA 7M3, and TLA 7M4 only)	Miscellaneous		
	At-speed Threshold Acquire[1,2]		✓

1 Ensure probes are disconnected before running this test.

2 Replace the Daughter board if this test fails *and* the DAC and the At-speed Async Acquire test *both* pass.

Adjustment After Repair

After the removal and replacement of a circuit board or assembly due to electrical failure, locate the board removed in Table 6–6 and perform the indicated procedures. Note that Adjustment procedures are found in the *TLA 700 Series Performance Verification and Adjustment Manual.*

Table 6–6: Requirements after replacement

Board Replaced	Adjustment Required	Verification Checks
LPU board	Adjustment: Powerflex[1], Firmware level restoration[2], Deskew, Self Calibration	Self Calibration, Power-on and Extended Diagnostics
Acquisition board	Adjustment: Self Calibration, Deskew	Self Calibration, Power-on and Extended Diagnostics
Daughter boards	Adjustment: Deskew	Power-on and Extended Diagnostics

1 **The PowerFlex restoration or changes can only be made by Tektronix service personnel.**

2 **Refer to the *TLA 700 Series Installation Manual* for instructions for updating module firmware.**

Overview of Procedures

Table 6–7 provides a brief overview of the troubleshooting, adjustment, verification, and calibration procedures.

NOTE. *Calibration constants are stored in the LPU NVRAM. You must always perform a new self calibration and certification after you replace the LPU board.*

Table 6–7: Troubleshooting overview

Procedure	Recommended interval	Purpose	When required	Documented
Diagnostics (power on & extended)	Incoming inspection Annually	Verifies basic functionality.	During troubleshooting	*Power on Diagnostics*, page 6–34
Adjustment: self calibration	Annually As needed	Verifies basic functionality.	After acquisition, LPU, or daughter board replacement	*When to perform Self Calibration*, page 2–7
Adjustment: deskew	After board replacement or annually	Time-aligns the data channel	After board replacement	*TLA 700 Series Performance Verification and Adjustment Technical Reference Manual*
Functional verification	Incoming inspection As needed	Verifies front end and basic functionality including probes	After board replacement	*TLA 700 Series Performance Verification and Adjustment Technical Reference Manual*
Performance verification	Annually or as needed	Verifies advertised performance specifications	After board replacement	*TLA 700 Series Performance Verification and Adjustment Technical Reference Manual*
Calibration (certification)	Annual recertification	Verifies primary references	After acquisition, LPU, or daughter board replacement	*TLA 700 Series Performance Verification and Adjustment Technical Reference Manual*

Repackaging Instructions

This section contains the information needed to repackage the logic analyzer module for shipment or storage.

Packaging

If at all possible use the original packaging to ship or store the instrument. If the original packaging is not available, use a corrugated cardboard shipping carton having a test strength of at least 275 pounds (125 kg) and with an inside dimension at least six inches (15.25 cm) greater than the instrument dimensions. Add cushioning material to prevent the instrument from moving around in the shipping container.



CAUTION. *When returning the LPU board separately, be sure to properly support the narrow LED arm of the circuit board so it will not be damaged during transit or storage.*

If the instrument is being shipped to a Tektronix Service Center, enclose the following information:

- The owner's address
- Name and phone number of a contact person
- Type and serial number of the instrument
- Reason for returning
- A complete description of the service required

NOTE. *When ordering the LPU board for exchange or repair, you will need to supply the above information, including the firmware level and PowerFlex configuration information.*

Seal the shipping carton with an industrial stapler or strapping tape.

Mark the address of the Tektronix Service Center and also your own return address on the shipping carton in two prominent locations.

Storage

The TLA 7Lx/TLA 7Mx Logic Analyzer Module should be stored in a clean, dry environment. The following environmental characteristics apply for both shipping and storage:

- Temperature range: –40° F to +160° F (–40° C to +71° C)
- Altitude: To 40,000 feet (12,190 meters)

See Table 1–9 on page 1–8 for a complete listing of the environmental characteristics.

Options

This chapter lists the advertised options for each logic analyzer module. Refer to the *Replaceable Mechanical Parts* chapter for a list of standard and optional accessories for each module.

Table 7–1 lists the options for the TLA 7L1, TLA 7L2, TLA 7L3, and TLA 7L4 Logic Analyzer modules.

NOTE. *Service options are listed on the Tektronix Service Options page that precedes the Table of Contents in this manual.*

Table 7–1: TLA 7L1, TLA 7L2, TLA 7L3, and TLA 7L4 options

Option	Description
1S	Substitute 200 MHz State module
2S	Substitute 128 K memory depth
95	Add calibration data report

Table 7–2 lists the options for the TLA 7M1, TLA 7M2, TLA 7M3, and TLA 7M4 Logic Analyzer modules.

Table 7–2: TLA 7M1, TLA 7M2, TLA 7M3, and TLA 7M4 options

Option	Description
1S	Substitute 200 MHz State module
95	Add calibration data report

Replaceable Electrical Parts

Refer to the *Mechanical Parts List* section for a complete listing and description of replaceable parts.

Diagrams

This chapter contains the block diagram and the interconnection diagram for the logic analyzer module.

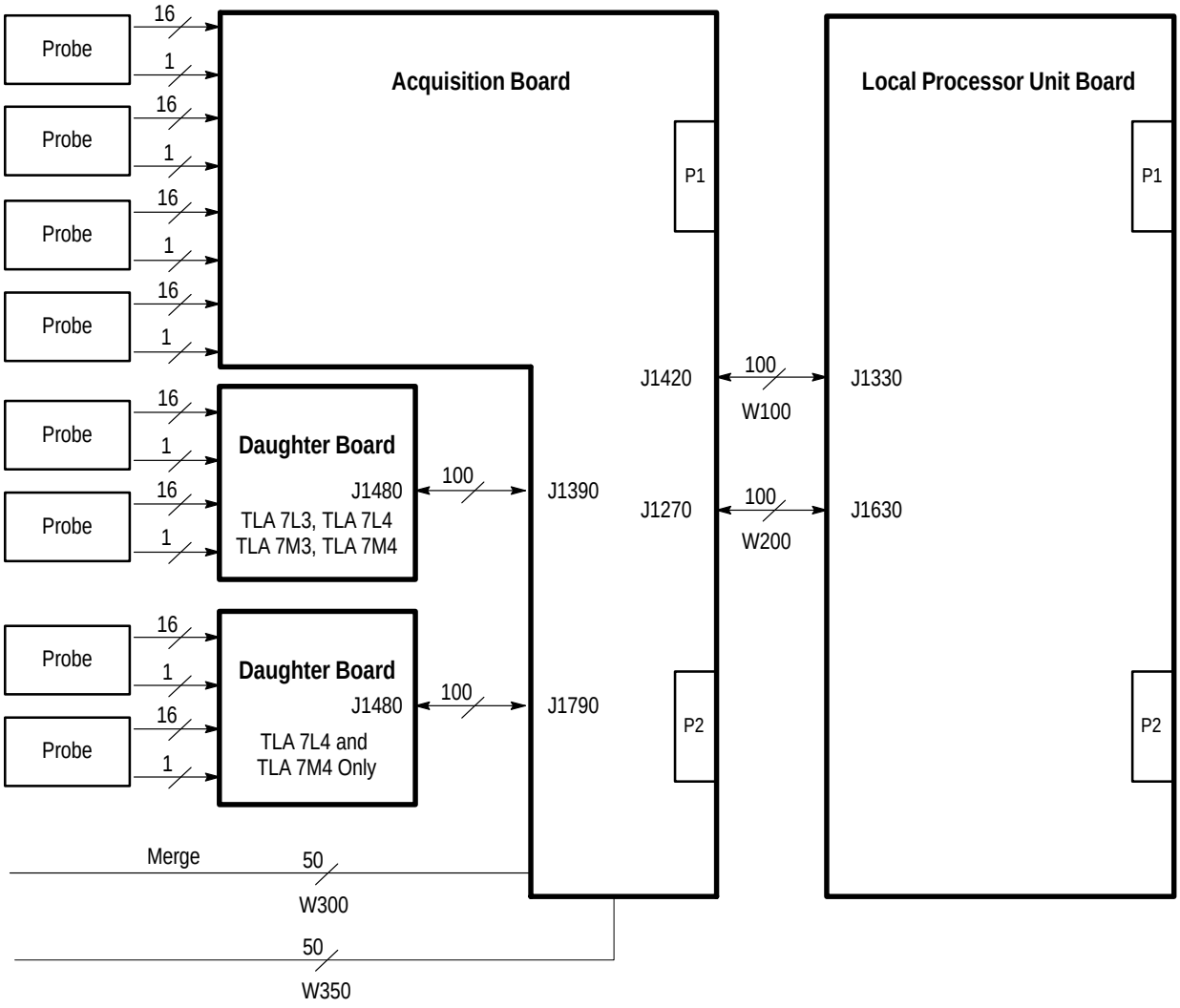


Figure 9–1: Interconnections

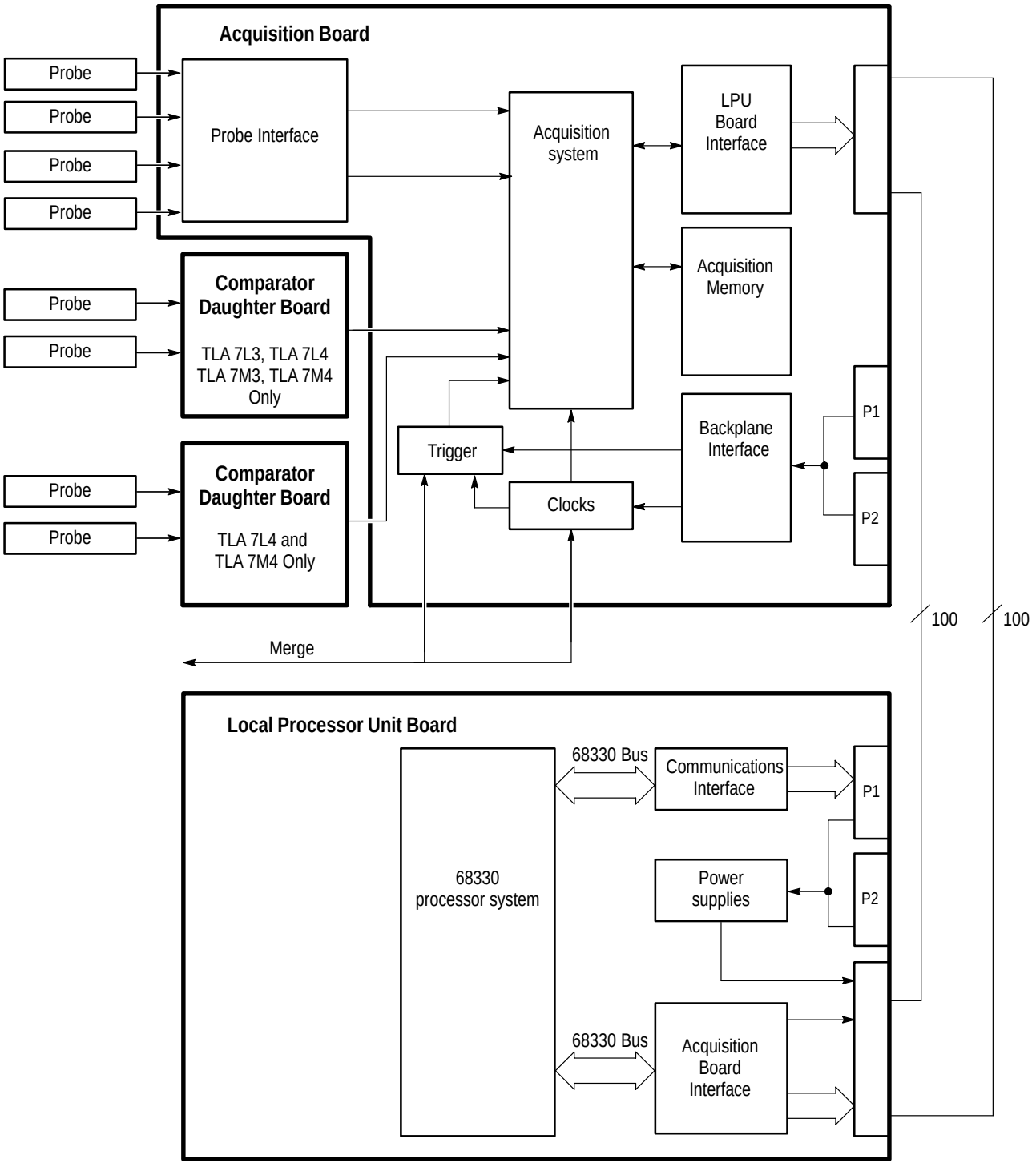


Figure 9–2: Block diagram

Replaceable Mechanical Parts

This section contains a list of the replaceable parts for the TLA 7Lx/TLA 7Mx Logic Analyzer Module. 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.

When you exchange some circuit boards, such as the LPU board, you must supply the following information. This will allow the board to be preconfigured to the proper PowerFlex level for your logic analyzer. Alternatively, you can return the repaired module (with the necessary information) to your local service center for configuration.

- Model number
- Serial number
- PowerFlex option upgrade number
- Firmware level

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

Module Servicing

Modules can be serviced by selecting one of the following three options. Contact your local Tektronix service center or representative for repair assistance.

Module Exchange. In some cases you may exchange your module for a remanufactured module. These modules cost significantly less than new modules and meet the same factory specifications. For more information about the module exchange program, call 1-800-TEK-WIDE, extension 6630.

Module Repair and Return. You may ship your module to us for repair, after which we will return it to you.

New Modules. You may purchase replacement modules in the same way as other replacement parts.

Using the Replaceable Parts List

This section contains a list of the mechanical and/or electrical components that are replaceable for the <instrument>. Use this list to identify and order replacement parts. The following table describes 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.

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

Manufacturers cross index

Mfr. code	Manufacturer	Address	City, state, zip code
00779	AMP INC.	CUSTOMER SERVICE DEPT PO BOX 3608	HARRISBURG, PA 17105–3608
05820	EG & G WAKEFIELD	60 AUDUBON ROAD	WAKEFIELD, MA 01880
06383	PANDUIT CORP	17303 RIDGELAND AVE	TINLEY PARK, IL 60477–3048
0JR05	TRIQUEST PRECISION PLASTICS	3000 LEWIS & CLARK HWY PO BOX 66008	VANCOUVER, WA 98666–6008
0KB01	STAUFFER SUPPLY CO	810 SE SHERMAN	PORTLAND, OR 97214–4657
0KB05	NORTH STAR NAMEPLATE INC	5750 NE MOORE COURT	HILLSBORO, OR 97124–6474
0LXM2	LZR ELECTRONICS INC	8051 CESSNA AVENUE	GAITHERSBURG, MD 20879
18677	SCANBE CORP	A ZERO CORP COMPANY 3445 FLETCHER AVE	EL MONTE, CA 91731
22526	BERG ELECTRONICS INC	825 OLD TRAIL ROAD	ETTERS, PA 17319
23633	RICHEY ELECTRONICS INC	7441 LINCOLN WAY	GARDEN GROVE, CA 92641
26742	METHODE ELECTRONICS INC	BACKPLAIN DIVISION 7444 WEST WILSON AVE	CHICAGO, IL 60656–4548
50434	HEWLETT PACKARD	370 W TRIMBLE ROAD	SAN JOSE, CA 95131–1008
53387	3M COMPANY	ELECTRONICS PRODUCTS DIV 3M AUSTIN CENTER	AUSTIN, TX 78769–2963
55285	BERGQUIST COMPANY INC., THE	5300 EDINA INDUSTRIAL BLVD	MINNEAPOLIS, MN 55435–3707
55322	SAMTEC INC	810 PROGRESS BLVD PO BOX 1147	NEW ALBANY, IN 47150
61857	SAN–O INDUSTRIAL CORP	91–3 COLIN DRIVE	HOLBROOK, NY 11741
75915	LITTELFUSE INC	800 E NORTHWEST HWY	DES PLAINES, IL 60016–3049
80009	TEKTRONIX INC	14150 SW KARL BRAUN DR PO BOX 500	BEAVERTON, OR 97077–0001
81073	GRAYHILL INC	561 HILLGROVE AVE PO BOX 10373	LAGRANGE, IL 60525
81312	WINCHESTER ELECTRONICS	DIV OF LITTON INDUSTRIES INC 400 PARK ROAD	WATERTOWN, CT 06795–0050
8X345	NORTHWEST SPRING MFG CO	5858 SW WILLOW LANE	LAKE OSWEGO, OR 97035
TK1943	NEILSEN MANUFACTURING INC	3501 PORTLAND RD NE	SALEM, OR 97303
TK2469	UNITREK CORPORATION	3000 LEWIS & CLARK HWY SUITE 2	VANCOUVER, WA 98661
TK2647	INSTRUMENT SPECIALTIES CO INC.	C/O TEMCO NW 1336 SE 51ST STREET	HILLSBORO, OR 97123

Replaceable parts list

Fig. & index number	Tektronix part number	Serial no. effective	Serial no. discont'd	Qty	Name & description	Mfr. code	Mfr. part number
					TLA 7L1 AND TLA 7M1 34-CHANNEL MODULES		
10–1–1	200–4338–00			1	COVER:HOLE COVER FOR NON-MERGED MODULES	0KB05	ORDER BY DESCR
–2	211–0409–00			17	SCR,ASSEM WSHR:4–40 X 0.312,PNH,STL,CDPL,T–10 TORX	0KB01	211–0409–00
–3	407–4489–00			1	BRACKET, LPU BUS CABLES		
–4	386–1657–00			5	SUPPORT,CKT BD:ACETY,RESIN NATURAL (PM1, PM2, PM3, PM4, PM5)	0JR05	ORDER BY DESCR
–5	671–3306–00			1	CKT BD ASSY:LPU,LOCAL PROCESSOR UNIT (A10)	80009	671–3306–00
–	150–5013–00			1	DIODE,OPTO:LED,GRN,572NM,5MCD AT 10MA (A10DS1460) (NOT ILLUSTRATED)	50434	HSMG–T600
–	159–0145–00			1	FUSE,WIRE LEAD:15A,32V,10 SECONDS (A10F1780) (NOT ILLUSTRATED)	61857	SP7–15A
–	159–5009–00			4	FUSE,SMD:1.5A,125V,FAST BLOW (A10F1681, A10F1881, A10F1981, A10F1983) (NOT ILLUSTRATED)	75915	45101.5
–6	131–2866–00			2	CONN,DIN:PCB,MALE,RTANG,3 X 32,0.1 CTR (A10P1, A10P2)	06383	100–096–053
–7	260–2597–00			2	SWITCH,ROTARY:HEXADECIMAL,100MA AT 50VDC,RIGHT ANGLE,0.430 W X 0.400 H X 0.202 L (A10S1, A10S2)	81073	94HAB16RA
–8	131–3766–00			1	CONN,HDR:PCB,MALE,RTANG,1 X 2,0.1 CTR (A10J1)	00779	87232–2
–9	131–1857–00			1	CONN,HDR:PCB,MALE,STR,1 X 36,0.1 CTR (A10J1250, A10J1258, A10J1450, A10J1458, A10J1465, A10J1540, A10J1541, A10J1565, A10J1641)	22526	65507–136
–	131–3520–00			1	CONN,HDR:PCB,MALE,STR,2 X 5,0.1 CTR (A10J1165) (NOT ILLUSTRATED)	53387	2510–6002UB
–	131–5562–00			1	CONN,RIBBON:PCB,MALE,STR,100 POS,0.050 CTR (A10J1160) (NOT ILLUSTRATED)	53387	91100–2201BP
–10	129–1478–00			5	SPACER, POST:1.860 L,1.10 SPACING,W/0.35 L,0.25 HEX,W/4–40 X 0.750 L 6–32 THD,1/4 HEX	80009	129–1478–00
–11	671–3866–01	B010100	B019999	1	CIRCUIT BD ASSY:34 CH,128K,100MHZ ACQUISITION (A16, TLA 7L1 ONLY)	80009	671–3866–01
–11	671–3866–02	B020000		1	CIRCUIT BD ASSY:34 CH,128K,100MHZ ACQUISITION (A16, TLA 7L1 ONLY)	80009	671–3866–02
–11	671–3868–01	B010100	B019999	1	CIRCUIT BD ASSY:34CH,512K,100MHZ ACQUISITION (A18, TLA 7M1 ONLY)	80009	671–3868–01
–11	671–3868–02	B020000		1	CIRCUIT BD ASSY:34CH,512K,100MHZ ACQUISITION (A18, TLA 7M1 ONLY)	80009	671–3868–02
–12	131–6174–00			2	CONN,DIN:PRESSFIT,MALE,RTANG,3 X 32,0.1 CTR (A16P1, A16P2, A18P1, A18P2)	81312	96P603307319
–13	386–6868–00			1	BACK PANEL	TK1943	386–6868–00
–14	441–2102–00			1	CHASSIS ASSY:TWO WIDE, 34CH, W/SUB FRONT PANEL & LABEL ATTACHED	80009	441–2102–00

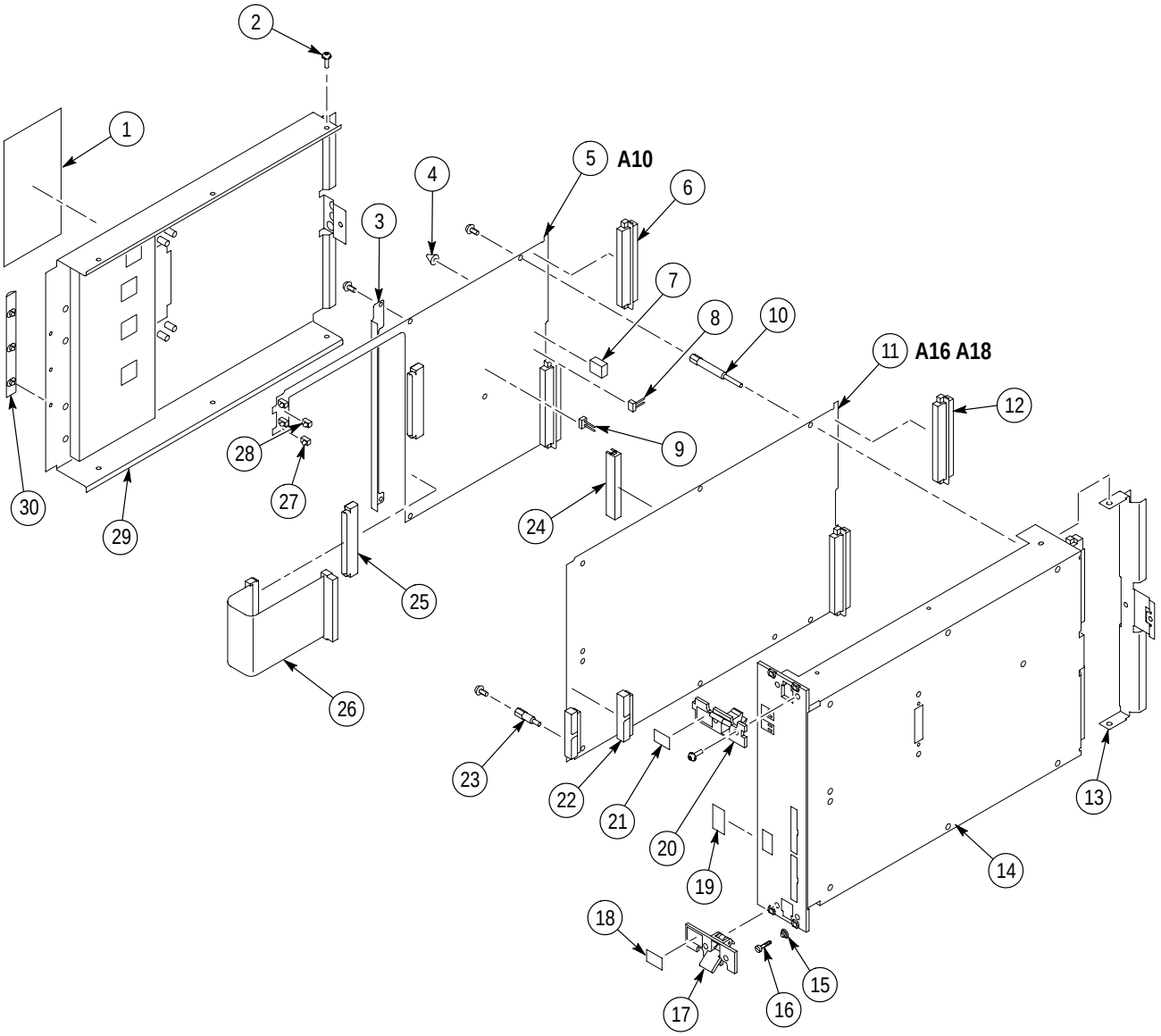


Figure 10–1: TLA 7L1 and TLA 7M1 Logic Analyzer Module exploded view

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
10–1–15	214–4762–00			4	SPRING,CONICAL:SPRING,CONICAL	8X345	ORDER BY DESCR
–16	211–0911–00			4	RETAINER SCREW,MACHINE:M2.5, PITCH 0.45MM, LENGTH 11MM, HEAD DIA 5MM, HEAD HEIGHT 2MM	18677	322401–05
–17	367–0484–00			1	HANDLE,EJECTOR:INJECTOR/EJECTOR ASSY, TWO WIDE,W/OUT KEYING,SPRING LOADED	80009	367–0484–00
–18	334–9189–00			1	MARKER INDENT:EJECTOR LABEL,BOTTOM	0KB05	334918900
–19	334–9235–00			1	MARKER,IDENT:CONFIGURATION LABELS,6 LABELS PER SHEET	80009	334–9235–00
–20	367–0483–00			1	HANDLE:INJECTOR/EJECTOR ASSEMBLY,TWO WIDE,W/KEYING,SPRING LOADED	80009	367–0483–00
–21	334–9224–00			1	MARKER,IDENT:MKD,TOP INJECTOR/EJECTOR LABEL (TLA 7L1 ONLY)	0KB05	ORDER BY DESCR
–21	334–9228–00			1	MARKER,IDENT:MKD,TOP INJECTOR/EJECTOR, LABEL (TLA 7M1 ONLY)	0KB05	ORDER BY DESCR
–22	131–3363–00			2	CONN,HDR:PCB,MALE,RTANG,2 X 17,0.1CTR (A16J2690, A16J2890, A18J2690, A18J2890)	53387	N2534–5002UB
–	159–5009–00			5	FUSE,SMD:1.5A,125V,FAST BLOW (A16F2500, A16F2504, A16F2506, A16F2903, A16F2901, A18F2500, A18F2504, A18F2506, A18F2903, A18F2901) (NOT ILLUSTRATED)	75915	45101.5
–	159–5010–00			1	FUSE,SMD:7A,125V,FAST BLOW (A16F2508, A18F2508) (NOT ILLUSTRATED)	75915	451007
–	214–4747–00			2	HEAT SINK,SEMIC:IC,PGA 11X11/MQUAD,1.1" X 1.1" X 0.45" H,PIN FIN,ALUMINUM,BLACK (A16XTU1570, A16XTU1670, A18XTU1570, A18XTU1670) (NOT ILLUSTRATED)	05820	658–45AB
–	214–4748–00			2	HEAT SINK,SEMIC:IC,PGA 11X11/MQUAD,1.1" X 1.1" X 0.25" H,PIN FIN,ALUMINUM,BLACK (A16XSU1460, A16XSU1660, A18XSU1460, A18XSU1660) (NOT ILLUSTRATED)	05820	658–25AB
–23	129–1479–00			4	SPACER, POST:1.285 OVERALL,0.535 L SPACING, W/0.35 L,0.25 HEX 4–40 INT THD X 6–32 EXT, 0.75 L	80009	129–1479–00
–24	131–5980–00			2	CONN,HDR:SMD,MALE,STR,2 X 50,0.05 X 0.1 CTR (A16J1270 A16J1420, A18J1270, A18J1420)	00779	1–104549–0
–25	131–6069–00			2	CONN, RIBBON:PCB,MALE,RTANG,100 POS,0.05 CTR (A10J1330, A10J1630)	00779	2–557100–5
–26	174–3533–00			2	CA ASSY,SP:RIBBON,IDC,30 AWG	80009	174–3533–00
–27	150–1278–00			3	DIODE,OPTO:LED,GRN,569NM,2MCD AT 5V (A10DS1100, A10DS1102, A10DS1103)	50434	HLMP–1640–010
–28	150–1279–00			1	DIODE,OPTO:LED,YEL,585NM,2MCD AT 5V (A10DS1101, A10DS1101)	50434	HLMP–1620–010
–29	200–4272–00			1	COVER	80009	200–4272–00
–30	348–1365–01			1	SHLD GSKT,ELEC:SYMETRICAL SLOTTED FINGER,0.350 W X 7.5 L,RIVIT MTG,SNAP–IN,RIVIT SPACING 1.5 IN	TK2647	0493–0069–01

Replaceable parts list

Fig. & index number	Tektronix part number	Serial no. effective	Serial no. discont'd	Qty	Name & description	Mfr. code	Mfr. part number
					TLA 7L2 AND TLA 7M2 68-CHANNEL MODULES		
10–2–1	200–4338–00			1	COVER:HOLE COVER FOR NON-MERGED MODULES	0KB05	ORDER BY DESCR
–2	211–0409–00			17	SCR,ASSEM WSHR:4–40 X 0.312,PNH,STL,CDPL,T–10 TORX	0KB01	211–0409–00
–3	407–4489–00			1	BRACKET, LPU BUS CABLES		
–4	386–1657–00			5	SUPPORT,CKT BD:ACETY,RESIN NATURAL (PM1, PM2, PM3, PM4, PM5)	0JR05	ORDER BY DESCR
–5	671–3306–00			1	CKT BD ASSY:LPU,LOCAL PROCESSOR UNIT (A10)	80009	671–3306–00
–	150–5013–00			1	DIODE,OPTO:LED,GRN,572NM,5MCD AT 10MA (A10DS1460) (NOT ILLUSTRATED)	50434	HSMG–T600
–	159–0145–00			1	FUSE,WIRE LEAD:15A,32V,10 SECONDS (A10F1780) (NOT ILLUSTRATED)	61857	SP7–15A
–	159–5009–00			4	FUSE,SMD:1.5A,125V,FAST BLOW (A10F1681, A10F1881, A10F1981, A10F1983) (NOT ILLUSTRATED)	75915	45101.5
–6	131–2866–00			2	CONN,DIN:PCB,MALE,RTANG,3 X 32,0.1 CTR (A10P1, A10P2)	06383	100–096–053
–7	260–2597–00			2	SWITCH,ROTARY:HEXADECIMAL,100MA AT 50VDC,RIGHT ANGLE,0.430 W X 0.400 H X 0.202 L (A10S1, A10S2)	81073	94HAB16RA
–8	131–3766–00			1	CONN,HDR:PCB,MALE,RTANG,1 X 2,0.1 CTR (A10J1)	00779	87232–2
–9	131–1857–00			1	CONN,HDR:PCB,MALE,STR,1 X 36,0.1 CTR (A10J1250, A10J1258, A10J1450, A10J1458, A10J1465, A10J1540, A10J1541, A10J1565, A10J1641)	22526	65507–136
–	131–3520–00			1	CONN,HDR:PCB,MALE,STR,2 X 5,0.1 CTR (A10J1165) (NOT ILLUSTRATED)	53387	2510–6002UB
–	131–5562–00			1	CONN,RIBBON:PCB,MALE,STR,100 POS,0.050 CTR (A10J1160) (NOT ILLUSTRATED)	53387	91100–2201BP
–10	129–1478–00			5	SPACER, POST:1.860 L,1.10 SPACING,W/0.35 L,0.25 HEX,W/4–40 X 0.750 L 6–32 THD,1/4 HEX	80009	129–1478–00
–11	671–3867–01	B010100	B019999	1	CIRCUIT BD ASSY:68CH,128K,ACQUISITION (A17, TLA 7L2 ONLY)	80009	671–3867–01
–11	671–3867–02	B020000		1	CIRCUIT BD ASSY:68CH,128K,ACQUISITION (A17, TLA 7L2 ONLY)	80009	671–3867–02
–11	671–3870–01	B010100	B019999	1	CIRCUIT BD ASSY:68CH,512K,100MHZ ACQUISITION (A20, TLA 7M2 ONLY)	80009	671–3870–01
–11	671–3870–02	B020000		1	CIRCUIT BD ASSY:68CH,512K,100MHZ ACQUISITION (A20, TLA 7M2 ONLY)	80009	671–3870–02
–12	131–6174–00			2	CONN,DIN:PRESSFIT,MALE,RTANG,3 X 32,0.1 CTR (A17P1, A17P2, A20P1, A20P2)	81312	96P603307319
–13	386–6868–00			1	BACK PANEL	TK1943	386–6868–00
–14	441–2103–00			1	CHASSIS ASSY:TWO WIDE, 68CH, W/SUB FRONT PANEL & LABEL ATTACHED	80009	441–2103–00

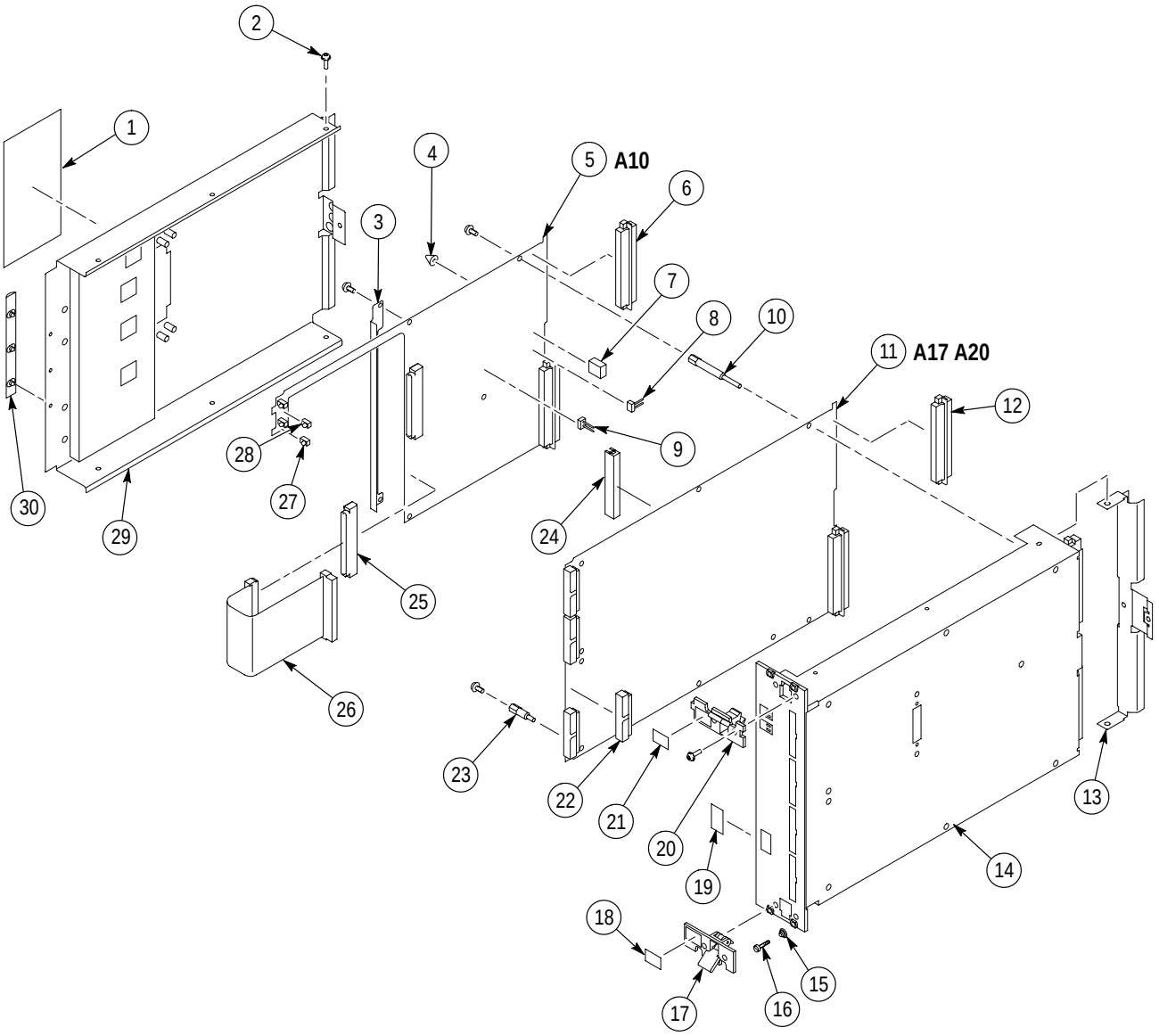


Figure 10–2: TLA 7L2 and TLA 7M2 Logic Analyzer Module exploded view

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
10–2–15	214–4762–00			4	SPRING,CONICAL:SPRING,CONICAL	8X345	ORDER BY DESCR
–16	211–0911–00			4	RETAINER SCREW,MACHINE:M2.5, PITCH 0.45MM, LENGTH 11MM, HEAD DIA 5MM, HEAD HEIGHT 2MM	18677	322401–05
–17	367–0484–00			1	HANDLE,EJECTOR:INJECTOR/EJECTOR ASSY, TWO WIDE,W/OUT KEYING,SPRING LOADED	80009	367–0484–00
–18	334–9189–00			1	MARKER INDENT:EJECTOR LABEL,BOTTOM	0KB05	334918900
–19	334–9235–00			1	MARKER,IDENT:CONFIGURATION LABELS,6 LABELS PER SHEET	80009	334–9235–00
–20	367–0483–00			1	HANDLE:INJECTOR/EJECTOR ASSEMBLY,TWO WIDE,W/KEYING,SPRING LOADED	80009	367–0483–00
–21	334–9225–00			1	MARKER,IDENT:MKD,TOP INJECTOR/EJECTOR (TLA 7L2 ONLY)	0KB05	ORDER BY DESCR
–21	334–9229–00			1	MARKER,IDENT:MKD,TOP INJECTOR/EJECTOR (TLA 7M2 ONLY)	0KB05	ORDER BY DESCR
–22	131–3363–00			4	CONN,HDR:PCB,MALE,RTANG,2 X 17,0.1CTR (A17J2290, A17J2490, A17J2690, A17J2890, A20J2290, A20J2490, A20J2690, A20J2890)	53387	N2534–5002UB
–	159–5009–00			5	FUSE,SMD:1.5A,125V,FAST BLOW (A17F2500, A17F2504, A17F2506, A17F2903, A17F2901, A20F2500, A20F2504, A20F2506, A20F2903, A20F2901) (NOT ILLUSTRATED)	75915	45101.5
–	159–5010–00			1	FUSE,SMD:7A,125V,FAST BLOW (A17F2508, A20F2508) (NOT ILLUSTRATED)	75915	451007
–	214–4747–00			3	HEAT SINK,SEMIC:IC,PGA 11X11/MQUAD,1.1" X 1.1" X 0.45" H,PIN FIN,ALUMINUM,BLACK (A17XTU1170, A17XTU1570, A17XTU1670, A20XTU1170, A20XTU1570, A20XTU1670) (NOT ILLUSTRATED)	05820	658–45AB
–	214–4748–00			2	HEAT SINK,SEMIC:IC,PGA 11X11/MQUAD,1.1" X 1.1" X 0.25" H,PIN FIN,ALUMINUM,BLACK (A17XSU1460, A17XSU1660, A20XSU1460, A20XSU1660) (NOT ILLUSTRATED)	05820	658–25AB
–23	129–1479–00			4	SPACER, POST:1.285 OVERALL,0.535 L SPACING, W/0.35 L,0.25 HEX 4–40 INT THD X 6–32 EXT, 0.75 L	80009	129–1479–00
–24	131–5980–00			2	CONN,HDR:SMD,MALE,STR,2 X 50,0.05 X 0.1 CTR (A17J1270, A17J1420, A20J1270, A20J1420)	00779	1–104549–0
–25	131–6069–00			2	CONN, RIBBON:PCB,MALE,RTANG,100 POS,0.05 CTR (A10J1330, A10J1630)	00779	2–557100–5
–26	174–3533–00			2	CA ASSY,SP:RIBBON,IDC,30 AWG	80009	174–3533–00
–27	150–1278–00			3	DIODE,OPTO:LED,GRN,569NM,2MCD AT 5V (A10DS1100, A10DS1102, A10DS1103)	50434	HLMP–1640–010
–28	150–1279–00			1	DIODE,OPTO:LED,YEL,585NM,2MCD AT 5V (A10DS1101)	50434	HLMP–1620–010
–29	200–4272–00			1	COVER	80009	200–4272–00
–30	348–1365–01			1	SHLD GSKT,ELEC:SYMETRICAL SLOTTED FINGER,0.350 W X 7.5 L,RIVIT MTG,SNAP–IN,RIVIT SPACING 1.5 IN	TK2647	0493–0069–01

Replaceable parts list

Fig. & index number	Tektronix part number	Serial no. effective	Serial no. discont'd	Qty	Name & description	Mfr. code	Mfr. part number
					TLA 7L3 AND TLA 7M3 102-CHANNEL MODULES		
10–3–1	407–4458–00			1	BRACKET,CABLE:MALE MERGE ASSEMBLY	80009	407–4458–00
–2	211–0409–00			23	SCR,ASSEM WSHR:4–40 X 0.312,PNH,STL,CDPL,T–10 TORX	0KB01	211–0409–00
–3	348–1537–00			4	GASKET,EMI:CLIP–ON,1.98 L, BE CU,TIN PLATED,W/T LANCES	TK2647	97–563–17 W/2 T LANCES
–4	407–4489–00			1	BRACKET, LPU BUS CABLES		
–5	386–1657–00			5	SUPPORT,CKT BD:ACETY,RESIN NATURAL (PM1, PM2, PM3, PM4, PM5)	0JR05	ORDER BY DESCR
–6	671–3306–00			1	CKT BD ASSY:LPU,LOCAL PROCESSOR UNIT (A10)	80009	671–3306–00
–	159–0145–00			1	FUSE,WIRE LEAD:15A,32V,10 SECONDS (A10F1780) (NOT ILLUSTRATED)	61857	SP7–15A
–	159–5009–00			4	FUSE,SMD:1.5A,125V,FAST BLOW (A10F1681, A10F1881, A10F1981, A10F1983) (NOT ILLUSTRATED)	75915	45101.5
–	150–5013–00			1	DIODE,OPTO:LED,GRN,572NM,5MCD AT 10MA (A10DS1460) (NOT ILLUSTRATED)	50434	HSMG–T600
–7	131–2866–00			2	CONN,DIN:PCB,MALE,RTANG,3 X 32,0.1 CTR (A10P1, A10P2)	06383	100–096–053
–8	260–2597–00			2	SWITCH,ROTARY:HEXADECIMAL,100MA AT 50VDC,RIGHT ANGLE,0.430 W X 0.400 H X 0.202 L (A10S1, A10S2)	81073	94HAB16RA
–9	131–3766–00			1	CONN,HDR:PCB,MALE,RTANG,1 X 2,0.1 CTR (A10J1)	00779	87232–2
–10	131–1857–00			1	CONN,HDR:PCB,MALE,STR,1 X 36,0.1 CTR (A10J1250, A10J1258, A10J1450, A10J1458, A10J1465, A10J1540, A10J1541, A10J1565, A10J1641)	22526	65507–136
–	131–3520–00			1	CONN,HDR:PCB,MALE,STR,2 X 5,0.1 CTR (A10J1165) (NOT ILLUSTRATED)	53387	2510–6002UB
–	131–5562–00			1	CONN,RIBBON:PCB,MALE,STR,100 POS,0.050 CTR (A10J1160) (NOT ILLUSTRATED)	53387	91100–2201BP
–11	129–1478–00			5	SPACER, POST:1.860 L,1.10 SPACING,W/0.35 L,0.25 HEX,W/4–40 X 0.750 L 6–32 THD,1/4 HEX	80009	129–1478–00
–12	671–3869–01	B010100	B019999	1	CIRCUIT BD ASSY:102CH,128K,100MHZ ACQUISITION (A19, TLA 7L3 ONLY)	80009	671–3869–01
–12	671–3869–02	B020000		1	CIRCUIT BD ASSY:102CH,128K,100MHZ ACQUISITION (A19, TLA 7L3 ONLY)	80009	671–3869–02
–12	671–3871–01	B010100	B019999	1	CIRCUIT BD ASSY:102CH,512K,100MHZ ACQUISITION (A21, TLA 7M3 ONLY)	80009	671–3871–01
–12	671–3871–02	B020000		1	CIRCUIT BD ASSY:102CH,512K,100MHZ ACQUISITION (A21, TLA 7M3 ONLY)	80009	671–3871–02
–13	131–6174–00			2	CONN,DIN:PRESSFIT,MALE,RTANG,3 X 32,0.1 CTR (A19P1, A19P2, A21P1, A21P2)	81312	96P603307319

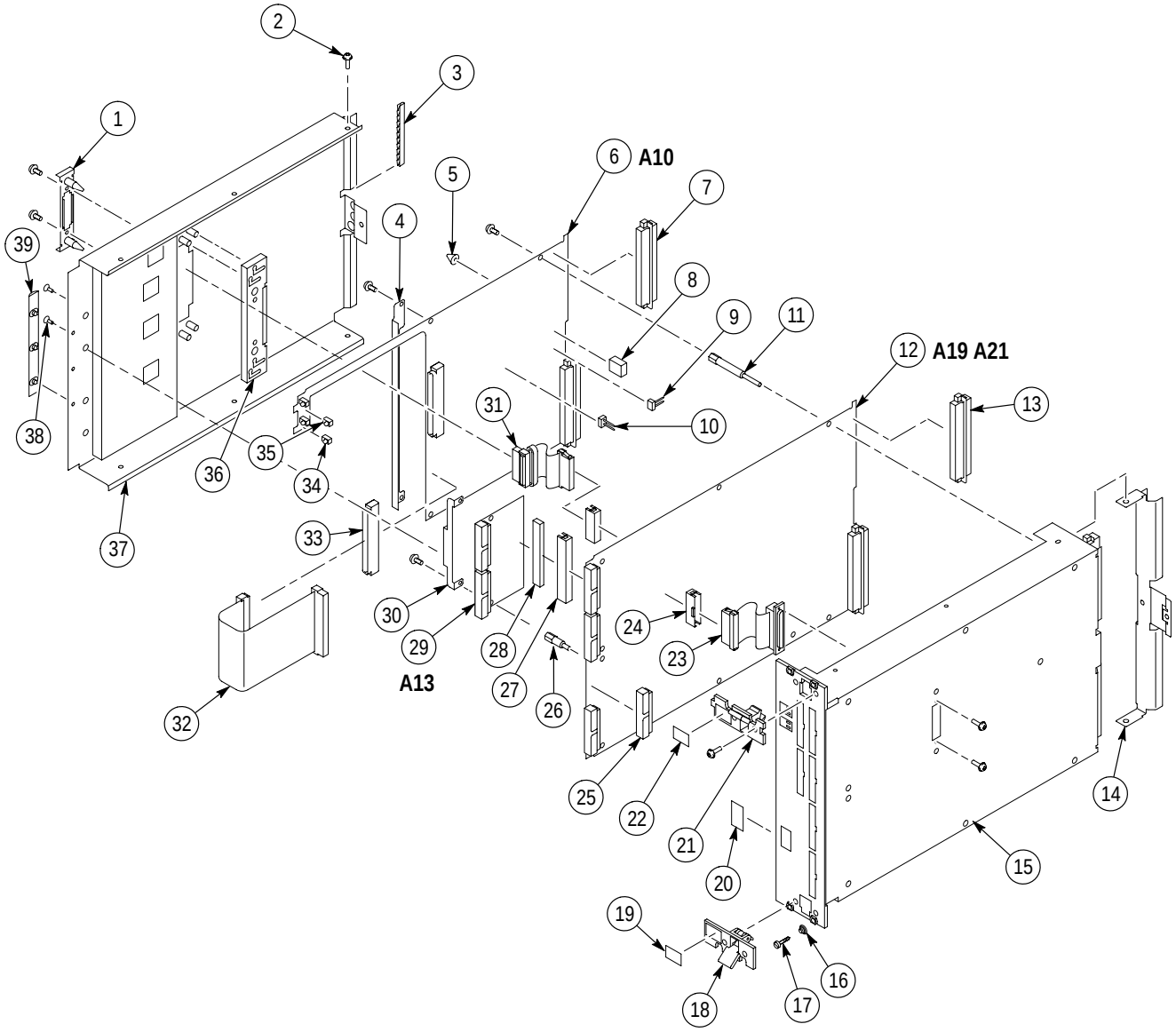


Figure 10–3: TLA 7L3 and TLA 7M3 Logic Analyzer Module exploded view

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
10–3–14	386–6868–00			1	BACK PANEL	TK1943	386–6868–00
–15	441–2104–00			1	CHASSIS ASSY:TWO WIDE, 102CH, W/SUB FRONT PANEL & LABEL ATTACHED	80009	441–2104–00
–16	214–4762–00			4	SPRING,CONICAL	8X345	ORDER BY DESCR
–17	211–0911–00			4	RETAINER SCREW,MACHINE:M2.5, PITCH 0.45MM, LENGTH 11MM, HEAD DIA 5MM, HEAD HEIGHT 2MM, BRIGHT NICKEL	18677	322401–05
–18	367–0484–00			1	HANDLE,EJECTOR:INJECTOR/EJECTOR ASSY, TWO WIDE,W/OUT KEYING,SPRING LOADED	80009	367–0484–00
–19	334–9189–00			1	MARKER INDENT:EJECTOR LABEL,BOTTOM	0KB05	334918900
–20	334–9235–00			1	MARKER,IDENT:CONFIGURATION LABELS,6 LABELS PER SHEET	80009	334–9235–00
–21	367–0483–00			1	HANDLE:INJECTOR/EJECTOR ASSEMBLY,TWO WIDE,W/KEYING,SPRING LOADED	80009	367–0483–00
–22	334–9226–00			1	MARKER,IDENT:MKD ,TOP INJECTOR/EJECTOR LABEL (TLA 7L3 ONLY)	0KB05	ORDER BY DESCR
–22	334–9230–00			1	MARKER,IDENT:MKD,TOP INJECTOR/EJECTOR LABEL (TLA 7M3 ONLY)	0KB05	ORDER BY DESCR
–23	174–3537–00			1	CA ASSY,SP:RIBBON,,IDC,30 AWG,0.025CTR,2.0 L	80009	174–3537–00
–24	131–6021–00			2	CONN,HDR:SMD,MALE,STR,2 X 25,0.05 X 0.1 CTR (A19J1465, A19J2460, A21J1465, A21J2460)	00779	146144–3
–	159–5009–00			5	FUSE,SMD:1.5A,125V,FAST BLOW (A19F2500, A19F2504, A19F2506, A19F2903, A19F2901, A21F2500, A21F2504, A21F2506, A21F2903, A21F2901)	75915	45101.5
–	159–5010–00			1	FUSE,SMD:7A,125V,FAST BLOW (A19F2508, A21F2508)	75915	451007
–	214–4747–00			4	HEAT SINK,SEMIC:IC,PGA 11X11/MQUAD,1.1" X 1.1" X 0.45" H,PIN FIN,ALUMINUM,BLACK (A19XTU1170, A19XTU1370, A19XTU1570, A19XTU1670, A21XTU1170, A21XTU1370, A21XTU1570, A21XTU1670)	05820	658–45AB
–	214–4748–00			2	HEAT SINK,SEMIC:IC,PGA 11X11/MQUAD,1.1" X 1.1" X 0.25" H,PIN FIN,ALUMINUM,BLACK (A19XSU1460, A19XSU1660, A21XSU1460, A21XSU1660)	05820	658–25AB
–25	131–3363–00			4	CONN,HDR:PCB,MALE,RTANG,2 X 17,0.1CTR (A19J2290, A19J2490, A19J2690, A19J2890, A21J2290, A21J2490, A21J2690, A21J2890)	53387	N2534–5002UB
–26	129–1479–00			4	SPACER, POST:1.285 OVERALL,0.535 L SPACING, W/0.35 L,0.25 HEX 4–40 INT THD X 6–32 EXT, 0.75 L	80009	129–1479–00
–	131–3363–00			2	CONN,HDR:PCB,MALE,RTANG,2 X 17,0.1CTR (PART OF A13)	53387	N2534–5002UB
–27	131–5980–00			3	CONN,HDR:SMD,MALE,STR,2 X 50,0.05 X 0.1 CTR (A19J1390, A19J1420, A19J1790, A20J1390, A20J1420, A20J1790)	00779	1–104549–0
–28	131–6016–00			1	CONN,HDR:SMD,FEMALE,STR,2 X 50,0.05 X 0.1 CTR (PART OF A13)	00779	104550–9
–29	671–3307–00			1	CKT BD ASSY:COMPARATOR DAUGHTER BOARD (A13)	80009	671–3307–00

Replaceable parts list

Fig. & index number	Tektronix part number	Serial no. effective	Serial no. discont'd	Qty	Name & description	Mfr. code	Mfr. part number
10–3–30	407–4494–00			1	BRACKET, EMI , DAUGHTER BOARD	80009	407–4494–00
–31	174–3536–01			1	CA ASSY,SP:MERGE RIBBON,IDC,30 AWG,0.025 CTR,2.5 L	80009	174–3536–01
–32	174–3533–00			2	CA ASSY,SP:RIBBON,IDC,30 AWG	80009	174–3533–00
–33	131–6069–00			2	CONN, RIBBON:PCB,MALE,RTANG,100 POS,0.05 CTR (A10J1330, A10J1630)	00779	2–557100–5
–34	150–1278–00			3	DIODE,OPTO:LED,GRN,569NM,2MCD AT 5V (A10DS1100, A10DS1102, A10DS1103)	50434	HLMP–1640–010
–35	150–1279–00			1	DIODE,OPTO:LED,YEL,585NM,2MCD AT 5V (A10DS1101)	50434	HLMP–1620–010
–36	352–1062–00			1	HOLDER,MERGE:MALE, 18AWG CRS W/HARDWARE	TK1943	ORDER BY DESCR
–37	200–4272–00			1	COVER	80009	200–4272–00
–38	211–0718–00			2	SCREW,MACHINE:6–32 X 0.312,FLH100,STL,CDPL,T–10 TORX DR	0KB01	ORDER BY DESCR
–39	348–1365–01			1	SHLD GSKT,ELEC:SYMETRICAL SLOTTED FINGER,0.350 W X 7.5 L,RIVIT MTG,SNAP–IN,RIVIT SPACING 1.5 IN	TK2647	0493–0069–01

Replaceable parts list

Fig. & index number	Tektronix part number	Serial no. effective	Serial no. discont'd	Qty	Name & description	Mfr. code	Mfr. part number
					TLA 7L4 AND TLA 7M4 136-CHANNEL MODULES		
10–4–1	407–4458–00			1	BRACKET,CABLE:MALE MERGE ASSEMBLY, 18 AWG CRS W/HARDWARE	80009	407–4458–00
–2	211–0409–00			25	SCR,ASSEM WSHR:4–40 X 0.312,PNH,STL,CDPL,T–10 TORX	0KB01	211–0409–00
–3	348–1537–00			4	GASKET,EMI:CLIP–ON,1.98 L, BE CU,TIN PLATED,W/T LANCES	TK2647	97–563–17 W/2 T LANCES
–4	407–4489–00			1	BRACKET, LPU BUS CABLES		
–5	386–1657–00			5	SUPPORT,CKT BD:ACETY,RESIN NATURAL (PM1, PM2, PM3, PM4, PM5)	0JR05	ORDER BY DESCR
–6	671–3306–00			1	CKT BD ASSY:LPU,LOCAL PROCESSOR UNIT (A10)	80009	671–3306–00
–	150–5013–00			1	DIODE,OPTO:LED,GRN,572NM,5MCD AT 10MA (A10DS1460) (NOT ILLUSTRATED)	50434	HSMG–T600
–	159–0145–00			1	FUSE,WIRE LEAD:15A,32V,10 SECONDS (A10F1780) (NOT ILLUSTRATED)	61857	SP7–15A
–	159–5009–00			4	FUSE,SMD:1.5A,125V,FAST BLOW (A10F1681, A10F1881, A10F1981, A10F1983) (NOT ILLUSTRATED)	75915	45101.5
–7	131–2866–00			2	CONN,DIN:PCB,MALE,RTANG,3 X 32,0.1 CTR (A10P1, A10P2)	06383	100–096–053
–8	260–2597–00			2	SWITCH,ROTARY:HEXADECIMAL,100MA AT 50VDC,RIGHT ANGLE,0.430 W X 0.400 H X 0.202 L A10S1, A10S2)	81073	94HAB16RA
–9	131–3766–00			1	CONN,HDR:PCB,MALE,RTANG,1 X 2,0.1 CTR (A10J1)	00779	87232–2
–10	131–1857–00			1	CONN,HDR:PCB,MALE,STR,1 X 36,0.1 CTR (A10J1250, A10J1258, A10J1450, A10J1458, A10J1465, A10J1540, A10J1541, A10J1565, A10J1641)	22526	65507–136
–	131–3520–00			1	CONN,HDR:PCB,MALE,STR,2 X 5,0.1 CTR (A10J1165) (NOT ILLUSTRATED)	53387	2510–6002UB
–	131–5562–00			1	CONN,RIBBON:PCB,MALE,STR,100 POS,0.050 CTR (A10J1160) (NOT ILLUSTRATED)	53387	91100–2201BP
–11	129–1478–00			5	SPACER, POST:1.860 L,1.10 SPACING,W/0.35 L,0.25 HEX,W/4–40 X 0.750 L 6–32 THD,1/4 HEX	80009	129–1478–00
–12	671–3305–01	B010100	B019999	1	CKT BD ASSY:136CH,128K ACQUISITION (A11, TLA 7L4 ONLY)	80009	671–3305–01
–12	671–3305–02	B020000		1	CKT BD ASSY:136CH,128K ACQUISITION (A11, TLA 7L4 ONLY)	80009	671–3305–02
–12	671–3561–01	B010100	B019999	1	CKT BD ASSY:136CH,512K ACQUISITION (A12, TLA 7M4 ONLY)	80009	671–3561–01
–12	671–3561–02	B020000		1	CKT BD ASSY:136CH,512K ACQUISITION (A12, TLA 7M4 ONLY)	80009	671–3561–02
–13	131–6174–00			2	CONN,DIN:PRESSFIT,MALE,RTANG,3 X 32,0.1 CTR (A11P1, A11P2, A12P1, A12P2)	81312	96P603307319

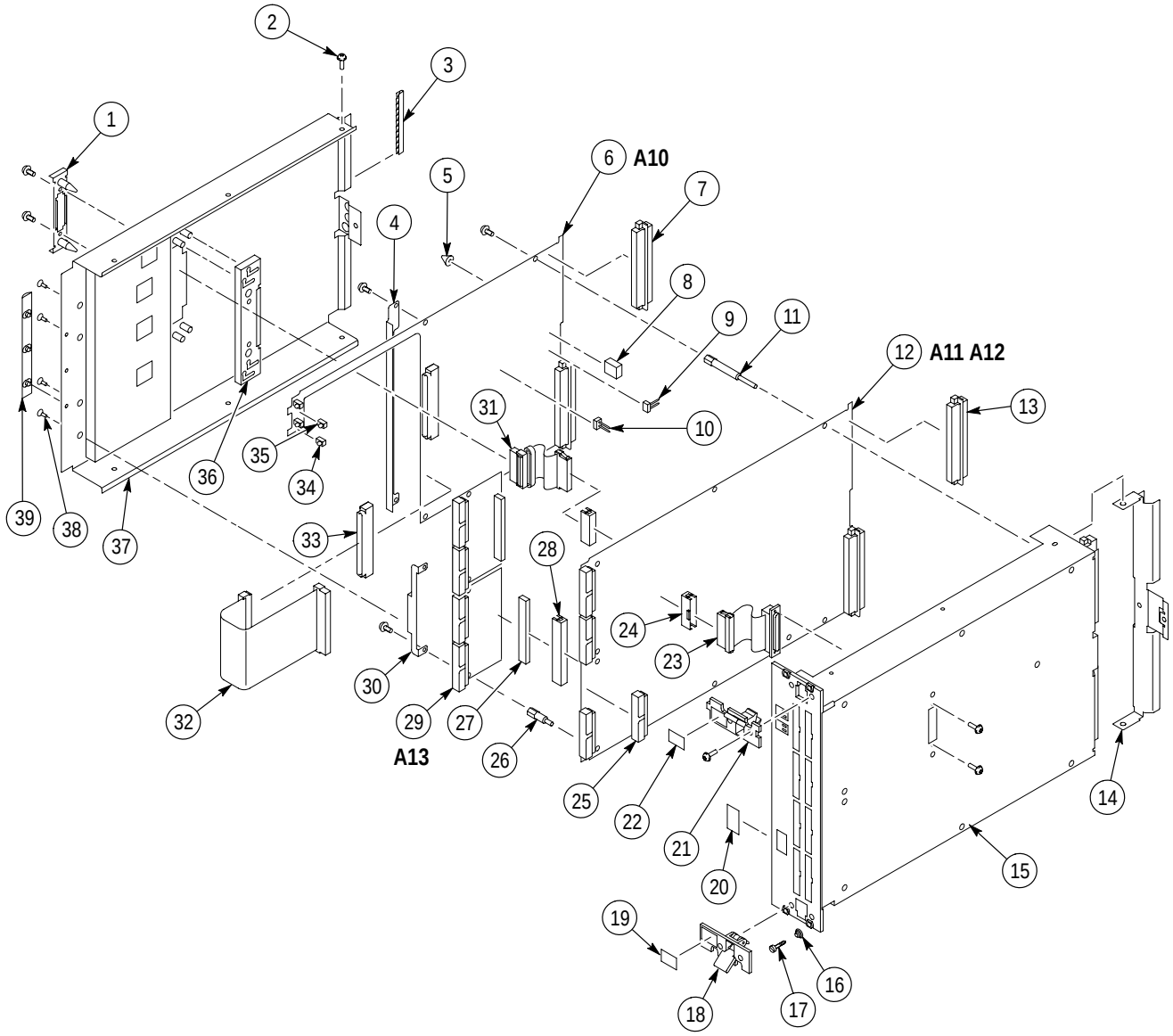


Figure 10–4: TLA 7L4 and TLA 7M4 Logic Analyzer Module exploded view

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
10–4–14	386–6868–00			1	BACK PANEL	TK1943	386–6868–00
–15	441–2065–00			1	CHASSIS ASSY:TWO WIDE, W/SUB FRONT PANEL & LABEL ATTACHED	80009	441–2065–00
–16	214–4762–00			4	SPRING,CONICAL	8X345	ORDER BY DESCR
–17	211–0911–00			4	RETAINER SCREW,MACHINE:M2.5, PITCH 0.45MM, LENGTH 11MM, HEAD DIA 5MM, HEAD HEIGHT 2MM	18677	322401–05
–18	367–0484–00			1	HANDLE,EJECTOR:INJECTOR/EJECTOR ASSY, TWO WIDE,W/OUT KEYING,SPRING LOADED	80009	367–0484–00
–19	334–9189–00			1	MARKER INDENT:EJECTOR LABEL,BOTTOM	0KB05	334918900
–20	334–9235–00			1	MARKER,IDENT:CONFIGURATION LABELS,6 LABELS PER SHEET	80009	334–9235–00
–21	367–0483–00			1	HANDLE:INJECTOR/EJECTOR ASSEMBLY,TWO WIDE,W/KEYING,SPRING LOADED	80009	367–0483–00
–22	334–9227–00			1	MARKER,IDENT:MKD,TOP INJECTOR/EJECTOR LABEL (TLA 7L4 ONLY)	0KB05	ORDER BY DESCR
–22	334–9231–00			1	MARKER,IDENT:MKD,TOP INJECTOR/EJECTOR LABEL (TLA 7M4 ONLY)	0KB05	ORDER BY DESCR
–23	174–3537–00			1	CA ASSY,SP:RIBBON,,IDC,30 AWG,0.025CTR,2.0 L	80009	174–3537–00
–24	131–6021–00			2	CONN,HDR:SMD,MALE,STR,2 X 25,0.05 X 0.1 CTR (A11J1465, A11J2460, A12J1465, A12J2460) (NOT ILLUSTRATED)	00779	146144–3
–	159–5009–00			5	FUSE,SMD:1.5A,125V,FAST BLOW (A11F2500, A11F2504, A11F2506, A11F2903, A11F2901, A12F2500, A12F2504, A12F2506,A12 F2903, A12F2901) (NOT ILLUSTRATED)	75915	45101.5
–	159–5010–00			1	FUSE,SMD:7A,125V,FAST BLOW (A11F2508, A12F2508) (NOT ILLUSTRATED)	75915	451007
–	214–4747–00			2	HEAT SINK,SEMIC:IC,PGA 11X11/MQUAD,1.1" X 1.1" X 0.45" H,PIN FIN,ALUMINUM,BLACK (A11XTU1170, A11XTU1370, A11XTU1570, A11XTU1670, A11XTU1870, A12XTU1170, A12XTU1370, A12XTU1570, A12XTU1670, A12XTU1870) (NOT ILLUSTRATED)	05820	658–45AB
–	214–4748–00			2	HEAT SINK,SEMIC:IC,PGA 11X11/MQUAD,1.1" X 1.1" X 0.25" H,PIN FIN,ALUMINUM,BLACK (A11XSU1460, A11XSU1660, A12XSU1460, A12XSU1660) (NOT ILLUSTRATED)	05820	658–25AB
–25	131–3363–00			4	CONN,HDR:PCB,MALE,RTANG,2 X 17,0.1CTR (A11J2290, A11J2490, A11J2690, A11J2890, A12J2290, A12J2490, A12J2690, A12J2890)	53387	N2534–5002UB
–26	129–1479–00			4	SPACER, POST:1.285 OVERALL,0.535 L SPACING, W/0.35 L,0.25 HEX 4–40 INT THD X 6–32 EXT, 0.75 L	80009	129–1479–00
–27	131–6016–00			1	CONN,HDR:SMD,FEMALE,STR,2 X 50,0.05 X 0.1 CTR (PART OF A13)	00779	104550–9
–	131–3363–00			2	CONN,HDR:PCB,MALE,RTANG,2 X 17,0.1CTR (PART OF A13)	53387	N2534–5002UB
–28	131–5980–00			4	CONN,HDR:SMD,MALE,STR,2 X 50,0.05 X 0.1 CTR (A11J1270, A11J1390, A11J1420, A11J1790, A12J1270, A12J1390, A12J1420, A12J1790)	00779	1–104549–0

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
–29	671–3307–00			2	CKT BD ASSY:COMPARATOR DAUGHTER BOARD (A13)	80009	671–3307–00
–30	407–4494–00			2	BRACKET, EMI , DAUGHTER BOARD	80009	407–4494–00
–31	174–3536–01			1	CA ASSY,SP:MERGE RIBBON,IDC,30 AWG,0.025 CTR,2.5 L	80009	174–3536–01
–32	174–3533–00			2	CA ASSY,SP:RIBBON,IDC,30 AWG	80009	174–3533–00
–33	131–6069–00			2	CONN, RIBBON:PCB,MALE,RTANG,100 POS,0.05 CTR (A10J1330, A10J1630)	00779	2–557100–5
–34	150–1278–00			3	DIODE,OPTO:LED,GRN,569NM,2MCD AT 5V (A10DS1100, A10DS1102, A10DS1103)	50434	HLMP–1640–010
–35	150–1279–00			1	DIODE,OPTO:LED,YEL,585NM,2MCD AT 5V (A10DS1101)	50434	HLMP–1620–010
–36	352–1062–00			1	HOLDER,MERGE:MALE, 18AWG CRS W/HARDWARE	TK1943	ORDER BY DESCR
–37	200–4272–00			1	COVER	80009	200–4272–00
–38	211–0718–00			4	SCREW,MACHINE:6-32 X 0.312,FLH100,STL,CDPL,T-10 TORX	0KB01	ORDER BY DESCR
–39	348–1365–01			1	SHLD GSKT,ELEC:SYMETRICAL SLOTTED FINGER,0.350 W X 7.5 L,RIVIT MTG,SNAP–IN,RIVIT SPACING 1.5 IN	TK2647	0493–0069–01

Replaceable parts list

Fig. & index number	Tektronix part number	Serial no. effective	Serial no. discont'd	Qty	Name & description	Mfr. code	Mfr. part number
					STANDARD ACCESSORIES		
10–5	010–6417–10			1	PROBE SET:17 CH PROBE & SHEET OF PROBE LABELS	80009	0100–6417–10
–	334–9239–00			1	MARKER,IDENT:PROBE,METIS, 8 SETS OF 2,(KISS CUT)0.010 LEXAN WITH 0.002 ADHESIVE	80009	334–9239–00
–1	196–3431–00			2	CA ASSY,SP:DESCRETE,8 CH LEAD SET	80009	196–3431–00
–2	196–3432–00			1	CA ASSY,SP:DESCRETE,1 CH LEADSET	80009	196–3432–00
–3	206–0364–00			20	TIP,PROBE:MICROCKT TEST,0.05 CTR	80009	206–0364–00
–	070–9774–XX			1	MANUAL,TECH:INSTALLATION,TLA700 SERIES,DP	80009	070–9774–XX
–10	407–4435–00			1	BRACKET,SUPPORT:PROBE ASSY CLAMP,18 AWG STEEL, BLACK ANODIZE FINISH W/RETAINING WASHER (TLA 7L1 & TLA 7M1 MODULES REQUIRE 2 BRACKETS) (TLA 7L2 & TLA 7M2 MODULES REQUIRE 4 BRACKETS) (TLA 7L3 & TLA 7M3 MODULES REQUIRE 6 BRACKETS) (TLA 7L4 & TLA 7M4 MODULES REQUIRE 8 BRACKETS)	80009	407–4435–00
					OPTIONAL ACCESSORIES		
–	070–9779–XX			1	MANUAL,TECH:SERVICE,TLA7LX/TLA7MX SERIES LOGIC ANALYZER MODULE,DP	80009	070–9779–XX
–	070–9775–XX			1	MANUAL,TECH:USER,TLA 700 SERIES LOGIC ANALYZER ,DP	80009	070–9775–XX
–	070–9777–XX			1	MANUAL,TECH:SERVICE,TLA704 PORTABLE MAINFRAME,DP	80009	070–9777–XX
–	070–9773–XX			1	MANUAL,TECH:SERVICE,TLA711 BENCH TOP CHASSIS,DP	80009	070–9773–XX
–	070–9778–XX			1	MANUAL,TECH:SERVICE,TLA711,BENCHTOP CONTROLLER,DP	80009	070–9778–XX
–	070–9776–XX			1	MANUAL,TECH:TECHNICAL REFERENCE,TLA700 SERIES PERFORMANCE VERIFICATION AND ADJUSTMENT,DP	80009	070–9776–XX
–	070–9780–XX			1	MANUAL,TECH:SERVICE,TLA7D1,TLA7E1 DIGITIZING OSCILLOSCOPE MODULE,DP	80009	070–9780–XX
–	020–2018–00			1	ACCESSORY KIT:MINI PV HOUSING,15 HOUSING,VARIOUS SIZES	23633	PER TEK DOCUMENTATION
–	020–3000–XX			1	**34CH PROBE INTERFACE KIT**	80009	020–3000–XX
–	012–1412–00			4	LEAD SET ASSY:LAPIKPV	23633	68654
–	012–1426–00			1	LEAD SET,ELEC:PKG OF 12,2 TO 1 SIGNAL/GROUND	23633	69025
–	012–1427–00			1	LEAD SET,ELEC:PKG OF 4,4 TO 1 SIGNAL/GROUND	23633	69026

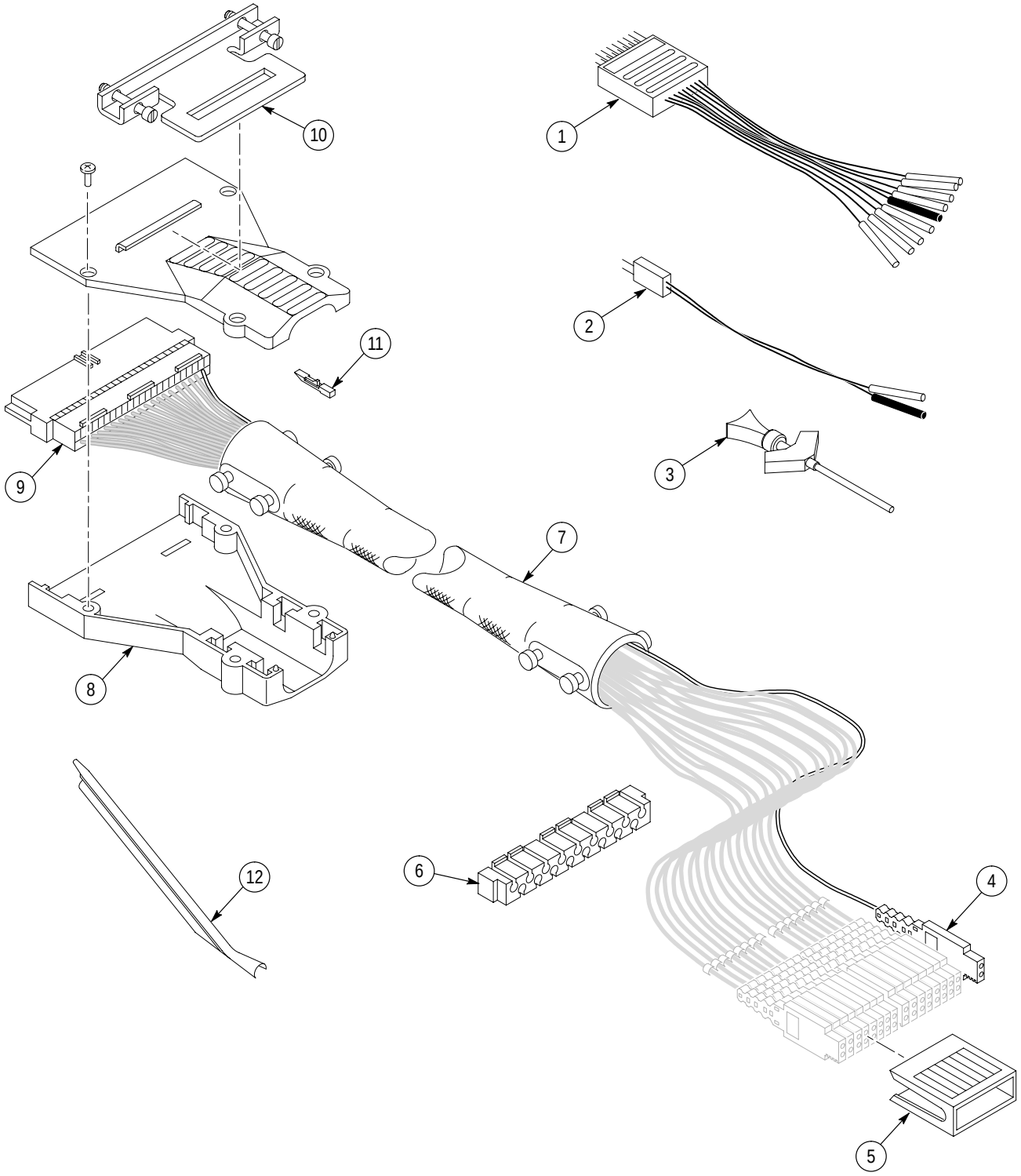


Figure 10–5: P6417 Probe exploded view

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	**PROBE ACCESSORIES KIT FOR P6417 (020–2198–00)**		
10–5–1	196–3431–00			2	CA ASSY,SP:DESCRETE,8 CH LEAD SET,SDI,16,22 AWG,5.0 L,2X8,MALE,0.278 MLG PIN HSG X 2X8,ULTR	80009	196–3431–00
–2	196–3432–00			1	CA ASSY,SP:DESCRETE,1 CH LEADSET,SDI,2,22 AWG,5.0 L,1 X 2,0.278 MLG,PIN HSG X 131–1998–00,W	80009	196–3432–00
–3	206–0364–00			20	TIP,PROBE:MICROCKT TEST,0.05 CTR	80009	206–0364–00
					34CH PROBE INTERFACE KIT (020–2199–00)		
10–5–1	196–3431–00			4	CA ASSY,SP:DESCRETE,8 CH LEAD SET,SDI,16,22 AWG,5.0 L,2X8,MALE,0.278 MLG PIN HSG X 2X8,ULTR	80009	196–3431–00
–2	196–3432–00			2	CA ASSY,SP:DESCRETE,1 CH LEADSET,SDI,2,22 AWG,5.0 L,1 X 2,0.278 MLG,PIN HSG X 131–1998–00,W	80009	196–3432–00
–	012–1377–00			1	LEAD SET,ELEC:2,26 AWG,STRD,2.030 L,PKG OF 12	23633	66156
–	012–1378–00			1	LEAD SET,ELEC:4,22 AWG,STRD,2.33 L (PKG OF 4)	23633	66155
–				1	**PROBE REPAIR KIT (020–2196–00)**		
10–5–5				2	8-CHANNEL PODLET HOLDERS		
–6				1	PODLET CHANNEL COMB		
–7				1	PROBE SLEEVE (CABLES NOT INCLUDED)		
–8				2	PROBE CASE HALVES WITH SCREWS		
–9				1	2X17 HEADER CONNECTOR		
10				1	PROBE RETAINER BRACKET WITH SCREWS		
–12					INSTALLATION TOOL & PODLET COLOR-CODED BANDS		
				1	**PODLET REPLACEMENT KIT (020–2200–00)**		
10–5–4				1	PODLET (INCLUDING CABLE)		
–5				2	8-CHANNEL PODLET HOLDERS		
–11				10	PODLET LATCHES		
–12					INSTALLATION TOOL & PODLET COLOR-CODED BANDS		

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