

# Installation Manual



## TLA7000 Series Logic Analyzers

**071-1747-00**

### **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.

**[www.tektronix.com](http://www.tektronix.com)**

Copyright © Tektronix, Inc. All rights reserved. Licensed software products are owned by Tektronix or its suppliers and are protected by United States copyright laws and international treaty provisions.

Use, duplication, or disclosure by the Government is subject to restrictions as set forth in subparagraph (c)(1)(ii) of the Rights in Technical Data and Computer Software clause at DFARS 252.227-7013, or subparagraphs (c)(1) and (2) of the Commercial Computer Software - Restricted Rights clause at FAR 52.227-19, as applicable.

Tektronix products are covered by U.S. and foreign patents, issued and pending. Information in this publication supercedes that in all previously published material. Specifications and price change privileges reserved.

TEKTRONIX and TEK are registered trademarks of Tektronix, Inc.

## **Contacting Tektronix**

Tektronix, Inc.  
14200 SW Karl Braun Drive or P.O. Box 500  
Beaverton, OR 97077 USA

For product information, sales, service, and technical support:

- In North America, call 1-800-833-9200.
- Worldwide, visit [www.tektronix.com](http://www.tektronix.com) to find contacts in your area.

## Warranty 2

Tektronix warrants that this product will be free from defects in materials and workmanship for a period of one (1) year from the date of shipment. If any such product proves defective during this warranty period, Tektronix, at its option, either will repair the defective product without charge for parts and labor, or will provide a replacement in exchange for the defective product. Parts, modules and replacement products used by Tektronix for warranty work may be new or reconditioned to like new performance. All replaced parts, modules and products become the property of Tektronix.

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

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

THIS WARRANTY IS GIVEN BY TEKTRONIX WITH RESPECT TO THE PRODUCT IN LIEU OF ANY OTHER WARRANTIES, EXPRESS OR IMPLIED. TEKTRONIX AND ITS VENDORS DISCLAIM ANY IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. TEKTRONIX' RESPONSIBILITY TO REPAIR OR REPLACE DEFECTIVE PRODUCTS IS THE SOLE AND EXCLUSIVE REMEDY PROVIDED TO THE CUSTOMER FOR BREACH OF THIS WARRANTY. TEKTRONIX AND ITS VENDORS WILL NOT BE LIABLE FOR ANY INDIRECT, SPECIAL, INCIDENTAL, OR CONSEQUENTIAL DAMAGES IRRESPECTIVE OF WHETHER TEKTRONIX OR THE VENDOR HAS ADVANCE NOTICE OF THE POSSIBILITY OF SUCH DAMAGES.

### **Warranty 9(b)**

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

In order to obtain service under this warranty, Customer must notify Tektronix of the defect before the expiration of the warranty period. If Tektronix is unable to provide a replacement that is free from defects in materials and workmanship within a reasonable time thereafter, Customer may terminate the license for this software product and return this software product and any associated materials for credit or refund.

THIS WARRANTY IS GIVEN BY TEKTRONIX WITH RESPECT TO THE PRODUCT IN LIEU OF ANY OTHER WARRANTIES, EXPRESS OR IMPLIED. TEKTRONIX AND ITS VENDORS DISCLAIM ANY IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. TEKTRONIX' RESPONSIBILITY TO REPLACE DEFECTIVE MEDIA OR REFUND CUSTOMER'S PAYMENT IS THE SOLE AND EXCLUSIVE REMEDY PROVIDED TO THE CUSTOMER FOR BREACH OF THIS WARRANTY. TEKTRONIX AND ITS VENDORS WILL NOT BE LIABLE FOR ANY INDIRECT, SPECIAL, INCIDENTAL, OR CONSEQUENTIAL DAMAGES IRRESPECTIVE OF WHETHER TEKTRONIX OR THE VENDOR HAS ADVANCE NOTICE OF THE POSSIBILITY OF SUCH DAMAGES.

# Table of Contents

<b>General Safety Summary</b> .....	<b>v</b>
<b>Service Safety Summary</b> .....	<b>vii</b>
<b>Environmental Considerations</b> .....	<b>ix</b>
<b>Preface</b> .....	<b>xi</b>
TLA7000 Series Logic Analyzers .....	xi
Documentation .....	xiv
<b>Basic Installation</b> .....	<b>1</b>
Check the Shipping List .....	1
Environmental Considerations .....	2
TLA7012 Portable Mainframe Site Considerations .....	2
TLA7016 Benchtop Mainframe Site Considerations .....	2
Support Hardware Site Considerations .....	2
Mainframe Interconnections .....	3
TekLink .....	5
Installing the Bracket Kit .....	8
Chassis Ground Connections .....	9
Installing TLA700 Modules .....	10
Logical Address Switches .....	10
Merging Modules .....	11
Installing Modules in the TLA7012 Portable Mainframe .....	12
Installing Modules in the TLA7016 Benchtop Mainframe .....	12
Covering Empty Slots .....	14
Connecting Accessories .....	15
Connecting Accessories to the TLA7000 Series .....	15
Additional Accessory Connection Information .....	16
Connecting Probes .....	17
Connecting Probes to the Logic Analyzer Module .....	17
Configuring and Connecting the Pattern Generator Probes .....	18
First Time Operation .....	19
Turning the Logic Analyzer On .....	19
Turning on Expansion Mainframes .....	20
Turning off the Mainframes .....	20
Performing the Incoming Inspection .....	21
Checking the P68xx Logic Analyzer Probes (Optional) .....	21
Checking the P69xx Logic Analyzer Probes (Optional) .....	21
Checking the P64xx Logic Analyzer Probes (Optional) .....	22
Checking the P624x Oscilloscope Probes (Optional) .....	22
Checking the P647x Pattern Generator Probes (Optional) .....	22
Checking the TLA7000 Mainframe (Optional) .....	22
Backing Up User Files .....	22
Removing the Replaceable Hard Disk Drive (TLA7012 Only) .....	23
Connecting Probes to the Target System .....	23
Connecting to a Network .....	24
<b>Merging TLA700 Modules</b> .....	<b>29</b>
Logic Analyzer Merging Rules .....	29
TLA7PG2 Pattern Generator Module Merging Rules .....	30

Merge Procedure .....	30
Merging TLA7Axx Logic Analyzer Modules .....	31
Unmerging TLA7Axx Logic Analyzer Modules .....	35
Merging TLA7Lx/Mx/Nx/Px/Qx Logic Analyzer Modules .....	36
Two-Way Logic Analyzer Merge Procedure .....	36
Three-Way Logic Analyzer Merge Procedure .....	41
Storing the Logic Analyzer Module Merge Cable .....	41
<b>Product Overview .....</b>	<b>43</b>
Front Panel Controls .....	43
TLA7000 Series External Connectors .....	44
<b>Restoring and Reinstalling Software .....</b>	<b>45</b>
Restoring the Hard Disk Image .....	45
TLA7012 Logic Analyzer .....	45
Flashing the BIOS .....	46
Reinstalling the Hard Disk Image .....	48
Backing Up Files .....	48
Installing the Operating System and TLA Application Software .....	49
Reinstalling the TLA Application Software .....	51
Installing the TPI Remote Operation Software .....	52
Upgrading or Restoring Firmware .....	53
Upgrading Firmware on TLA7Axx Logic Analyzer Modules .....	53
Upgrading Firmware on TLA7Lx/Mx/Nx/Px/Qx/Dx/7Ex Modules .....	55
Upgrading Firmware on TLA7PG2 Pattern Generator Modules .....	58
<b>Appendix A: Mainframe Power Information .....</b>	<b>61</b>
<b>Appendix B: User Service Procedures .....</b>	<b>65</b>
Service Offerings .....	65
Warranty Repair Service .....	65
Calibration and Repair Service .....	65
General Care .....	65
Preventive Maintenance .....	66
Cleaning the Flat Panel Display .....	66
Exterior Surfaces .....	66
In Case of Problems .....	67
Diagnostics .....	67
Software Problems .....	67
Hardware Problems .....	68
Repacking for Shipment .....	68
<b>Appendix C: Accessories &amp; Options .....</b>	<b>69</b>
Accessories .....	69
Options .....	72
Field Kit Options .....	75
<b>Index</b>	

# List of Figures

<b>Figure i: TLA7012 Portable Mainframe</b> .....	<b>x</b>
<b>Figure ii: TLA7016 Benchtop Mainframe</b> .....	<b>xi</b>
<b>Figure 1: Basic standalone connections</b> .....	<b>3</b>
<b>Figure 2: Network Switch</b> .....	<b>4</b>
<b>Figure 3: TLA7PC1 Benchtop PC Controller</b> .....	<b>4</b>
<b>Figure 4: Portable LAN connections</b> .....	<b>4</b>
<b>Figure 5: Expanded benchtop system with TekLink cable (up to 12 modules)</b> .....	<b>5</b>
<b>Figure 6: TL708EX Hub and TekLink cable</b> .....	<b>6</b>
<b>Figure 7: Expanded benchtop system with TL708EX Hub (up to 48 modules)</b> .....	<b>7</b>
<b>Figure 8: Bracket kit for the TL708EX Hub and PC Controller installed</b> .....	<b>8</b>
<b>Figure 9: Location of the ground connection on the TLA7000 logic analyzers</b> .....	<b>9</b>
<b>Figure 10: Logical address switches (set to address FF)</b> .....	<b>11</b>
<b>Figure 11: Installing modules</b> .....	<b>13</b>
<b>Figure 12: Installing panel covers on the TLA7012 Portable Mainframe</b> .....	<b>14</b>
<b>Figure 13: Installing panel covers on the TLA7016 Benchtop Mainframe</b> .....	<b>14</b>
<b>Figure 14: TLA7012 accessories connections</b> .....	<b>15</b>
<b>Figure 15: TLA7016 accessories connections</b> .....	<b>16</b>
<b>Figure 16: Connecting the P69xx logic analyzer probes to the TLA7Axx logic analyzer module</b> .....	<b>17</b>
<b>Figure 17: Connecting the P64xx logic analyzer probes to the TLA7Lx/Mx/Nx/Px/Qx logic analyzer modules</b> .....	<b>18</b>
<b>Figure 18: Line fuse and power cord connector locations</b> .....	<b>19</b>
<b>Figure 19: TLA7000 On/Standby switch locations</b> .....	<b>20</b>
<b>Figure 20: Accessing the TLA7012 replaceable hard disk drive</b> ....	<b>23</b>
<b>Figure 21: TLA Connection dialog box</b> .....	<b>25</b>
<b>Figure 22: TLA Network Search dialog box</b> .....	<b>26</b>
<b>Figure 23: Location of modules in a merged system</b> .....	<b>31</b>
<b>Figure 24: Removing the merger connector assembly from the module</b> .....	<b>32</b>
<b>Figure 25: Connecting modules in a merged set</b> .....	<b>33</b>
<b>Figure 26: Installing the merged module set in the mainframe</b> ....	<b>34</b>

<b>Figure 27: Removing the cover</b> .....	<b>37</b>
<b>Figure 28: Feeding the merge cable through the cover</b> .....	<b>38</b>
<b>Figure 29: Seating the cover on the chassis</b> .....	<b>39</b>
<b>Figure 30: Lining up the two modules</b> .....	<b>40</b>
<b>Figure 31: Positioning the merge cable before installing the cover</b> .	<b>42</b>
<b>Figure 32: TLA7012 Portable mainframe front panel</b> .....	<b>43</b>
<b>Figure 33: TLA7000 Series external connectors</b> .....	<b>44</b>
<b>Figure 34: Flash programming pins</b> .....	<b>56</b>
<b>Figure 35: Fuse identification chart</b> .....	<b>63</b>

## List of Tables

<b>Table i: Related Documentation</b> .....	<b>xii</b>
<b>Table 1: Additional accessory connection information</b> .....	<b>16</b>
<b>Table 2: TLA7016 Benchtop mainframe line fuses</b> .....	<b>19</b>
<b>Table 3: TLA user file suffixes</b> .....	<b>48</b>
<b>Table 4: BIOS Boot settings for reinstalling software from the CD-ROM</b> .....	<b>49</b>
<b>Table 5: TLA firmware files</b> .....	<b>57</b>
<b>Table 6: Power for instrument modules</b> .....	<b>61</b>
<b>Table 7: Standard accessories, portable mainframe</b> .....	<b>69</b>
<b>Table 8: Standard accessories, benchtop mainframe</b> .....	<b>70</b>
<b>Table 9: Optional accessories, portable mainframe</b> .....	<b>71</b>
<b>Table 10: Optional accessories, benchtop mainframe</b> .....	<b>71</b>
<b>Table 11: Instrument Options</b> .....	<b>72</b>
<b>Table 12: Options for TLA7NAX Modules</b> .....	<b>73</b>
<b>Table 13: Options for TLA7AAX Modules</b> .....	<b>74</b>
<b>Table 14: Options for TLA7ABx Modules</b> .....	<b>75</b>



# General Safety Summary

Review the following safety precautions to avoid injury and prevent damage to this product or any products connected to it.

To avoid potential hazards, use this product only as specified.

*Only qualified personnel should perform service procedures.*

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

## To Avoid Fire or Personal Injury

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

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

**Ground the Product.** This product is grounded through the grounding conductor of the 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 markings on the product. Consult the product manual for further ratings information before making connections to the product.

Connect the ground lead of the probe to earth ground only.

**Powering Off.** The power cord disconnects the product from the power source. Do not block the power cord; it must remain accessible to the user at all times.

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

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

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

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

**Do Not Operate in Wet/Damp Conditions.**

**Do Not Operate in an Explosive Atmosphere.**

**Keep Product Surfaces Clean and Dry.**

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

**Symbols and Terms**

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



---

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

---



---

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

---

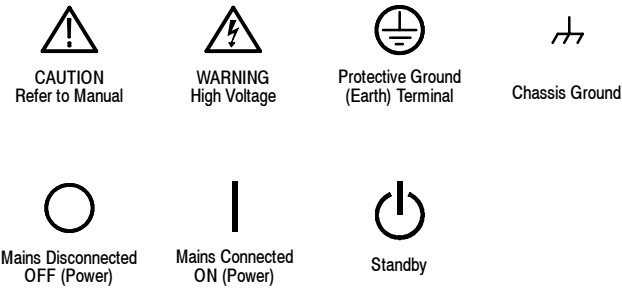
**Terms on the Product.** These terms may appear on the product:

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

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

CAUTION indicates a hazard to property including the product.

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



# Service Safety Summary

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

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

**Disconnect Power.** To avoid electric shock, switch off the instrument power, then disconnect the power cord from the mains power.

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

To avoid electric shock, do not touch exposed connections.



# Environmental Considerations

This section provides information about the environmental impact of the product.

## Product End-of-Life Handling

Observe the following guidelines when recycling an instrument or component:

**Equipment Recycling.** Production of this equipment required the extraction and use of natural resources. The equipment may contain substances that could be harmful to the environment or human health if improperly handled at the product's end of life. In order to avoid release of such substances into the environment and to reduce the use of natural resources, we encourage you to recycle this product in an appropriate system that will ensure that most of the materials are reused or recycled appropriately.



The symbol shown to the left indicates that this product complies with the European Union's requirements according to Directive 2002/96/EC on waste electrical and electronic equipment (WEEE). For information about recycling options, check the Support/Service section of the Tektronix Web site ([www.tektronix.com](http://www.tektronix.com)).

**Mercury Notification.** This product uses an LCD backlight lamp that contains mercury. Disposal may be regulated due to environmental considerations. Please contact your local authorities or, within the United States, the Electronics Industries Alliance ([www.eiae.org](http://www.eiae.org)) for disposal or recycling information.

## Restriction of Hazardous Substances

This product has been classified as Monitoring and Control equipment, and is outside the scope of the 2002/95/EC RoHS Directive. This product is known to contain lead, cadmium, mercury, and hexavalent chromium.



# Preface

This manual contains all information needed to install your Tektronix logic analyzer and related accessories.

To prevent personal injury or damage consider the following requirements before attempting service:

- The procedures in this manual should be performed only by qualified service personnel.
- Read the *General Safety Summary* and *Service Safety Summary* found at the beginning of this manual.

Be sure to follow all warnings, cautions, and notes in this manual.

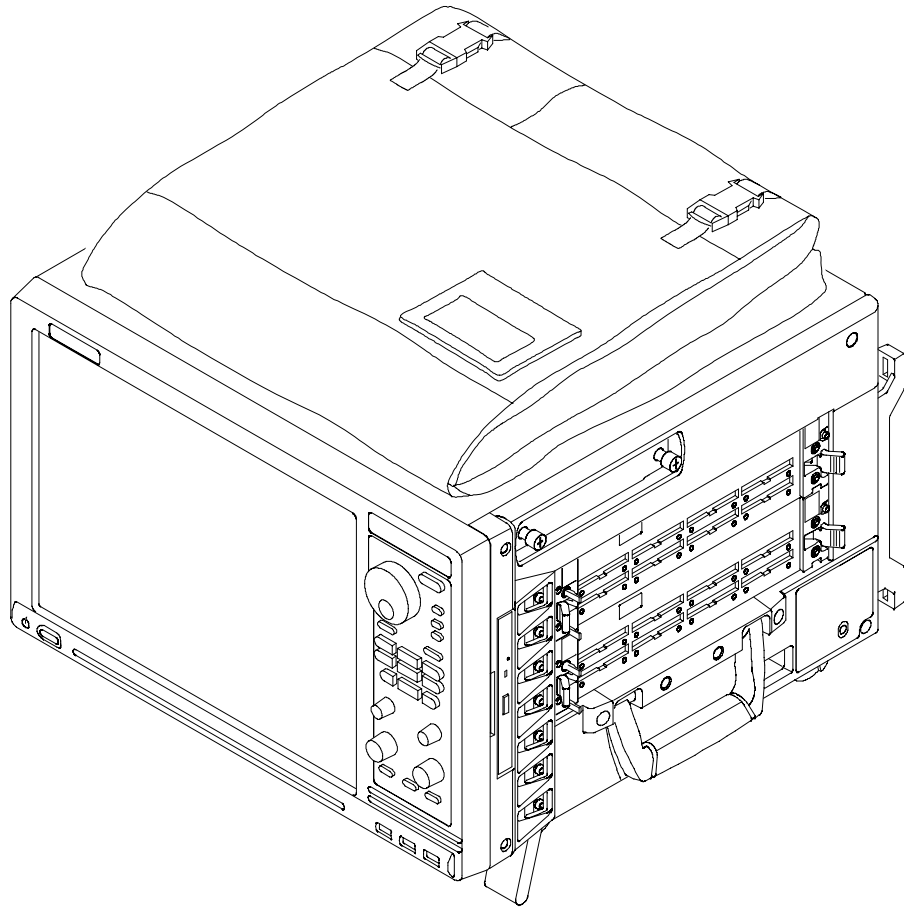
## TLA7000 Series Logic Analyzers

The TLA7000 Series Logic Analyzers are comprised of a 2-module portable mainframe (TLA7012), and a 6-module benchtop mainframe (TLA7016). See Figure i and Figure ii.

A LAN (local area network) switch and an 8-port instrument hub (TL708EX Hub) expand the system and connect it to your network. A dedicated PC controller (TLA7PC1) is also available, or you can load the application software on your PC.

The logic analyzers are built upon the Windows operating system which allows you to install any PC-compatible, third-party hardware and software on the instrument.

The TLA7000 series logic analyzers combine high-performance logic analyzer and pattern generator modules with optional application modules or an external Tektronix oscilloscope.

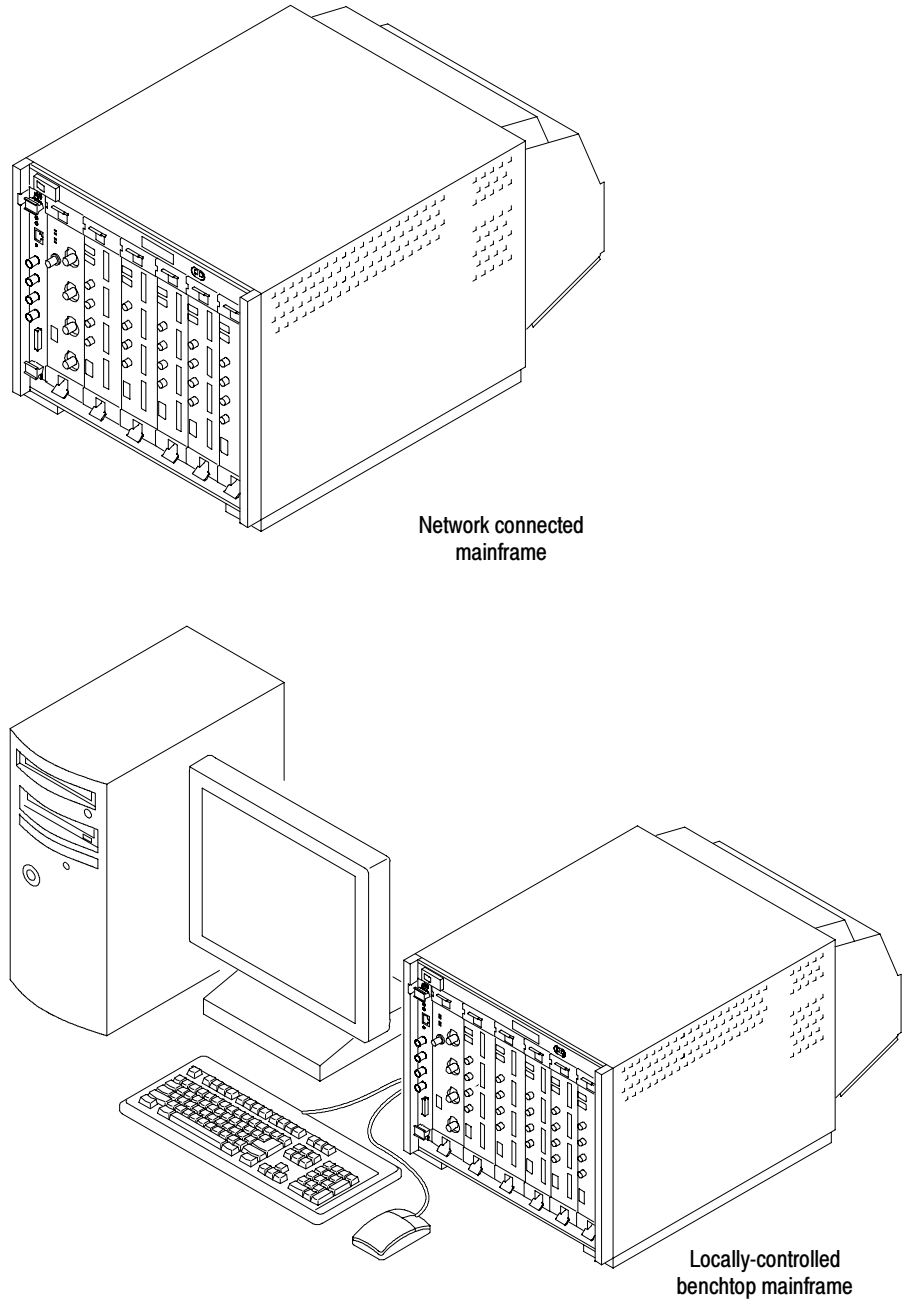


**Figure i: TLA7012 Portable Mainframe**

Several logic analyzer modules are available in various combinations of channel width, state speed, and memory depth. All of the logic analyzer modules provide simultaneous state and timing measurements through a single probe.

For a complete list of accessories, refer to *Appendix C: Accessories and Options*.





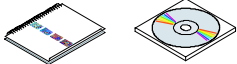

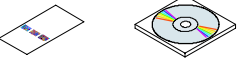
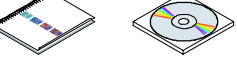



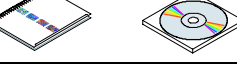
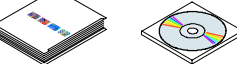
**Figure ii: TLA7016 Benchtop Mainframe**

## Documentation

The following table lists related documentation available for your logic analyzer. The documentation is available on the TLA Documentation CD and on the Tektronix website ([www.Tektronix.com](http://www.Tektronix.com)).

For documentation not specified in the table, contact your local Tektronix representative.

**Table i: Related Documentation**

Item	Purpose	Location
TLA Quick Start User Manual	High-level operational overview	
Online Help	In depth operation and UI help	
Installation Quick Reference Cards	High-level installation information	
Installation Manuals	Detailed first-time installation information	
XYZs of Logic Analyzers	Introduction to logic analyzer basics	
TLA Product Specifications	Complete list of TLA product specifications	
TPI.NET Documentation	Detailed information for controlling the logic analyzer using .NET	
Field upgrade kits	Upgrade information for your logic analyzer product	
Optional Service Manuals	Self-service documentation for modules and mainframes	

# Basic Installation

This chapter describes all of the steps needed to install your Tektronix logic analyzer and its related accessories. It is written from the perspective that you purchased most of the items uninstalled and you intend to install all of the pieces. If you purchased a logic analyzer with modules already installed, you should still review this chapter and perform the steps that apply to your situation.

## Check the Shipping List

Check that you have received all of the parts of your logic analyzer using the shipping list. Also check the following:

- That you have the correct power cords for your geographical area.
- That you have the correct probes and modules.
- That you have all the standard and optional accessories that you ordered. See *Appendix C: Accessories and Options*.

Fill out and return the customer registration card that is packaged with this manual.

## Environmental Considerations

Read this section before installing the logic analyzer. This section describes site considerations, power requirements, and ground connections for your logic analyzer.



---

**CAUTION.** Allow a 15.3 cm (6 in) clearance at the top, back, and sides of the instrument to ensure proper cooling. Inadequate clearances can cause the instrument to overheat and shut down.

---

### TLA7012 Portable Mainframe Site Considerations

You can use the TLA7012 Portable Mainframe on a bench or on a cart in the normal position (on the bottom feet). The front feet extend to give a better view of the instrument display. You can also mount the mainframe in an instrument rack.

### TLA7016 Benchtop Mainframe Site Considerations

The TLA7016 Benchtop Mainframe is designed to operate on a bench or in a rackmount environment. If you need to stack more than two benchtop mainframes, install the mainframes in a rack. Rackmount kits are available from third-party vendors. Please refer to the online help under Standard and Optional Accessories for rackmount kit part numbers.



---

**WARNING.** To avoid personal injury, never lift or move a benchtop mainframe by yourself. The size and weight of the mainframe requires two people to lift or move it.

*Do not stack more than one benchtop mainframe on top of another benchtop mainframe. Always use a rackmount kit to ensure that the mainframes are secure and will not fall.*

---

### Support Hardware Site Considerations

The TLA7PC1 Benchtop PC Controller, TL708EX Hub, and GbE switch units can operate separately on your workbench, equipment rack, or cart, or you can mount them to your benchtop mainframe using the brackets provided with the TLA7016 Benchtop Mainframe. See *Installing the Bracket Kit* on page 8.

## Mainframe Interconnections

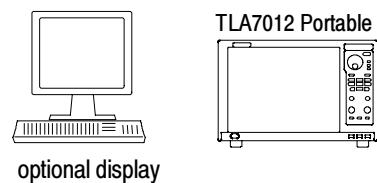
Use this section to make the connections between the logic analyzer mainframes and the support hardware—the controller, network switch and TL708EX Hub.

### Standalone Installation

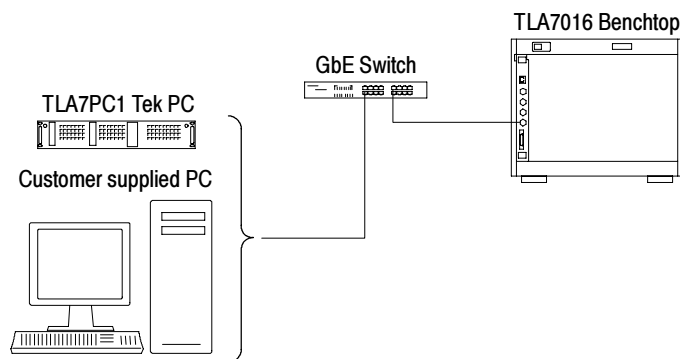
If you plan to use the portable mainframe as a standalone instrument (without network connections), set up the instrument in a convenient location and connect the peripheral components that you plan to use, for example, a keyboard, external display, or printer. (See page 15 for connector locations.)

The benchtop mainframe requires a controller; you can use either the dedicated TLA7PC1 Benchtop PC Controller or your PC loaded with the TLA application software. In both cases, you need a network switch between the controller and the benchtop mainframe.

Figure 1 shows the standalone setups.



### Portable mainframe setup (up to 2 LA modules)



### Benchtop mainframe setup (up to 6 LA modules)

**Figure 1: Basic standalone connections**

**Network Switch.** Connect the GbE switch between the logic analyzer mainframe and the TLA7PC1 Controller or an external PC (loaded with the TLA application). The GbE switch is shown in Figure 2.



**Figure 2: Network Switch**

**TLA7PC1 Benchtop PC Controller.** This optional PC-based controller connects to the benchtop mainframe through the GbE switch. The controller is housed in a 19 in-wide chassis for easy mounting to your instrument rack, or you can mount it to the benchtop mainframe using the benchtop bracket kit. The controller is shown in Figure 3.

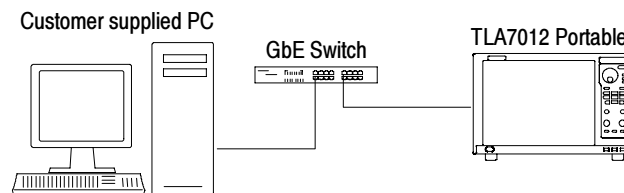


**Figure 3: TLA7PC1 Benchtop PC Controller**

## Network Installation

If you plan to control the mainframes remotely from your PC, share files, etc., you need to use a network switch and configure the instrument to communicate over the network. (See Figure 4.)

Refer to *Connecting to a Network* for information about setting network properties and for details on configuring your networked instrument. (See page 24.) The online help also has related information. If you want to enable a firewall on your network, Windows provides details for changing firewall settings in the Control Panel.



**Figure 4: Portable LAN connections**

**Expanded System**

If you are going to expand your system to two mainframes (up to 12 modules total), you need to use a network switch and a TekLink cable between the mainframes.

To expand your system to more than two mainframes, you need to add the TL708EX Hub unit and interconnecting TekLink cables.

Refer to the figures on the following pages for examples of TekLink connections.



**CAUTION.** TLA7000 Series components are not compatible with TLA7XM expansion mainframes. If you need to expand your TLA7000 system, use additional TLA7016 benchtop mainframes.

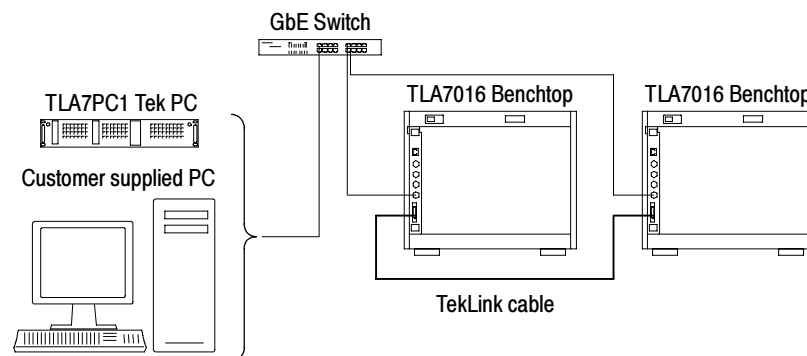
**TekLink**

TekLink is a mainframe real-time communication system that uses a cable to connect between two TLA7000 Series logic analyzers. An eight-port hub (TL708EX Hub) and cables are used for interconnecting from three to a maximum of eight benchtop mainframes. See Figure 6.

TekLink coordinates trigger signals, input/output signals, and time references between mainframes.

**TekLink Cable.** Use the TekLink cable to connect to the first expansion benchtop mainframe (up to 6 additional logic analyzer modules). If you have more than one mainframe, you need to add the TL708EX Hub to the system.

You can also use the Teklink cable to expand a TLA7012 portable mainframe to either another TLA7012 or to a TLA7016 benchtop mainframe. Connect the cable between the TekLink connectors. If you want to expand the TLA7012 portable mainframe to more than one mainframe, you need to add the TL708EX Hub to the system.

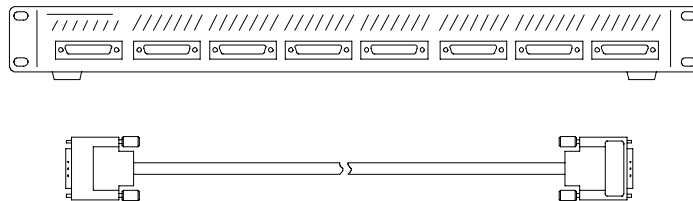


**Figure 5: Expanded benchtop system with TekLink cable (up to 12 modules)**

**TL708EX Hub.** The TL708EX Hub allows you to expand your system to accommodate up to seven TLA7000 mainframes, configured as expansion mainframes (48 modules total).

The connectors on the TL708EX Hub are not preassigned; use whichever connectors are convenient for your application: See Figure 6.

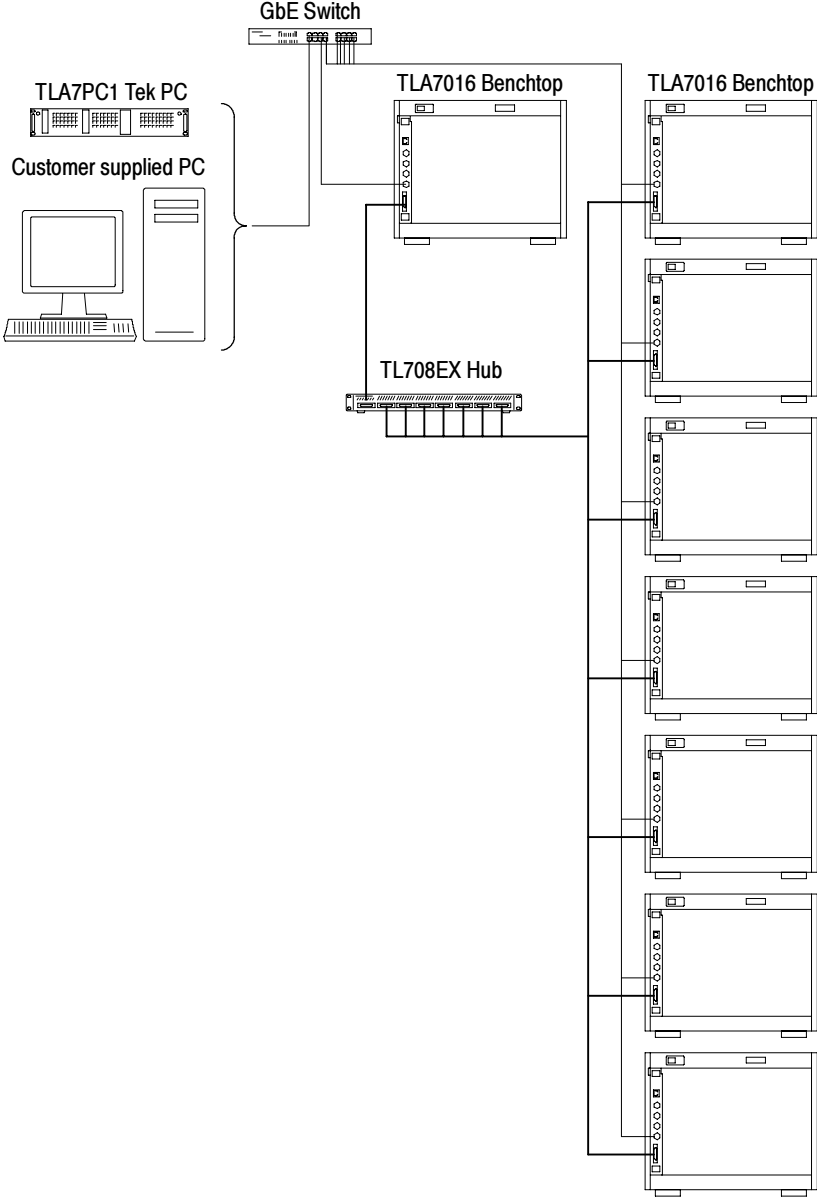
1. Connect a TekLink cable from the first benchtop mainframe to any one of the eight TekLink connectors on the TL708EX Hub.
2. Connect another TekLink cable from any of the other TekLink connectors on the hub to the TekLink connector on your expansion mainframe.
3. Connect the power cord to the back of the hub and to an appropriate AC power source.



**Figure 6: TL708EX Hub and TekLink cable**



Figure 7 shows the hub connected to accomodate eight mainframes (48 modules total).

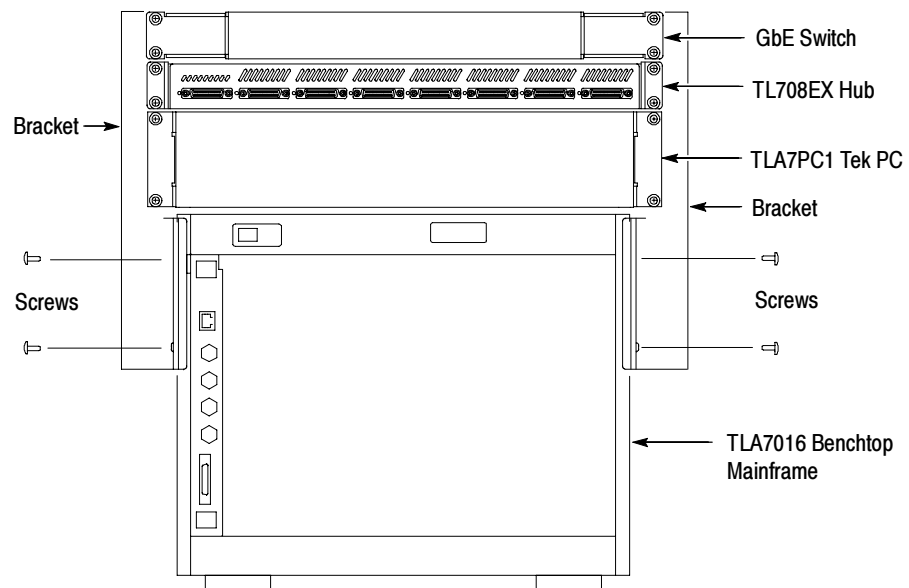


**Figure 7: Expanded benchtop system with TL708EX Hub (up to 48 modules)**

## Installing the Bracket Kit

If you are using your benchtop logic analyzer outside of a rackmount environment, you can use the bracket kit to mount the PC controller, GbE switch, and TL708EX Hub to your benchtop mainframe. Refer to Figure 8 and use the following procedure.

1. Place the components you want to mount on top of the logic analyzer, putting the heaviest units lowest in the stack.
2. A left and right-side bracket is included in the kit, along with mounting screws. Align one of the brackets to the frame of the logic analyzer so that the bracket reaches all of the components, but minimize the extra bracket height above the top unit.
3. Remove the screws from the logic analyzer where you will mount the brackets. Fasten the bracket to the logic analyzer with the screws.
4. Repeat steps 2 and 3 for the bracket on the other side of the logic analyzer.
5. If necessary, reposition the rackmount tabs on the components you are mounting. For example, the tabs on the TL708EX Hub come mounted to the back of the unit.
6. Using the screws provided, fasten the components to the brackets.



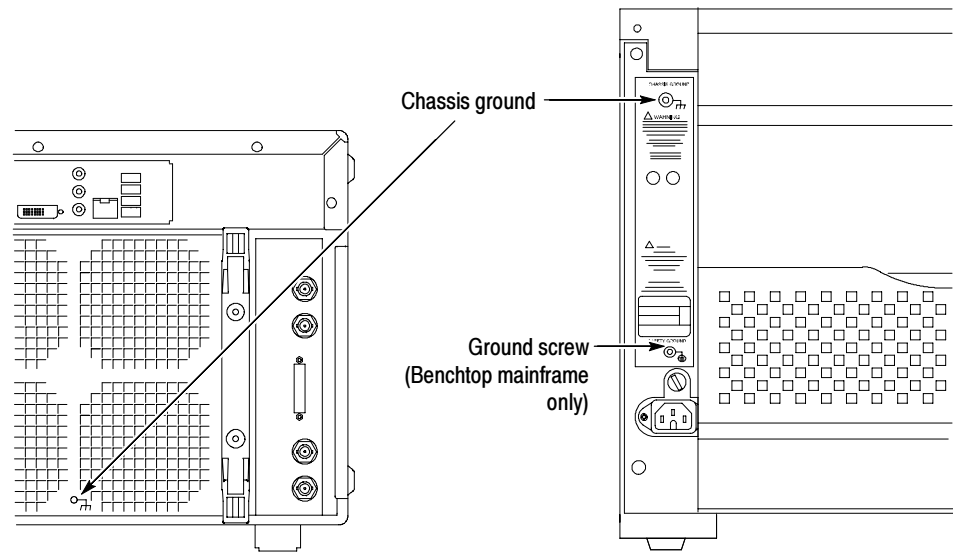
**Figure 8: Bracket kit for the TL708EX Hub and PC Controller installed**

## Chassis Ground Connections

Use the chassis ground connections to connect the grounds of the target system (system-under-test) to the logic analyzer to ensure a common ground connection between instruments (see Figure 9).



**CAUTION.** To reduce the risk of ground-loop noise, ground all of the instruments in the system to the logic analyzer mainframe using the ground connections shown.



**Figure 9: Location of the ground connection on the TLA7000 logic analyzers**

## Installing TLA700 Modules

TLA700 Modules are fully compatible with the TLA7000 Series mainframes. This section describes how to install TLA700 modules in your TLA7000 mainframe.



---

**CAUTION.** *To avoid damaging the instrument, do not install or remove any modules while the instrument is powered on. Always power down the instrument before installing or removing modules.*

---

### Logical Address Switches

Every module in the instrument must have a unique logical address; no two modules can have the same address. Use the two rotary switches on the rear panel of the modules to select the logical address (see Figure 10).

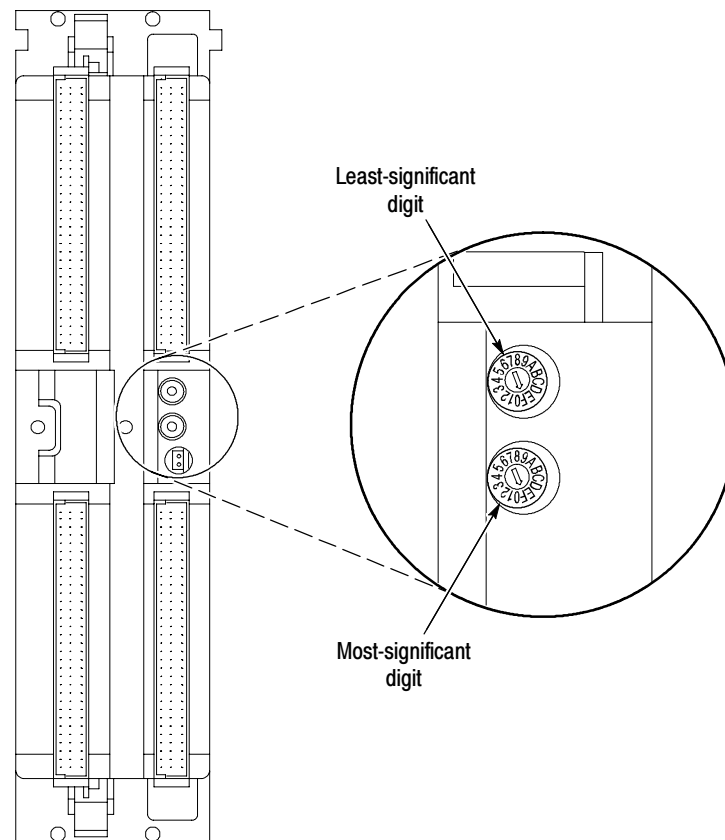
The factory default switch setting is FF (Dynamic Auto Configuration). With dynamic logical address auto configuration, the instrument automatically sets the address to an unused value.

Normally, you would not want to change the default settings. However, you can set the address to a fixed static logical address value. You can select any static addresses between 01 and FE hexadecimal (1 to 254 decimal). If you set the logical address switches to any other setting than FF, you must verify that no two modules (or devices) share the same address.

---

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

---



**Figure 10: Logical address switches (set to address FF)**

### **Merging Modules**

You can merge modules together to create wider modules. If your application requires you to merge modules, refer to *Merging TLA700 Modules* (beginning on page 29) for the merge instructions before continuing with this section.

### **Installing Modules in the TLA7012 Portable Mainframe**

You can install any of the modules in any slot of the portable mainframe. If you intend to merge the modules, disregard the following suggestions and refer to the merging modules rules on page 29. If you are not merging the modules, and for air flow considerations, follow these guidelines:

- Install a single module in slots 3-4. Place a double-width slot cover over slots 1-2.
- When installing two logic analyzer modules, install the module with the higher channel count in slots 1-2. Install the module with the lower channel count in slots 3-4.
- When installing two logic analyzer modules with different amounts of memory, install the module with the larger memory in slots 3-4. Install the module with the lower memory in slots 1-2.
- Install TLA7Lx/Mx/Nx/Px/Qx modules, TLA7Dx/Ex modules, or TLA7PG2 modules before you install TLA7Axx modules.
- When installing a logic analyzer module with an oscilloscope module, install the oscilloscope module in slots 1-2, and the logic analyzer module in slots 3-4.

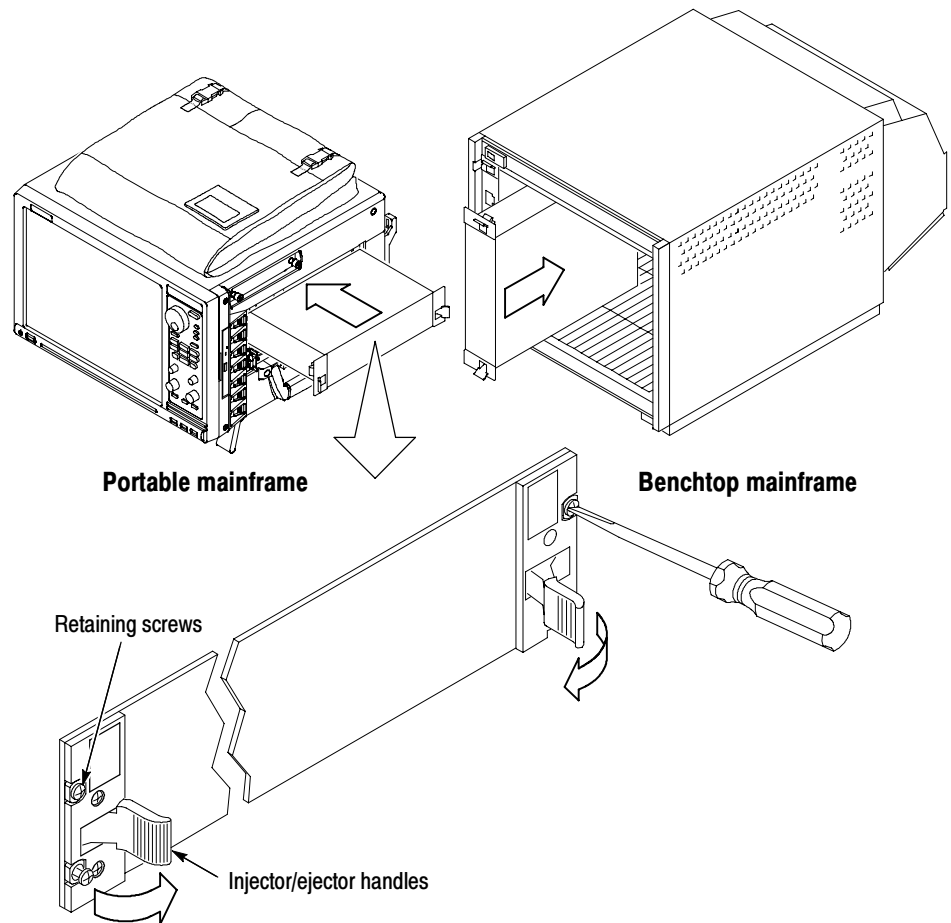
Use a screwdriver to tighten the retaining screws to 2.5 in-lbs after seating the modules in place. See Figure 11 on page 13.

### **Installing Modules in the TLA7016 Benchtop Mainframe**

You can install any of the modules in any slot of the benchtop mainframe. If you intend to merge the modules, disregard the following suggestions and refer to the merging modules rules on page 29. If you are not merging the modules, and for airflow considerations, follow these guidelines:

- Install a single module in slots 1-2. Place a double-width slot cover over slots 3-4, 5-6, 7-8, 9-10, and 11-12.
- When installing two or more logic analyzer modules, install the module with the highest channel count in slots 1-2. Install the module with the lower channel count in slots 3-4. Place double-width slot covers over slots 5-6, 7-8, 9-10, and 11-12.
- When installing two or more logic analyzer modules with different amounts of memory, install the module with the largest memory in slots 1-2. Install the module with the lower memory in slots 3-4. Place double-width slot covers over slots 5-6, 7-8, 9-10, and 11-12.
- Install TLA7Lx/Mx/Nx/Px/Qx modules, TLA7Dx/Ex modules, or TLA7PG2 modules before you install TLA7Axx modules.
- When installing a logic analyzer module with an oscilloscope module, install the logic analyzer module in slots 1-2 and the oscilloscope module in slots 3-4. Place double-width slot covers over slots 5-6, 7-8, 9-10, and 11-12.

Use a screwdriver to tighten the retaining screws to 2.5 in-lbs after seating the modules in place. See Figure 11.

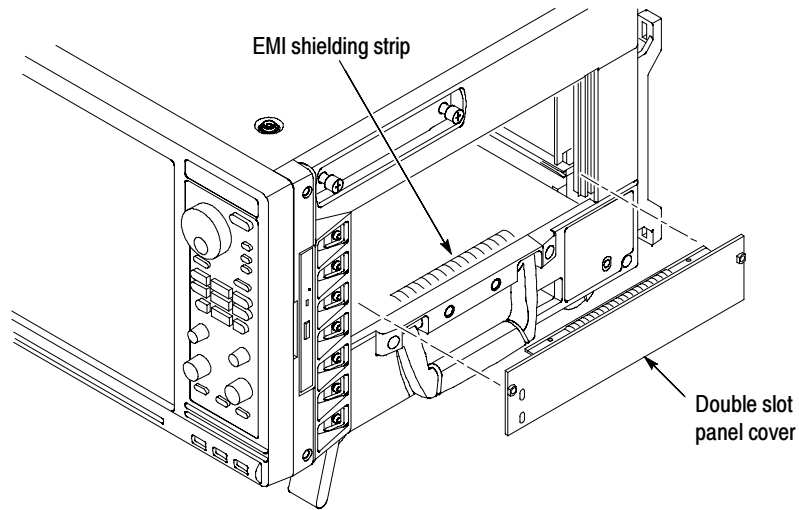


**Figure 11: Installing modules**

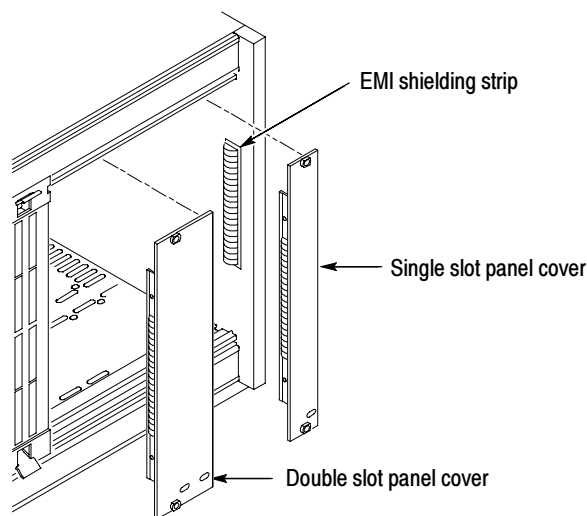
### Covering Empty Slots

If you have any unused (empty) slots in your mainframe, install blank-slot panel covers to meet EMC and cooling specifications. Install a blank-slot panel cover for each empty slot as shown in Figure 12 or 13. The blank-slot panel covers must be installed first, before any modules. Use only Tektronix TLA covers; otherwise the mainframe may not meet EMC and cooling requirements.

Make sure that the EMI shielding is in contact with the adjacent panel or module cover, and that the airflow shutter activation arms protrude through the holes in the blank-slot panel.



**Figure 12: Installing panel covers on the TLA7012 Portable Mainframe**



**Figure 13: Installing panel covers on the TLA7016 Benchtop Mainframe**



## Connecting Accessories

After installing the mainframes and modules, you can connect the accessories such as external monitors, keyboard, and printer.

### Connecting Accessories to the TLA7000 Series

The connection points are shown in Figures 14 and 15.

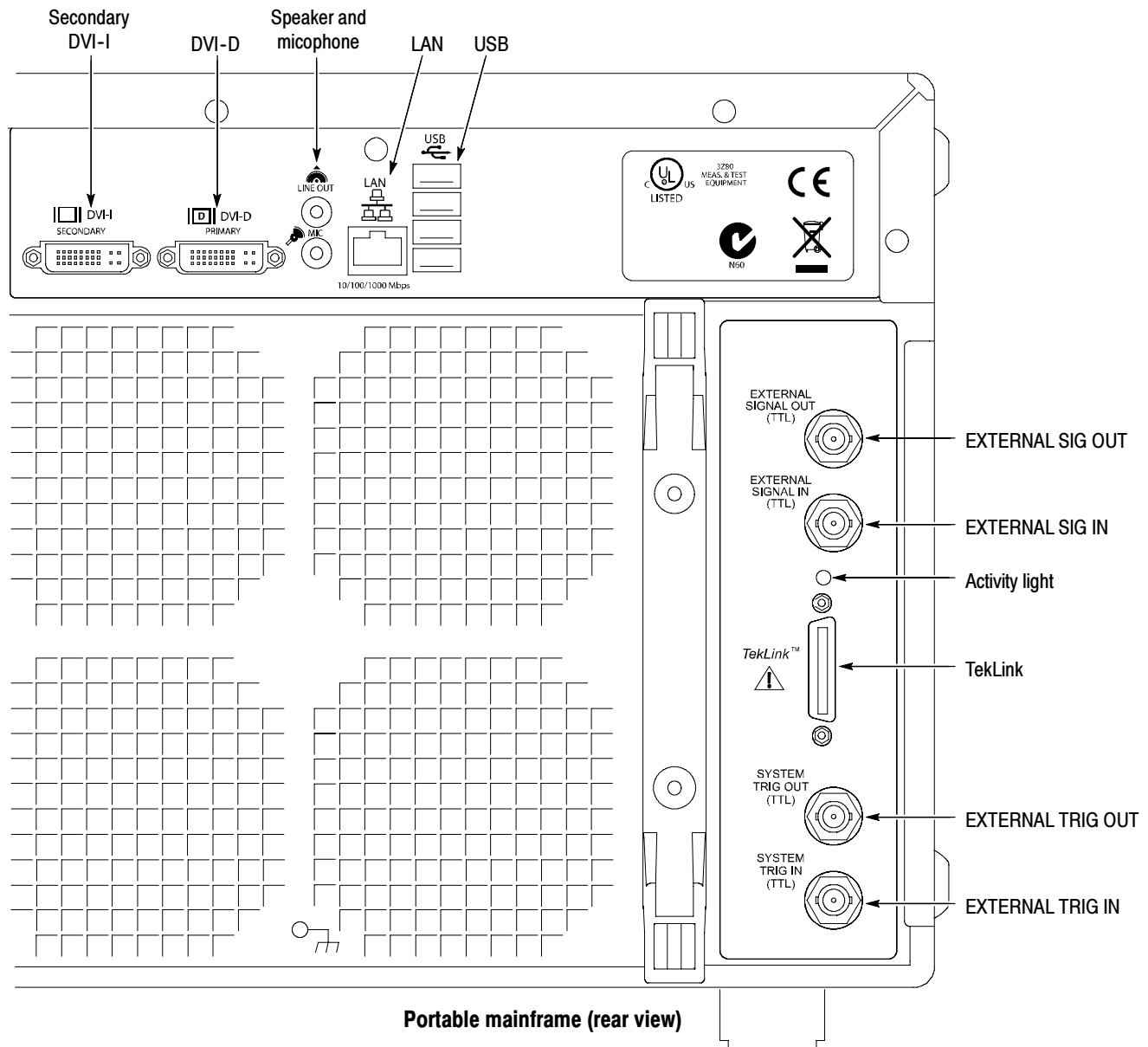
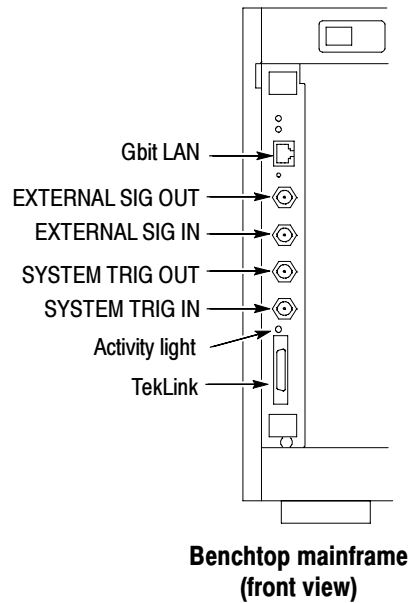


Figure 14: TLA7012 accessories connections



**Figure 15: TLA7016 accessories connections**

**Additional Accessory Connection Information**

Table 1 provides additional information on accessories.

**Table 1: Additional accessory connection information**

Item	Description
Monitor	If you use a nonstandard monitor, you may need to change the the Windows display settings to achieve the proper resolution.
LAN	Connect the mainframes to your network through the Gbit LAN connectors. You can remotely control the mainframes through a LAN switch using your PC (loaded with the TLA application software), or the dedicated PC controller (TLA7PC1).
Printer	The instruments send printer information to the USB ports. Use any of the four USB ports for your printer.
Rackmount	The TLA7012 Portable Mainframe and the TLA7016 Benchtop Mainframes can be installed in rackmount kits. (See Appendix C for part numbers.) Refer to the respective rackmount kit instructions for installation information.  The TLA7016 Benchtop Mainframe can also support the related hardware in a stacked, benchtop configuration using the optional bracket kit. See page 8 for instructions on mounting the support hardware to the benchtop mainframe.

## Connecting Probes

After you have connected all the accessories, you can connect the probes to the instrument. Refer to the appropriate section for your instrument.

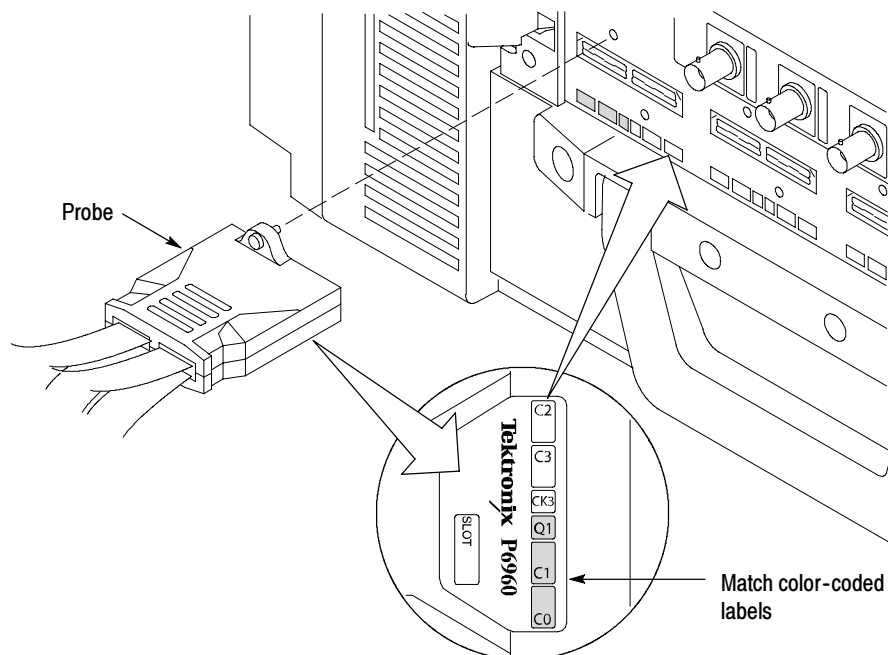
For additional information on the individual probes, refer to the instructions that accompanied your probes.



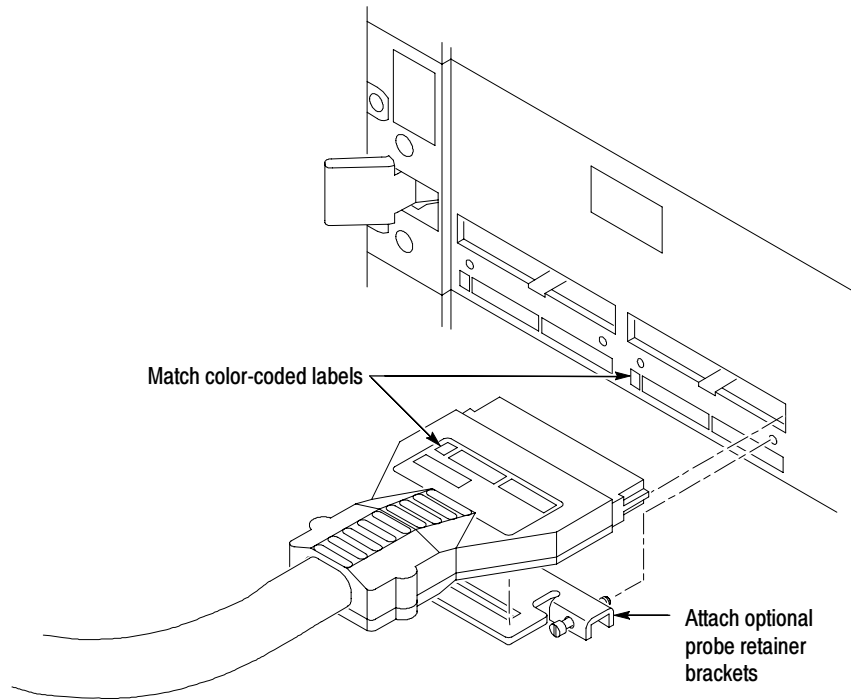
**CAUTION.** When attaching the probe to the logic analyzer, you must use care to evenly tighten probe screws until they are snug. First slightly tighten screws, then snug each screw to 4 in-lbs (max). Under tightening the probe screws can result in intermittence. Over tightening can result in stripped screws.

### Connecting Probes to the Logic Analyzer Module

Connect the logic analyzer probes as shown in Figure 16 and Figure 17.



**Figure 16: Connecting the P69xx logic analyzer probes to the TLA7Axx logic analyzer module**



**Figure 17: Connecting the P64xx logic analyzer probes to the TLA7Lx/Mx/Nx/Px/Qx logic analyzer modules**

**Configuring and Connecting the Pattern Generator Probes**

Some of the TLA Pattern Generator probes require series termination resistors to provide impedance matching for the pattern generator and the target system. Determine the impedance matching for your application, and then refer to the *TLA7PG2 Probe Instruction Manual* for information about how to change the series termination resistors.

Always power off the logic analyzer before connecting the pattern generator probes to the logic analyzer and to the target system.

## First Time Operation

Use the information in this section to turn on the logic analyzer for the first time.



**CAUTION.** *Connecting the accessories after turning on the logic analyzer may damage the accessories. Connect the keyboard, mouse, and other accessories before applying power to the logic analyzer.*

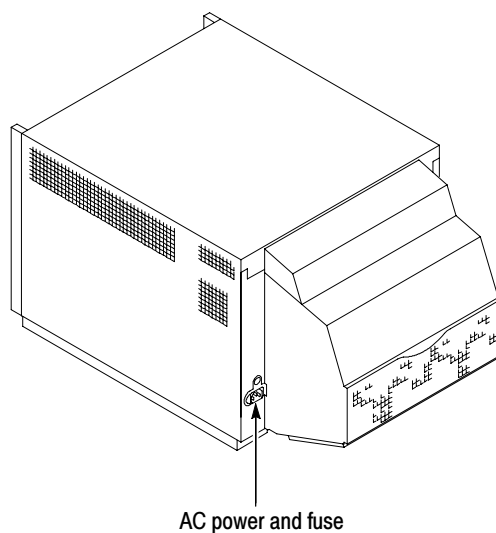
### Turning the Logic Analyzer On

Follow these steps to turn the logic analyzer on:

1. Check that the line fuse is correct for your benchtop application. See Table 2.
2. Connect the power cord. See Figure 18 on page 19.
3. If you have an external monitor, connect the power cord and power on the monitor.

**Table 2: TLA7016 Benchtop mainframe line fuses**

Line voltage	Rating	Tektronix part number
90 V to 132 V operation	20 A, slow blow, 250 V	159-0379-xx
103 V to 250 V operation	15 A, fast blow, 125 V	159-0256-xx
207 V to 250 V operation	6.3 A, fast blow, 250 V	159-0381-xx



**Figure 18: Line fuse and power cord connector locations**

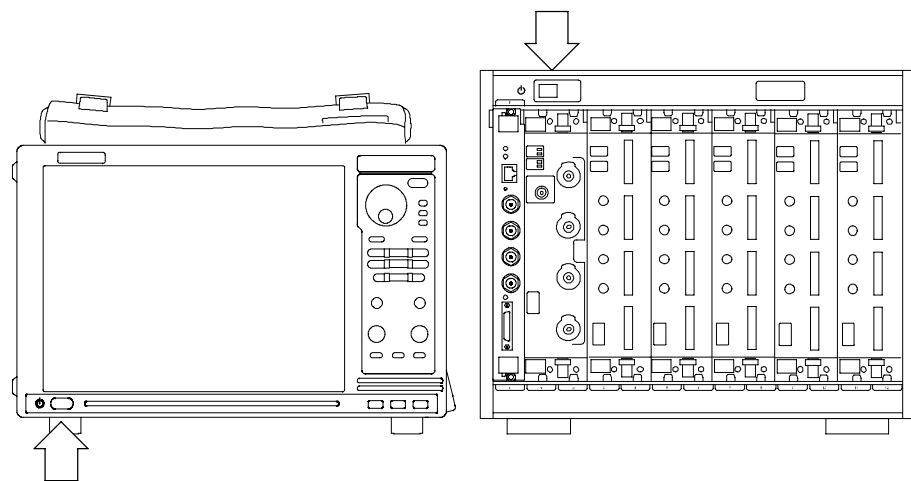


**CAUTION.** To avoid overloading the power distribution system, if you have four or more modules in your mainframe, you must determine the correct fuse to use.

See Appendix A: Mainframe Power Information for further information.

---

4. Press the On/Standby switch to turn on the mainframe (see Figure 19 for the switch location).
5. Wait for the mainframe to complete the power-on self tests and start Windows.



**Figure 19: TLA7000 On/Standby switch locations**

### Turning on Expansion Mainframes

The benchtop mainframes that are connected as expansion mainframes are automatically powered on when the first benchtop or portable mainframe is powered on. If everything is properly connected and operational, you will see the expansion mainframe and the installed modules in the System window.

---

**NOTE.** You must have a module installed in the expansion mainframe before the expansion mainframe appears in the System window.

---

### Turning off the Mainframes

To power off the mainframes, press the On/Standby switch on the mainframe. Both the portable and benchtop mainframes have a built-in soft power-off function that safely powers off the mainframe when you press the On/Standby switch. The expansion mainframes automatically power off when you turn off the benchtop or portable mainframe.

## Performing the Incoming Inspection

Incoming inspection consists of verifying the basic operation of the logic analyzer. The power-on diagnostics check the basic functionality. The diagnostics run every time you turn on the logic analyzer.

You can also verify more detailed functionality by running the self-calibration and extended diagnostics.

---

**NOTE.** Allow the mainframe and modules to warm up for 30 minutes before running the self-calibration.

---

To run self-calibration and diagnostics, perform the following:

1. Disconnect any probes attached to the modules.
2. Select the System menu and click Calibration and Diagnostics.
3. Run the self-calibration, and then the extended diagnostics by selecting the proper tab. Results of the tests display on the individual property page.

To run self-calibration and external diagnostics for a pattern generator, perform the following:

1. Select the Pattern Generator System menu and click Calibration and Diagnostics.
2. Run the self-calibration, and then the extended diagnostics by selecting the proper tab. Results of the tests display on the individual property page.

---

**NOTE.** The time required to run the self-calibration on the logic analyzer modules depends on the number of acquisition channels. Modules with a large number of channels may take several minutes to run the self-calibration.

---

### Checking the P68xx Logic Analyzer Probes (Optional)

To check the P68xx logic analyzer probes, connect the probes to a signal source, start an acquisition, and verify that the acquired data is displayed in either the listing or waveform windows.

If available, use the TLACAL2 fixture to run the performance verification. For further details, refer to the performance verification procedure in the *TLA7Axx Logic Analyzer Module Service Manual*.

### Checking the P69xx Logic Analyzer Probes (Optional)

To check the P69xx logic analyzer probes, connect the probes to a signal source, start an acquisition, and verify that the acquired data is displayed in either the listing or waveform windows.

**Checking the P64xx Logic Analyzer Probes (Optional)**

Connect the P64xx logic analyzer probes to a signal source, start an acquisition, and verify that the acquired data is displayed in either the listing or waveform windows. You can also use the Activity Indicators in the logic analyzer Setup window to view signal activity at the probe tips.

---

**NOTE.** *If you connect probes to any channels other than the A2 and A3 groups, you must define the groups and channels in the Setup window before acquiring data on other probe channels.*

---

**Checking the P624x Oscilloscope Probes (Optional)**

Connect the oscilloscope probes to the Probe Compensation connector on the front panel of the oscilloscope modules. You can then run the Calibrate Probe function in each vertical setup page for the module.

**Checking the P647x Pattern Generator Probes (Optional)**

Set up a simple pattern generator program to output a signal to the probes. Connect an oscilloscope probe to the probe outputs and verify that the signal is present at the probe outputs.

**Checking the TLA7000 Mainframe (Optional)**

To check the mainframe diagnostics not covered by the TLA Application software, run the TLA7000 Mainframe Diagnostics located under the Windows Start menu (Start/Programs/Tektronix Logic Analyzer/TLA Mainframe Diagnostics). Exit the TLA Application before running the external diagnostics.

## Backing Up User Files

Back up your user files on a regular basis. Use the Windows back up tools or copy the files to another media. Always keep a backup copy of files that you access on a regular basis.



## Removing the Replaceable Hard Disk Drive (TLA7012 Only)



**CAUTION.** To avoid permanently damaging the replaceable hard disk drive, do not remove it while the instrument is powered on. Always power off the instrument before removing the hard disk drive.

1. Verify that the instrument is powered off.
2. Remove the replaceable hard disk drive cartridge by unscrewing the locking thumbscrews; see Figure 20.
3. Pull on the replaceable hard disk drive cartridge to remove it from the chassis.

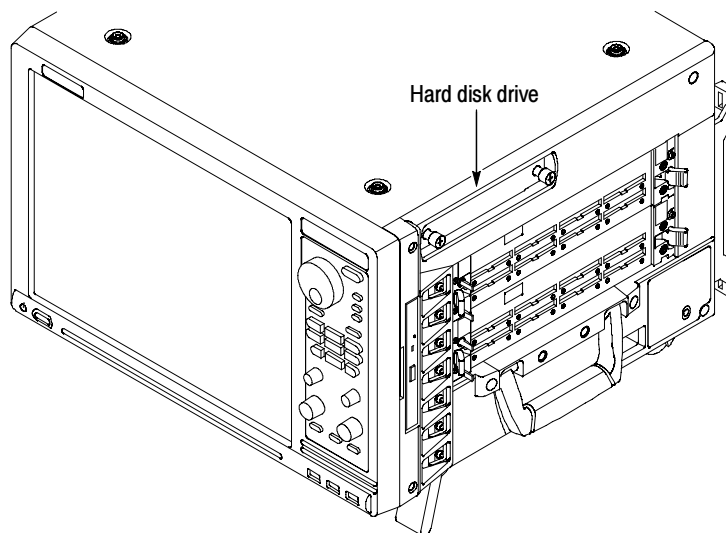


Figure 20: Accessing the TLA7012 replaceable hard disk drive

## Connecting Probes to the Target System

The logic analyzer connects to the target system through the probes. The logic analyzer probes allow you to connect to the target system in several different ways. For probe-specific connection details, refer to the appropriate probe instruction manual or browse through the Tektronix website.

## Connecting to a Network

If you want to control the mainframe remotely from your PC, you need to configure the mainframe to communicate over the network and load software from the TLA application CD onto your PC. You may need help from your IT department or network administrator to complete the network configuration.

### Start the TLA Server on the Mainframe

The TLA server application must be running on the logic analyzer before it can be operated over the network from another PC. The TLA server application only runs on the logic analyzer; it does not run on your PC.

To start the TLA server on the portable mainframe, do the following:

1. Click Start → All Programs → Tektronix Logic Analyzer → TLA Server. An icon with a red circle appears in the Windows toolbar.
2. Click the icon and select Start TLA Server. The red circle on the icon disappears, indicating that the application is now running.
3. Configure your PC as described below.

### Install the Application Software on a PC

The TLA application CD includes the TPI client software that allows you to programmatically control the logic analyzer from a remote PC. Install the TLA application software on a PC for the following purposes:

- To run the TLA application software in an offline mode (similar to TLAVu in earlier software versions)
- To control a logic analyzer with TLA Application Software V5.0, or higher, over a network.

**Load Third-Party Software.** Prior to installing the TLA application software on your PC, you must install the following additional third-party software (included on the TLA Application Software CD V5.0, or higher):

- NI-GPIB-USB software allows you to use the iView software with your PC.
- SnagIt software is useful for copying screen shots of logic analyzer data for use with other applications.

Complete the following steps to install the third-party software on your PC:

4. Insert the TLA Application Software CD in the CD drive.
5. Browse to the NI-GPIB-USB folder on the CD and run the Setup.exe program. Follow the on-screen instructions and the substeps below:
  - a. When you are prompted to select the installation option, select Typical.

- b. When you are prompted to select an interface, click GPIB-USB-B and then Finish. Restart the PC when prompted.
6. Browse to the SnagIt folder on the CD and run the Setup.exe program. Follow the on-screen instructions.

**Load the TLA Application Software.** Perform the following procedure to install the TLA application software on your PC for remote operation.

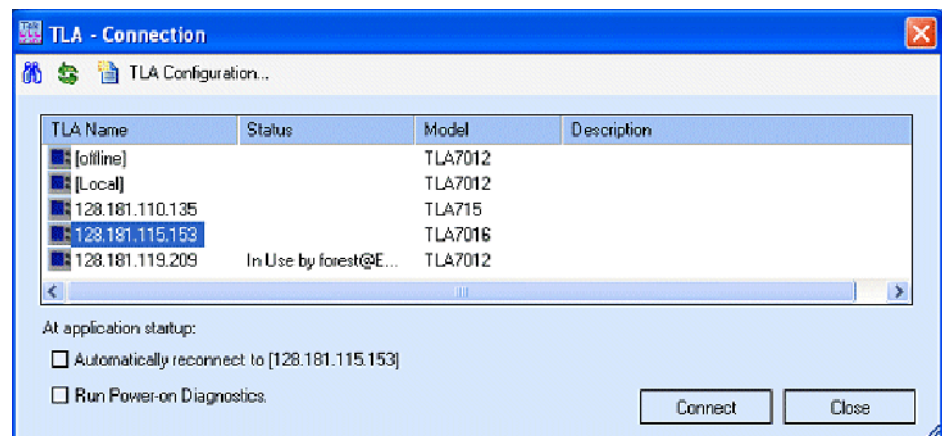
7. Browse to the TLA Application SW folder on the CD and run the Setup.exe program. Follow the on-screen instructions.

If you have an older version of the software on the hard disk, the installation program will detect it and ask if you want to remove it. Follow the on-screen instructions to remove the software, answering “Yes” to any prompts. Do not cancel the uninstall program, as this may cause undesirable effects. Restart the PC when prompted.

## Connect to the Mainframe

To connect to the logic analyzer mainframe from your PC:

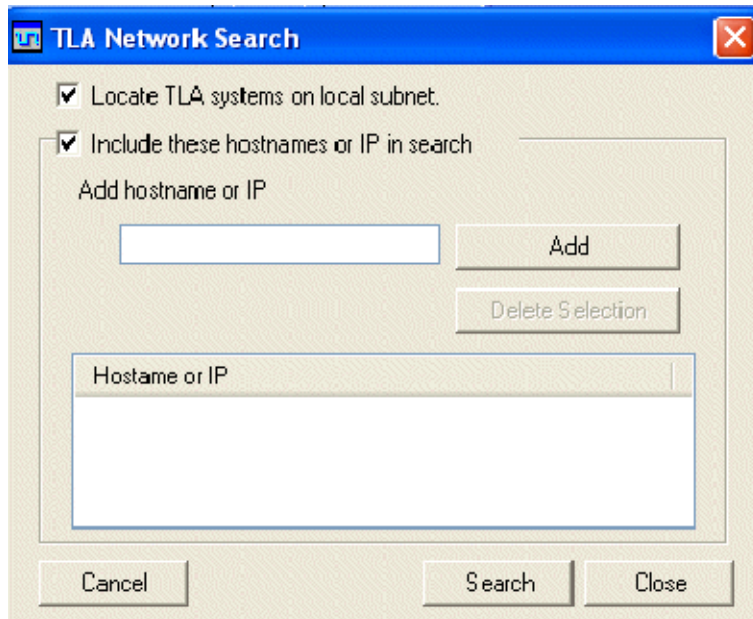
8. Start the TLA application by double-clicking the TLA Application icon on the PC. The TLA Connection dialog box appears. (See Figure 21.)



**Figure 21: TLA Connection dialog box**

9. Select an instrument in the TLA Connection dialog box and then click the Connect button. You can connect to any instrument on your local network that is not being used by another user. If no instruments are displayed in the Connection dialog box:
  - a. Click the Search icon to open the TLA Network Search dialog box. (See Figure 22.)

- b. If you know the hostname or IP address of the TLA, add it to the list of hosts to search.



**Figure 22: TLA Network Search dialog box**

- c. Verify that the Include these hostnames or IP in the search checkbox is checked. You can also check the Locate TLA systems on local subnet checkbox to locate all of the TLA mainframes connected to the subnet.
- d. Click the Search button.

The TLA Connection dialog box displays the search progress. When the search is complete, a list of found TLA systems is displayed, along with the current status of the system: In Use, Power Off, Server Down, Blank (available), etc.

- 10. Select the mainframe you want to connect to and click the Connect button. The application opens on the remote instrument and displays on your PC.

**Run the TLA Application  
Offline on a PC**

If you have installed the TLA application software on a PC for remote operation, you can run the TLA application without connecting to a real instrument, by using the TLA Offline software.

You can analyze previously acquired data from a logic analyzer, create or modify reference memories, or perform system tests without being connected to a real instrument:

1. Start the software by double-clicking the TLA Application icon.
2. From the TLA Connection dialog box, click Offline to start an offline version of the TLA application software.



# Merging TLA700 Modules

This chapter describes how to merge TLA700 Series logic analyzer and pattern generator modules to form wider modules, that all operate from a single time base.

A merged logic analyzer module set consists of a master logic analyzer module and up to four slave logic analyzer modules that are physically connected together by a merge cable and are merged in software. Review the guidelines under *Logic Analyzer Module Merging Rules* and then follow the steps to physically connect the modules together before installing the modules in the mainframe.

A merged pattern generator module set consists of a master pattern generator module and up to four slave pattern generator modules merged in software. Review the guidelines under *TLA7PG2 Pattern Generator Module Merging Rules* on page 30 before installing the modules in the mainframe.

## Logic Analyzer Merging Rules

The following logic analyzer module merging rules must be followed:

- Only modules with 102 or 136 channels can be merged.
- Logic analyzer modules must be in adjacent slots and physically connected.
- Logic analyzer modules cannot be merged across mainframes (between the benchtop mainframe and one or more expansion mainframes).
- Merging logic analyzer modules with unequal memory depths will result in the merged modules assuming the depth of the shallowest module.
- When merging logic analyzer modules of unequal channel widths, use the logic analyzer module with the highest number of channels as the master module. If there is a second slave module, the first slave must have greater than or equal the number of channels as the second slave module. Slave 3 cannot have more channels than the master, slave 1 or slave 2. Slave 4 cannot have more channels than the master, slave 1, slave 2, or slave 3.
- The logic analyzer modules must have the same firmware version.
- The maximum merged combinations are two TLA7Lx and TLA7Mx logic analyzer modules; three TLA7Nx, TLA7Px, or TLA7Qx logic analyzer modules; and five TLA7Axx logic analyzer modules.

- TLA7Nx, TLA7Px, and TLA7Qx Logic analyzer modules cannot be merged with TLA7Lx and TLA7Mx Logic analyzer modules (even if they are connected together).
- TLA7Axx modules cannot be merged with TLA7Nx, TLA7Px, TLA7Qx, TLA7Lx, or TLA7Mx modules.
- To merge a logic analyzer module to an established merged set, the established merged set must first be unmerged through software. Unmerged modules are the only potential candidates to add to a merged configuration.

## TLA7PG2 Pattern Generator Module Merging Rules

The following pattern generator module merging rules must be followed:

- Pattern generator modules are merged through software.
- Pattern generator modules must be physically adjacent.
- Pattern generator modules may not be merged across mainframes.
- Merging pattern generator modules with unequal memory depths will result in the merged set assuming the depth of the shallowest pattern generator module.
- Pattern generator modules must have the same firmware version.
- When merged, the left-most pattern generator module is the master.

## Merge Procedure

Complete the following steps to create a merged module from two or more individual modules. You must complete these steps prior to installing the modules in a mainframe.



---

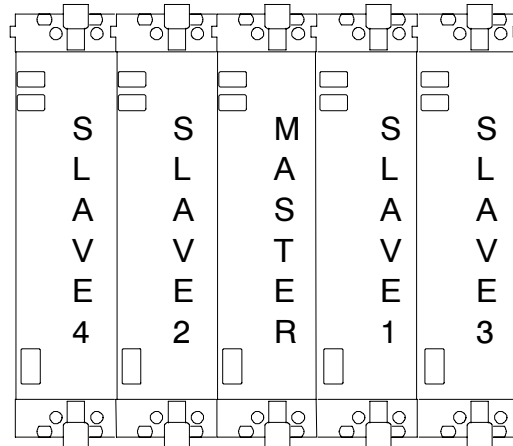
**CAUTION.** *To avoid damaging the mainframe or any modules, always power off the mainframe before removing or installing modules.*

---

1. Determine which modules will reside in the highest-numbered slots in a single mainframe.
2. Place the merge connector of these modules in the extended position. The module in the lowest-numbered slot must have the merge connector in the recessed position.



Use Figure 23 as a guide for determining the location of the master module with the merged module set. Even though Figure 23 shows a five module set, you can still use the illustration to position the master module with respect to the slave module. For example, if you have a two module set, the master module is located in the lower-numbered slot, and the slave module is in the higher-numbered slot.

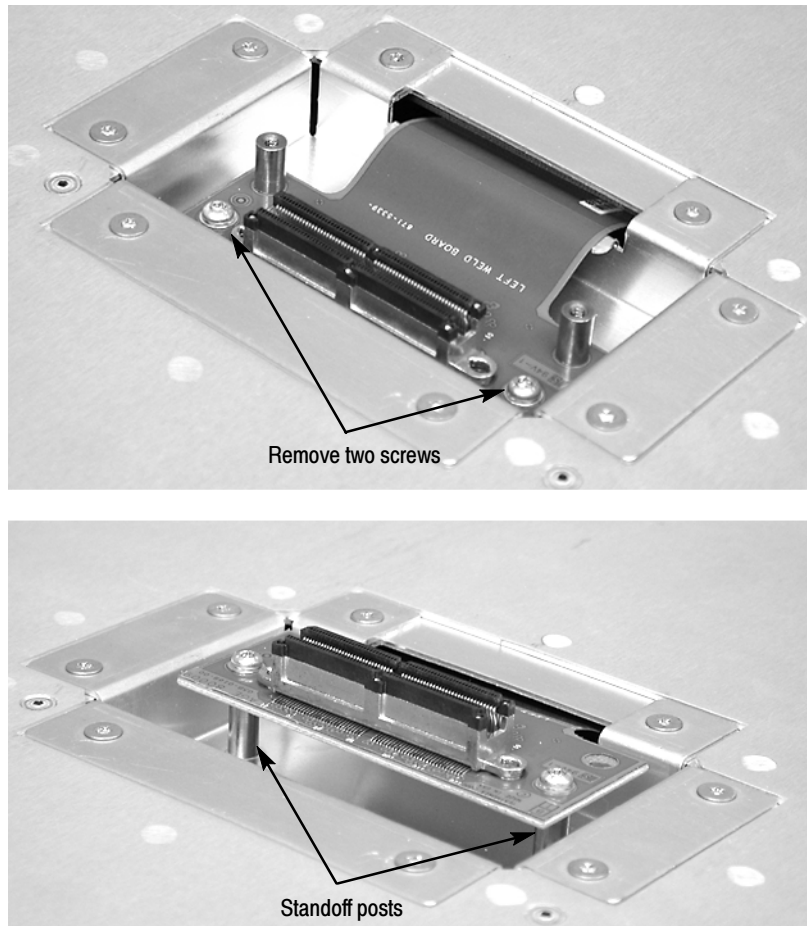


**Figure 23: Location of modules in a merged system**

## Merging TLA7Axx Logic Analyzer Modules

Complete the following steps to create a merged module from two to five individual TLA7Axx modules.

1. Place the module on the right side.
2. Using a Torx T-10 screwdriver, remove the two screws holding the merge connector to the module (see Figure 24).



**Figure 24: Removing the merger connector assembly from the module**

3. Gently lift the merge connector out of the slot and place it in the extended position such that the screw holes line up over the two standoff posts.
4. Install the two screws into the standoff posts. Tighten the screws to 4-in. lbs.
5. Repeat steps 1 through 4 for the remaining modules.

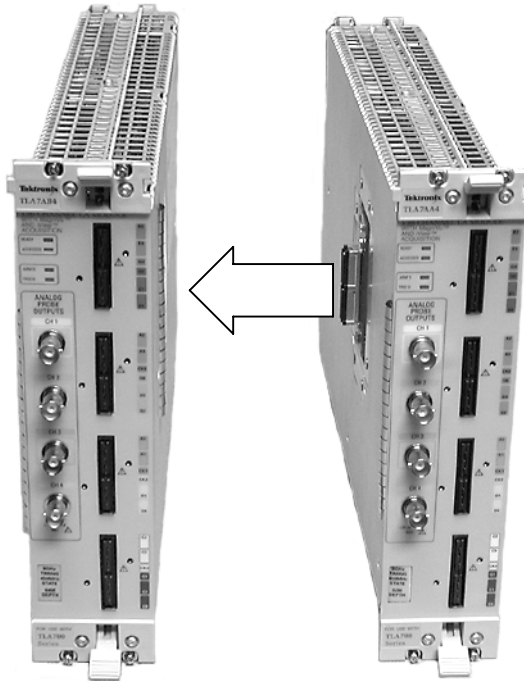
---

**NOTE.** When installing the merged modules into a mainframe, you may need the help of another individual.

---

6. Place the first pair of modules to be merged side-by-side such that the merge connector assemblies line up and connect between the two modules (see Figure 25).
7. Push the two modules together until the connectors are seated in place.

8. Add any additional modules to the set.

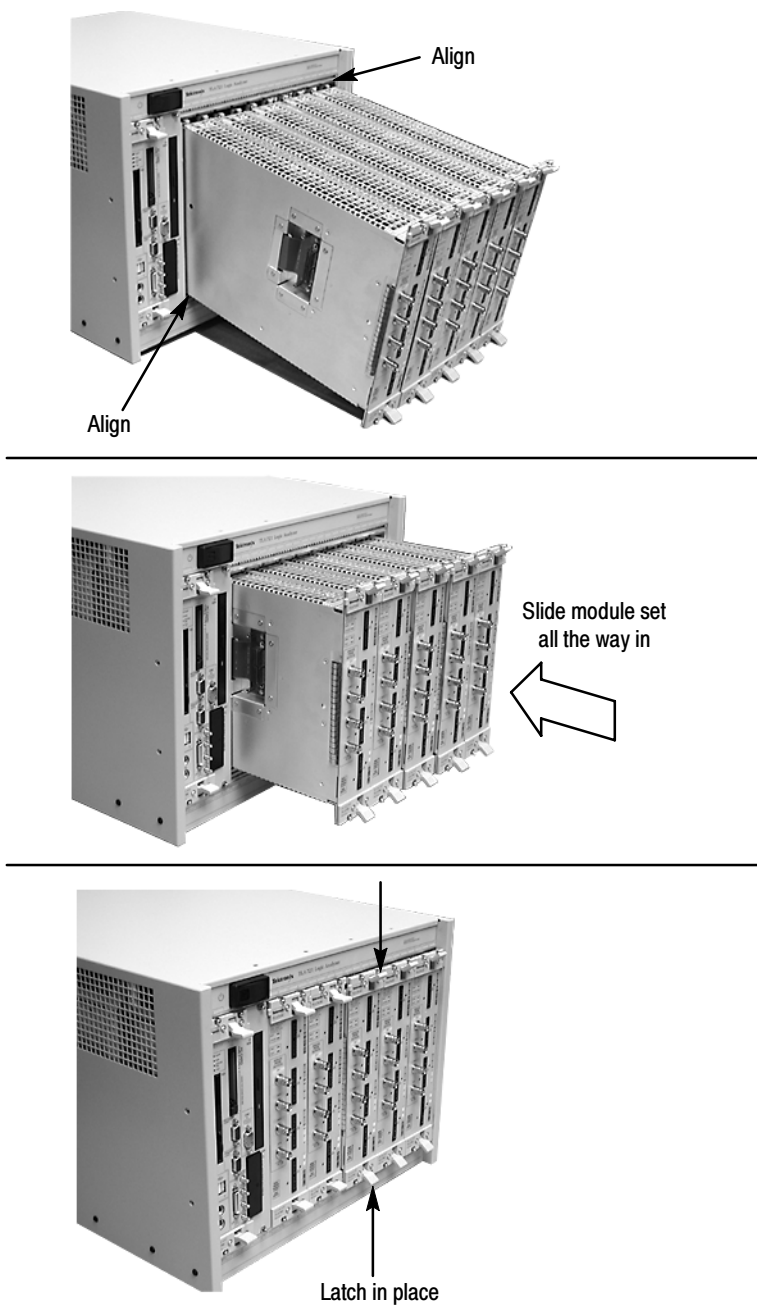


**Figure 25: Connecting modules in a merged set**



**CAUTION.** Ensure that the mainframe is powered-off before installing or removing the modules. Failure to do so can damage the mainframe or the modules.

9. Place the merged module set into the mainframe.
10. Align the tops and bottoms of the modules with the slots in the mainframe (see Figure 26 on page 34). You may need the help of another individual if your merged module set contains more than two modules.



**Figure 26: Installing the merged module set in the mainframe**

11. Slide the modules all the way into the mainframe until they rest against the rear panel connectors.

12. Use the injector handles to firmly seat the modules in place one at a time. The merge cable assembly should allow enough play between two side-by-side modules to allow you to seat or unseat them individually.
13. Tighten the four retaining screws on each module to 2.5-in. lbs.
14. After installing all of the modules, power on the mainframe and complete the merge process listed under the Merged Modules tab in the System Configuration dialog box.

## Unmerging TLA7Axx Logic Analyzer Modules

Although you can unmerge modules from a merged set from within the TLA application without physically separating modules, there will be situations when you have to physically unmerge the modules. The following procedures provide the steps for unmerging the modules.



---

**CAUTION.** *Ensure that the mainframe is powered-off before installing or removing the modules. Failure to do so can damage the mainframe or the modules.*

---

1. Power off the mainframe before removing the modules from the mainframe.
2. Loosen the four retaining screws on each module.
3. Use the ejector handles to disengage each module in the merged module set from the mainframe.
4. With the assistance of another individual, slide all of the merged modules out of the mainframe and place them on a static-free working surface.
5. Gently separate the modules one at a time from the merged module set.
6. Lay the modules on their right sides.
7. Remove the two Torx T-10 screws that hold the merge cable assembly to the module.
8. Place the merge cable assembly into the recessed position.
9. Install the two Torx T-10 screws onto the assembly and tighten the screws to 4 in-lbs.
10. Repeat steps 7 through 9 for the other modules.

You can now reinstall the modules in the mainframe as needed.

## Merging TLA7Lx/Mx/Nx/Px/Qx Logic Analyzer Modules

Use the following procedures to physically merge the logic analyzer modules together.



---

**CAUTION.** *Ensure that the mainframe is powered-off before installing or removing the modules. Failure to do so can damage the mainframe or the modules.*

---

### Two-Way Logic Analyzer Merge Procedure

Use the following procedure to merge two logic analyzer modules. For information on merging three modules, see *Three-Way Logic Analyzer Merge Procedure* on page 41.



---

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

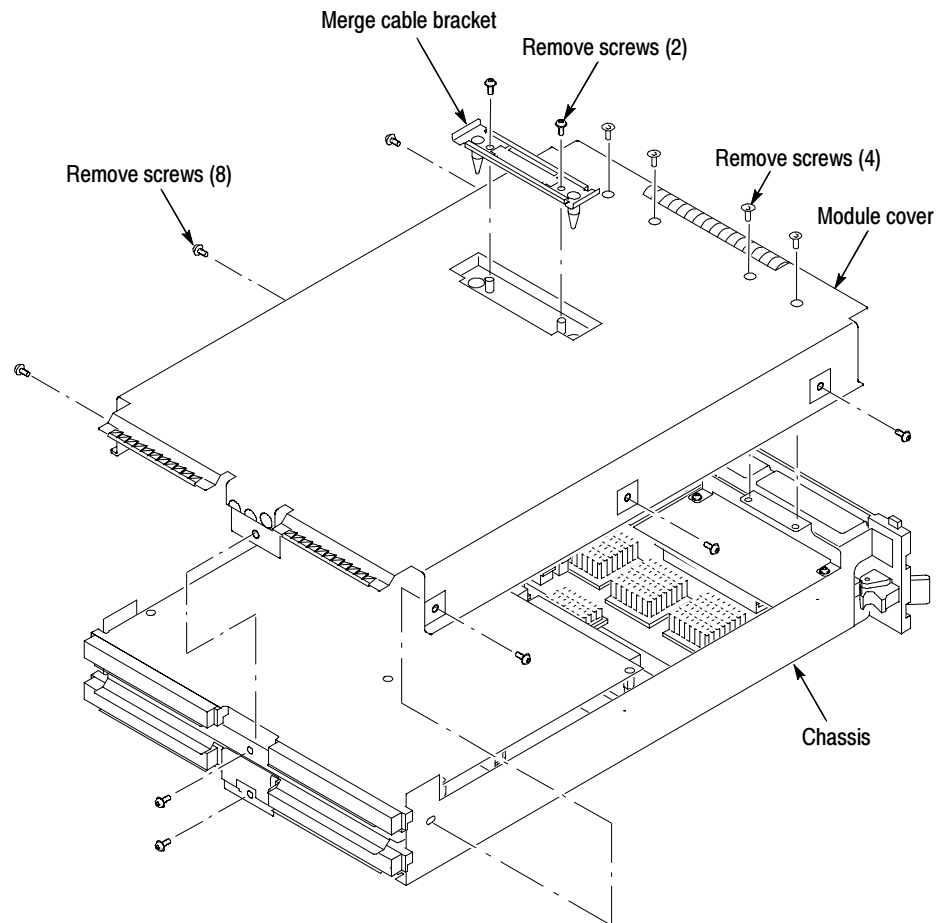
---

*Discharge the static voltage from your body by wearing a grounded antistatic wrist strap while performing the merge procedure.*

---

Perform the following steps to merge two modules:

1. If you have not already done so, power off the mainframe and remove the modules that you want to merge together.
2. Determine which module will be designated as the slave module and which module will be the master module.
3. Lay the slave module on the right side (as viewed from the front panel).
4. Remove the screws from the module cover with a screwdriver with a T-10 Torx tip; refer to Figure 27 on page 37.
5. Remove the screws near the front of the module.
6. Remove the screws holding the merge cable bracket to the cover.
7. Remove the top part of the cable bracket and set it aside.
8. Remove the module cover and locate the merge cable.



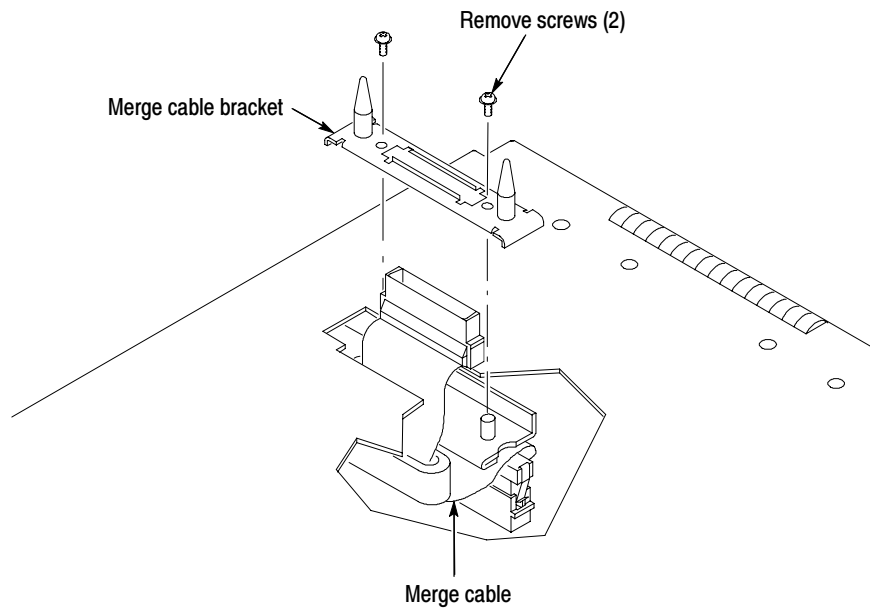
**Figure 27: Removing the cover**

9. Replace the cover while feeding the merge cable through the hole in the cover (see Figure 28).

---

**NOTE.** Do not twist the cable while feeding it through the hole. If the cable is twisted, the modules will not merge correctly.

---



**Figure 28: Feeding the merge cable through the cover**

10. Turn the merge cable bracket over so that the guide pins point up.
11. Place the bracket over the merge cable connector.
12. Install the two screws that hold the merge cable bracket in place.



---

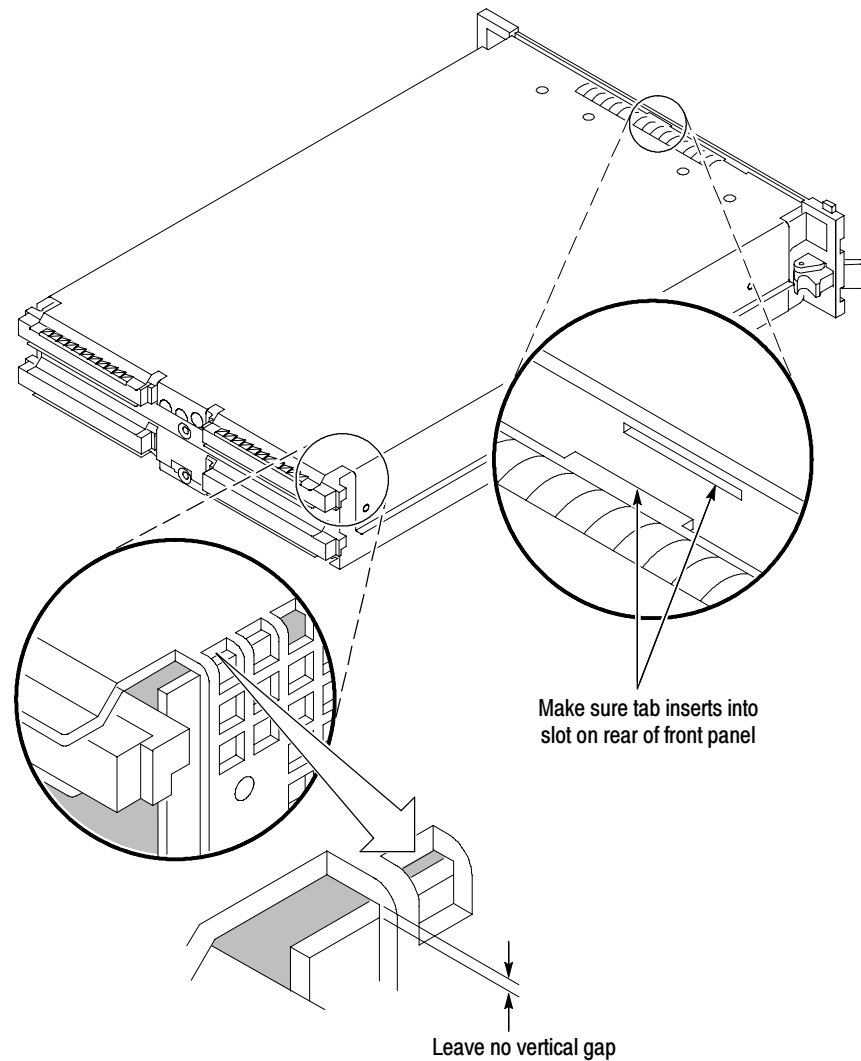
**CAUTION.** To prevent damage to the module during the installation process, reinstall the cover exactly as described in steps 14 through 19.

*If the cover is not properly seated, the module can be damaged when you install it in the mainframe and it may not meet EMC requirements.*

---



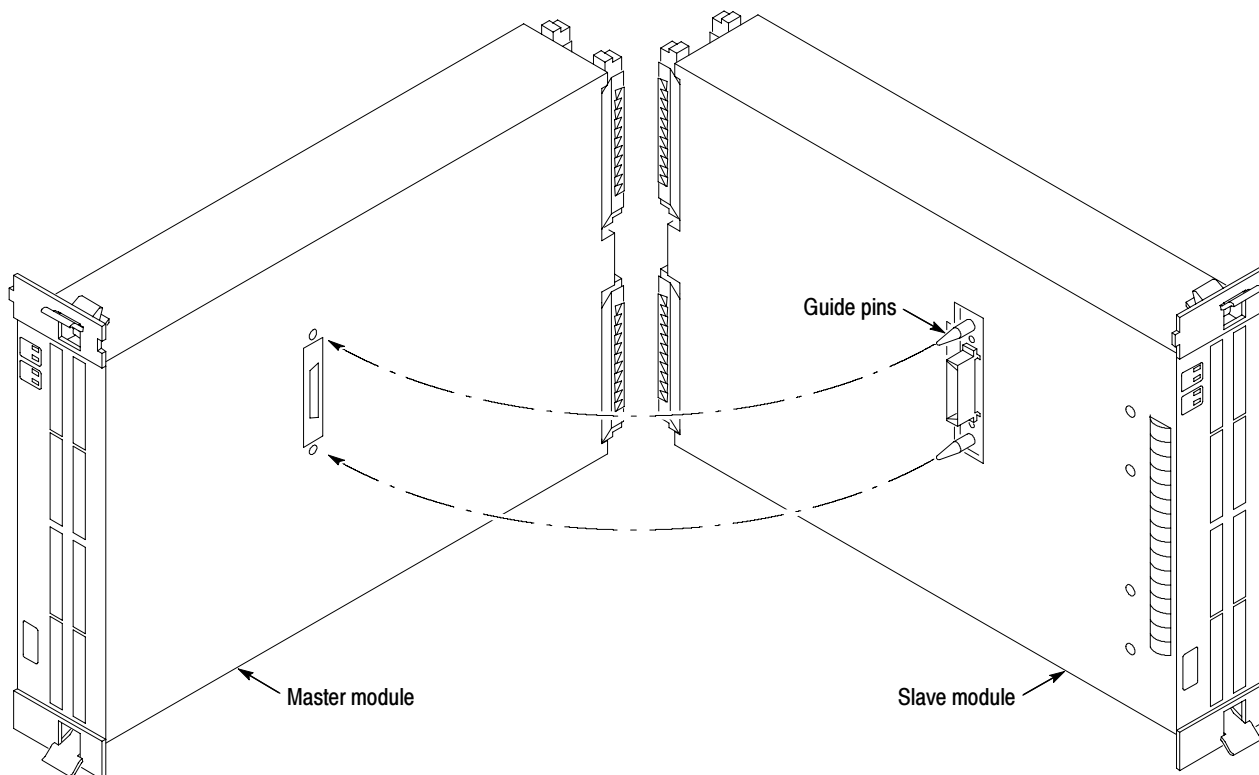
13. Replace the logic analyzer module cover.
14. Push forward on the cover so the tab on the front edge of the cover inserts into the rear of the front subpanel. Make sure that the cover is fully seated (no gaps) against the front and rear chassis flanges.



**Figure 29: Seating the cover on the chassis**

15. While holding the cover in place, install the screws at the front of the module (two on the top and two on the bottom) to secure the cover to the chassis.
16. Install the screws near the front of the module.
17. Slide the rear panel on the chassis and install the rear panel screws.

18. Install the top and bottom rear screws.
19. Check and tighten all screws.
20. Place the master module adjacent to the slave module so that the two guide pins from the slave module line up with the guide pin holes in the master module.



**Figure 30: Lining up the two modules**

21. Gently push the two modules together so that the merge connector of the slave module merges with the connector on the master module.
22. Slide the modules all the way into the mainframe until they rest against the rear panel connectors.
23. Use the injector handles to firmly seat the modules in place one at a time.
24. Tighten the four retaining screws on each module to 2.5-in. lbs.

### Three-Way Logic Analyzer Merge Procedure

The following procedure is used for merging three logic analyzer modules together to form a merged set with a higher logic analyzer channel count.

In a three-way merge (TLA7Nx, TLA7Px, and TLA7Qx logic analyzer modules only), the master module is in the center. Slave module 1 is to the right of the master module. Slave module 2 is on the left of the master module as shown in Figure 23 on page 31.



---

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

*Discharge the static voltage from your body by wearing a grounded antistatic wrist strap while performing the merge procedure.*

---

Perform the *Two-Way Logic Analyzer Merge Procedure* beginning on page 36.

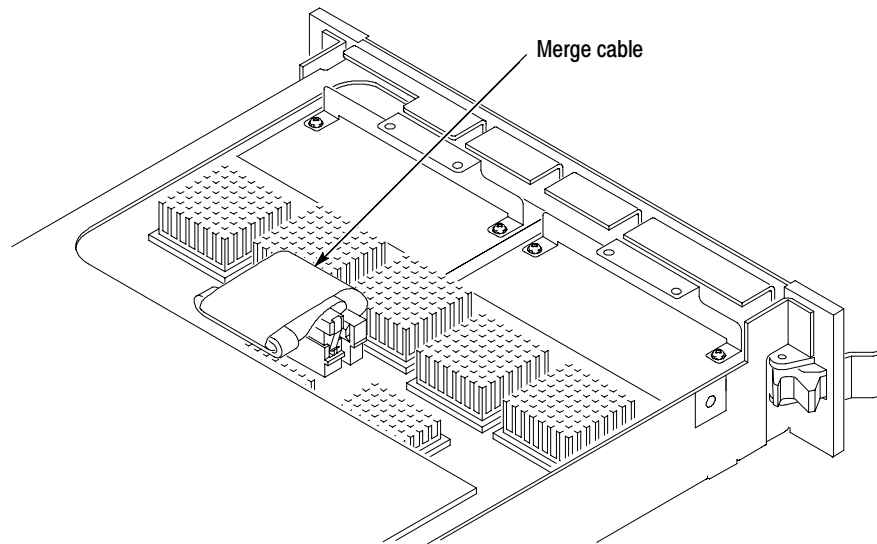
Perform the following steps to merge the second slave module:

1. Lay the two merged module set on its right side (as viewed from the front panel).
2. Follow the procedure beginning on page 36 to merge the second slave module to the left of the center master module.

### Storing the Logic Analyzer Module Merge Cable

Perform the following steps to store the logic analyzer merge cable inside the logic analyzer module:

1. Use the screwdriver with the T-10 Torx tip to remove the screws that hold the merge cable bracket in place.
2. Remove the merge cable bracket.
3. Remove the screws from the side cover and rear cover.
4. Push the merge cable through the side cover and remove the cover.
5. Position the merge cable as shown in Figure 31.



**Figure 31: Positioning the merge cable before installing the cover**

6. Push forward on the cover so that you insert the tab on the front edge of the cover into the rear of the front subpanel. Make sure that the cover is fully seated and there are no gaps between the front and rear chassis flanges; refer to Figure 29 on page 39.
7. While holding the cover in place, install the screws nearest the front of the module to secure the cover to the chassis.
8. Install the screws near the front of the module.
9. Slide the rear panel on the chassis and install the rear panel screws.
10. Install the top and bottom rear screws.
11. Install the merge cable bracket so that the guide pins point into the module.
12. Install and tighten the screws on the merge cable bracket.
13. Verify that you have installed and tightened all screws on the module.

# Product Overview

This chapter describes the product controls and connectors of the logic analyzers. Refer to the online help for detailed operating information for the logic analyzer.

## Front Panel Controls

You can use the front-panel controls to operate most of the TLA7012 portable mainframes (see Figure 32). You can also attach an external keyboard, monitor, and mouse to operate the logic analyzers. The TLA7016 Benchtop Mainframes do not have front-panel controls and require an external controller—the TLA7PC1 benchtop PC with a keyboard, monitor, and mouse, or a user-supplied PC loaded with the TLA application software.

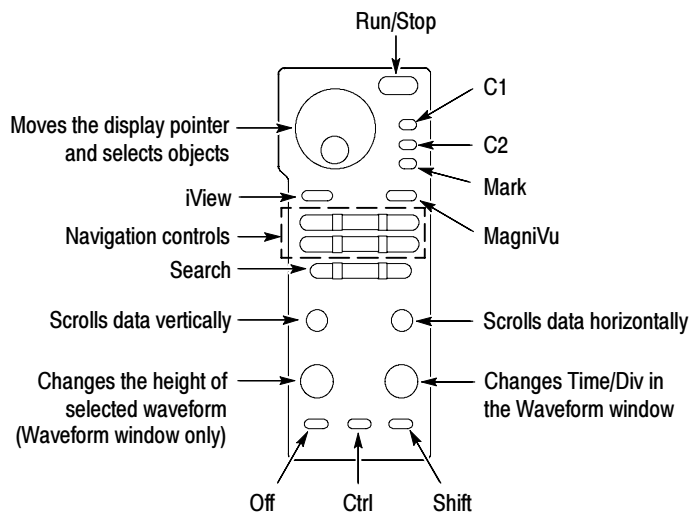


Figure 32: TLA7012 Portable mainframe front panel

## TLA7000 Series External Connectors

The mainframe external connectors are shown in Figure 33. The following connections are available:

- System Trigger In and System Trigger Out, used to receive or send a trigger from/to an external source.
- External Signal In and External Signal Out, used to receive or send a signal from/to an external source.
- TekLink, used to coordinate trigger signals, input/output signals, and time references between mainframes.
- Accessory connections, such as USB, LAN, and audio/video outputs.

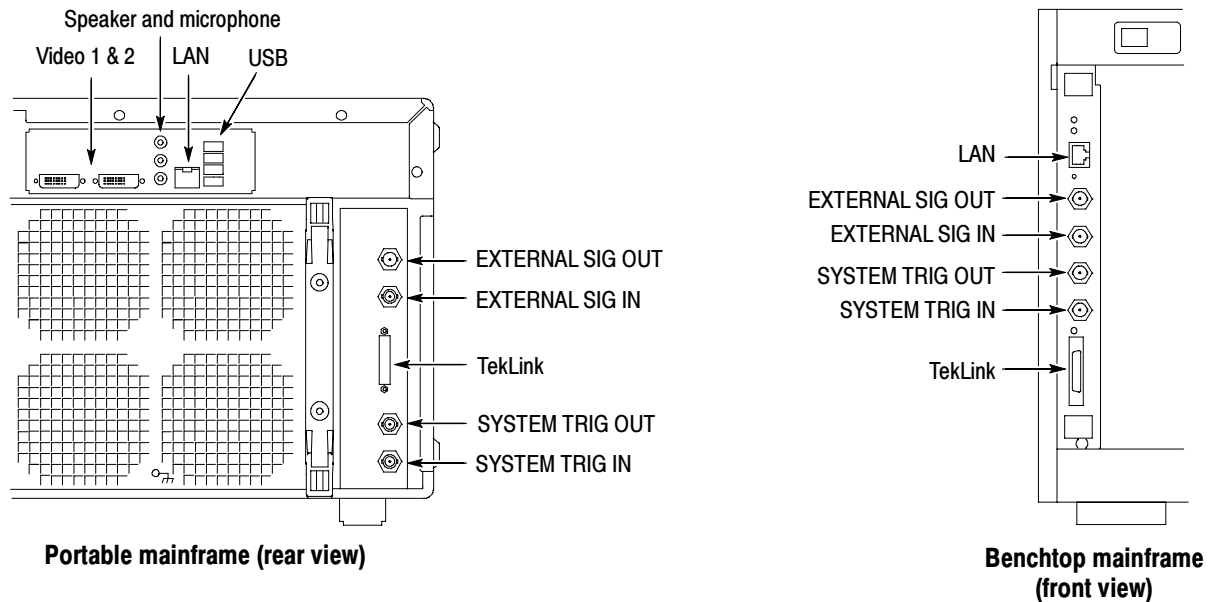


Figure 33: TLA7000 Series external connectors

# Restoring and Reinstalling Software

Most of the software comes factory-installed when you receive your logic analyzer. You only need to refer to this section if you reinstall your software. These instructions only refer to reinstalling the application software and operating system. If you want to upgrade to a newer application software version and operating system, contact your local Tektronix representative about purchasing the TLA7KUP field upgrade kit. This section also provides information on installing related logic analyzer software on a PC for remote operation or for offline applications.

---

**NOTE.** *If you install or reinstall software on a remote PC, make sure that the software version matches that of the main application on the logic analyzer.*

---

## Restoring the Hard Disk Image



---

**CAUTION.** *The software installation procedure using the Hard Disk Image CD will overwrite the **entire contents** of your hard disk. If you want to save files or software applications from the hard disk, back them up to another media (a second hard disk drive, CD, or network drive) before continuing with this procedure.*

---

### TLA7012 Logic Analyzer

This procedure is necessary after replacing the hard disk or when the BIOS settings are corrupted or lost. To configure the BIOS, complete the following steps:

1. Power on the logic analyzer and press the F2 function key before the logic analyzer boots the Windows operating system.
2. Press the F9 function key, select Yes, and then press Enter to set all settings to their default values. Verify that the hard disk was auto-recognized and that the correct size of the hard disk is displayed in the Primary Master setting.
3. Using the arrow keys, navigate to the Advanced page.
4. Under Peripheral Configuration, perform the following:
  - a. Set the Parallel Port Mode to ECP.
  - b. Set the Audio to Disabled.

5. Under Diskette Configuration, set the Diskette Controller to Disabled.
6. Under Video Configuration, set the Primary Video Adapter to PCI.
7. Press the F10 function key to exit and save the BIOS setup.
8. Continue with the steps under *Reinstalling the Hard Disk Image* beginning on page 48.

## Flashing the BIOS

You may need to flash the controller BIOS on your logic analyzer to update the controller with the latest flash image before reinstalling software on the hard disk.

This procedure is only necessary if you need to update the latest flash image. To flash the BIOS, complete the following steps (use the TLA7000 BIOS floppy disk that came with your instrument or with the TLA7KUP Upgrade kit):

1. Power on the logic analyzer and press function key F2 before the Windows operating system starts. The BIOS Setup menu displays.
2. From the BIOS Setup menu, go to the Exit menu.
3. Insert the TLA7000 BIOS disk in the floppy disk drive.
4. From the Exit menu, choose Exit & Update BIOS.
5. When the system displays a dialog box asking if you want to proceed with the Flash update, confirm your choice.

The display goes blank during the flash operation for about one minute. When the update is complete, the logic analyzer automatically reboots.

6. Remove the BIOS disk from the floppy disk drive.



---

**CAUTION.** *Do not remove the floppy disk drive or power off the logic analyzer during the flash operation. Doing so causes the system to become inoperable.*

---

The following procedure is necessary after replacing the hard disk drive or when the BIOS settings are corrupted or lost. To configure the Controller BIOS, complete the following steps:

1. Power on the logic analyzer and press function key F2 before the logic analyzer boots the Windows operating system.



2. Press function key F9, select Yes, and then press Enter to set the default settings. Verify that the hard disk was auto-recognized and that the correct size of the hard disk is displayed in the Primary Master setting.
3. Using the arrow keys, navigate to the Advanced page.
4. Under Peripheral Configuration, perform the following:
  - a. Set the Parallel Port Mode to ECP.
  - b. Set the Audio to Disabled.
5. Under Diskette Configuration, set the Diskette Controller to Disabled.
6. Under Video Configuration, set the Primary Video Adapter to PCI.
7. Press function key F10 to exit and save the BIOS settings and then continue with the disk image installation procedure on page 48.

## Reinstalling the Hard Disk Image

The Tektronix Logic Analyzer comes with CDs containing the Microsoft Windows operating system and the latest application software. All software required to run the logic analyzer comes with the CDs except for any microprocessor support packages or non-logic analyzer application software. The process of reloading the software on the hard disk will destroy any files or programs installed on the hard disk.




---

**CAUTION.** To avoid destroying the *entire contents* of your hard disk, save any files or applications by backing them up to another media (a second hard drive, CD, or a network drive) before continuing with this procedure.

---

### Backing Up Files

Before loading the Hard Disk Image software, make sure that you back up any files and personal documents to an external storage device.

You can find most TLA user files using the Windows Search utility. Locate the files in the current folder and all subfolders using file suffixes. (See Table 3). You may want to search for other file suffixes depending on the files installed on your logic analyzer.

**Table 3: TLA user file suffixes**

Suffix	Description
.tla	TLA setup files
.tsf	TLA symbol files
.tbf	Tektronix binary format
.tls	TLA script file
.tpg	Tektronix pattern generator files
.txt	Tektronix TLA data exchange format files
.stk	Stack files
.spz	Protocol files

Once you find the files, copy them to the external storage device. Use this procedure to find any files or applications that you may want to save.

If you purchased any microprocessor support packages, you need to reinstall the application after you reinstall the hard disk image. If you do not have a copy of the microprocessor support software, contract your Tektronix Account Manager to order a replacement copy. If you cannot contact the account manager, contact

the Tektronix Support Center (refer to *Contacting Tektronix* at the beginning of this document).

---

**NOTE.** You can reinstall the Microsoft Windows operating system and other software only from the Hard Disk Image CDs that came with your instrument. These software applications are licensed and cannot be reinstalled by any other method without violating the license agreements.

---

### Installing the Operating System and TLA Application Software

This procedure reformats the hard disk, installs the operating system software, and installs the Tektronix Logic Analyzer application software. Because this procedure reformats the hard disk drive, be sure to back up any files or software that you want to preserve by following the steps in the previous section.




---

**CAUTION.** To avoid losing user files on your hard disk, back them up before proceeding.

---

**Change the BIOS Boot Settings.** Before installing the Hard Disk Image, you may need to change the BIOS settings to enable booting the logic analyzer from the CD-ROM.

1. Restart the logic analyzer and then press function key F2 to enter the BIOS setup.
2. In the BIOS setup, go to the Boot menu.
3. Set the Boot devices for your instrument. (See Table 4.) Follow the on-screen instructions to change the settings.

**Table 4: BIOS Boot settings for reinstalling software from the CD-ROM**

Instrument	Setting
TLA7012 or TLA7016	USB FDC:
	IDE 2: (DVD Drive ID)
	IDE 0: (Hard Drive ID)

4. Save the settings by pressing function key F10 and confirm that you want to save the new settings.

**Load the Hard Disk Image.** Complete the following steps to load the Hard Disk Image.

1. Insert the Hard Disk Image CD in the CD drive.
2. Reboot the logic analyzer and follow the on-screen instructions. The procedure automatically installs and sets up the logic analyzer application.

---

**NOTE.** *Use care when proceeding through the software license agreement. Ensure that you make the proper selections.*

---

3. After the image is loaded, remove the CD and reboot the logic analyzer.
4. A Systems Settings Change error message may display. If so, restart the instrument so that your changes can take effect. Click Yes to restart the instrument.
5. Reinstall any user files that you backed up previously. Reinstall any software (such as the microprocessor support packages) that you want to use on the logic analyzer.
6. If desired, reconfigure the TLA network interface.

## Reinstalling the TLA Application Software

Complete the following steps to reinstall the latest version of the TLA application software. Use these steps as a first resort to recovering from application software problems. If you still experience problems with the software after completing these steps, follow the instructions under *Restoring the Hard Disk Image*. (See page 45).

While using this procedure you will be asked to log on as Administrator. The logic analyzer is initially set up to automatically log on as Administrator (with no password) so you may not see the login prompt. If the network setups have been changed on your instrument, make sure that you log on as Administrator or as a user who has administrator privileges. Failure to do so can prevent the software upgrade from completing successfully.

1. Log on to the instrument as Administrator and quit any applications.
2. Install the TLA Application Software CD in the CD drive of the logic analyzer.
3. If the installation software does not start automatically, click Run in the Windows Start menu to display the Run dialog box. Enter D:\TLA Application SW\Setup.exe in the Run dialog box (if your CD drive is not the D-drive, enter the appropriate letter for your drive).
4. Click OK to perform the installation.

If you have an older version of the software on the hard disk, the installation program will detect it and ask if you want to remove it. Follow the on-screen instructions to remove the software, answering “Yes” to any prompts. Restart the instrument when prompted. Repeat Step 4 to reinstall the software following any on-screen prompts.

5. After the software has been successfully installed, restart the instrument.
6. If you have installed the TLA application software on a PC for remote operation, start the software by double-clicking on the TLA Application icon. The TLA Startup dialog box displays.
  - a. Select an instrument in the TLA Connection dialog box and click the Connect button. If your instrument is connected to a network, you can connect to any instrument on your local network that has a TLA server running, enabled, and is not currently being used by another user.
  - b. Click Offline to start an offline version of the TLA application software. The TLA Offline software allows you to run the TLA application without connecting to a real instrument. You can analyze previously acquired data from a logic analyzer, create or modify reference memories, or perform system tests without being connected to a real instrument.

## Installing the TPI Remote Operation Software

The TPI client software package allows you to remotely control the logic analyzer from a remote PC. This software package is located on the TLA application software CD. You must ensure that the version of the TPI client software is the same as that of TLA application on your logic analyzer.

Complete the following steps to update the TPI client software package on your PC. If you have an older version already installed on your PC, the program will automatically detect it and replace it during the upgrade process.

1. Install the Tektronix Logic Analyzer Family Application Software CD in the CD drive of the PC.
2. Click Run in the Windows Start menu to display the Run dialog box.
3. To install the TPI client software, enter D:\TPI Client SW\Setup.exe in the Run dialog box.
4. Click OK to perform the installation. Follow any on-screen instructions.
5. If you have an earlier version of the software package installed on your PC, the Setup.exe program will uninstall the application before installing the new version. If you are prompted for permission to remove unused shared files or any read-only files, select Yes to All.

---

**NOTE.** You may also want to refer to the TPI online help for configuration instructions for the TPI client software.

---

## Upgrading or Restoring Firmware

You may have to upgrade the firmware on the logic analyzer or on individual modules if the firmware version is not compatible with the TLA application software version. This will be indicated by one or more messages (one per module) when you start the logic analyzer. The most current firmware for the TLA application software resides in a file on the hard disk of the logic analyzer.

Although the firmware update procedures are similar, there are some key differences between the Tektronix Logic Analyzer products and are therefore listed as separate procedures. If you have mixed modules within your TLA7000 mainframe, review the procedures for each of the modules before beginning the upgrade.

### Upgrading Firmware on TLA7Axx Logic Analyzer Modules

Use the following procedure to upgrade the firmware for the TLA7Axx Series Logic Analyzer Modules.

1. Note which modules require new firmware.

If any modules are missing from the System window, you can verify the status of the modules by doing the following steps:

- a. Select System Properties from the System menu.
- b. Click the Modules tab.
- c. Note the information under the Messages column for any installed modules. If any modules indicate invalid or similar messages, you must update the firmware for those modules.

2. Exit the logic analyzer application.

3. Click Start → Programs → Tektronix Logic Analyzer → TLA Firmware Loader.

When the firmware loader is operated on portable instruments only, you are given a choice to load Mainframe or Instrument Module Firmware. Click Load for the Instrument Module Firmware.

4. You may be prompted to cycle the power on the mainframe after completing the upgrade operation. Click Yes to continue.

The logic analyzer will scan the mainframe to determine which modules are installed and which modules can have their firmware upgraded. If you have any older modules, you may see them listed in the bottom half of the window. These modules cannot be updated until you install the flash jumper on the rear of the modules.

5. Select the modules that you want to update from the list of modules displayed in the Supported list box near the top of the window. If you are updating more than one module at a time, note the slot location of the module in the selection box.
6. Select Load Firmware from the Execute menu.
7. Click the TLA7A.lod file for the selected module.

---

**NOTE.** Be sure to select the proper .lod file for each module. Note the slot number in the title bar so that you select the correct module for the .lod file.

---

8. Click OK. You will be prompted to confirm your action; click Yes.

---

**NOTE.** The program will not allow you to load firmware to an incompatible module. For example, the program will not load oscilloscope firmware to a logic analyzer module.

---

The program will load the firmware for each module one at a time. The process may take several minutes per module.

9. When the firmware has been loaded for each module, exit the firmware loader program and power down the logic analyzer. You must power down the logic analyzer to allow the TLA application to start up properly.
10. Remove the logic analyzer module from the mainframe.
11. Locate the big label on the side of the module.
12. Record the firmware version that is printed on the label. You will need this information to see that the firmware version matches the label.
13. Reinstall the module in the mainframe and power on the mainframe.
14. After the logic analyzer completes the power-on diagnostics, select System Properties from the System menu.
15. Click the module tab (for example, LA1).
16. Verify that the firmware version for the selected module matches the version on the label that you recorded in step 12.
17. If the firmware versions do not match, power down the mainframe, remove the module from the mainframe and update the label.



**Upgrading Firmware on  
TLA7Lx/Mx/Nx/Px/Qx/  
Dx/7Ex Modules**

Complete the following steps to upgrade the module firmware on the TLA7Lx, TLA7Mx, TLA7Nx, TLA7Px, or TLA7Qx logic analyzer modules and the TLA7Dx or TLA7Ex oscilloscope modules. These modules require you to install a jumper on the rear of the module before you can upgrade the firmware.

1. Note which of the modules that may require new firmware.

If any modules are missing from the System window, you can verify the status of the modules by doing the following steps:

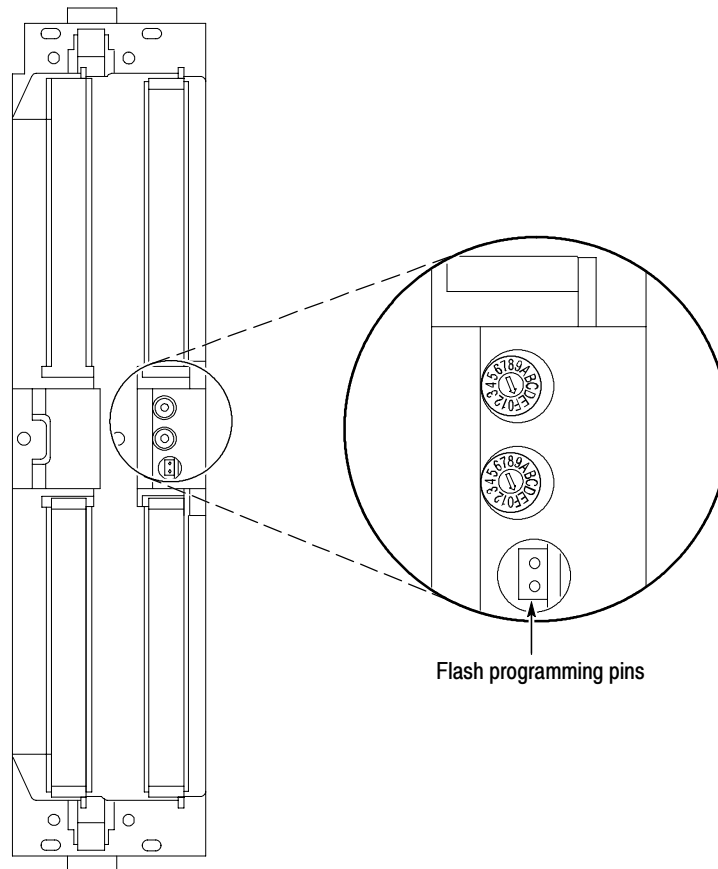
- a. Select System Properties in the System menu.
  - b. Click the Modules tab.
  - c. Note the information under the Messages column for any installed modules. If any modules indicate invalid or similar messages, you must update the firmware for those modules.
2. Turn off the logic analyzer and disconnect the power cord.
  3. Remove the modules from the logic analyzer.
  4. Locate the flash programming pins on the rear of each module. (See Figure 34 on page 56).
  5. Install a jumper on the flash programming pins (use one of the spare jumpers that came with your logic analyzer).
  6. Reinstall the module(s) in the logic analyzer.
  7. Reconnect the power cord and then power on the logic analyzer.
  8. Wait for the TLA application to start.

---

**NOTE.** Any modules with the flash programming jumper installed will not display in the System window.

---

9. Exit the TLA application (and pattern generator application if you have it installed on your instrument).



**Figure 34: Flash programming pins**

10. Click Start → Programs → Tektronix Logic Analyzer → TLA Firmware Loader.
11. Select the modules that you want to update from the list of modules displayed in the Supported list box near the top of the window. This selects the modules for the upgrade.
12. If you are upgrading more than one module at a time, note the slot location of the module in the selection box.
13. Select Load Firmware from the Execute menu.
14. Click the proper .lod file for the selected module. (Refer to Table 5 if necessary). (The .lod files are located in the C:\Program Files\TLA 700\Firmware directory).

---

**NOTE.** Be sure to select the proper .lod file for each module. Note the slot number in the title bar so that you select the correct module for the .lod file.

---

**Table 5: TLA firmware files**

Module type	.lod file
TLA7Nx, TLA7Px, TLA7Qx logic analyzer modules	TLA7NPQ.lod
TLA7Lx and TLA7Mx logic analyzer modules	TLA7LM.lod
TLA7Dx and TLA7Ex oscilloscope modules	FirmwareDSO.lod
TLA7012 Portable mainframe	TLA7012.lod
TLA7016 Benchtop controller module	TLA7016.lod

15. Click OK. When asked to confirm your action; click Yes.

---

**NOTE.** The program will not allow you to load firmware to an incompatible module. For example, the program will not load oscilloscope firmware to a logic analyzer module.

---

The program loads the firmware for each module one at a time. The process may take several minutes per module.

16. When the upgrade is complete, exit the program.
17. Turn off the logic analyzer and disconnect the power cord.
18. Remove the module from the instrument and remove the jumper from the Flash programming pins on the rear of the module. Keep the jumper for future updates.
19. Locate the big label on the side of the module.
20. Record the firmware version that is printed on the label. You will need this information to see that the firmware version matches the label.
21. Reinstall the module in the mainframe and power on the mainframe.
22. After the logic analyzer completes the power-on diagnostics, select System Properties from the System menu.
23. Click the module tab (for example, LA1).
24. Verify that the firmware version for the selected module matches the version on the label that you recorded in step 20.
25. If the firmware versions do not match, power down the mainframe, remove the module from the mainframe and update the label.

### Upgrading Firmware on TLA7PG2 Pattern Generator Modules

Use the following procedure to upgrade the firmware on the pattern generator modules.

1. Note which modules require new firmware.

If any modules are missing from the System window, you can verify the status of the modules by doing the following steps:

- a. Select System Properties in the System menu.
  - b. Click the Modules tab.
  - c. Note the information under the Messages column for any installed modules. If any modules indicate invalid or similar messages, you must update the firmware for those modules.
2. Power down the mainframe and disconnect the power cord.
  3. Remove the modules from the mainframe.
  4. Locate the flash programming pins on the rear of each module. (Refer to Figure 34 on page 56).
  5. Install a jumper on the flash programming pins (use one of the spare jumpers that came with your pattern generator).
  6. Reinstall the modules in the mainframe.
  7. Reconnect the power cord, and then power on the mainframe.
  8. Wait for the pattern generator application to start.

---

**NOTE.** Any modules with the flash programming jumper installed will not display in the System window.

---

9. Exit the pattern generator application (and the TLA application).
10. Click Start → Programs → Tektronix Logic Analyzer → TLA Firmware Loader.
11. Select the modules that you want to update from the list of modules displayed in the Supported list box near the top of the window. This selects the modules for the upgrade.
12. If you are upgrading more than one module at a time, note the slot location of the module in the selection box.
13. Select Load Firmware from the Execute menu.
14. Select the tla7pg2.lod file for the selected module; if necessary, navigate to the C:\Program Files\Tektronix Pattern Generator\Firmware folder.

15. Click OK. You will be prompted to confirm your action; click Yes.

The program will load the firmware for each module one at a time. The process may take several minutes per module.

16. When the upgrade is complete, exit the program.
17. Power off the mainframe and disconnect the power cord.
18. Remove the module from the instrument and remove the jumper from the Flash programming pins on the rear of the module. Keep the jumper for future updates.
19. Locate the big label on the side of the module.
20. Record the firmware version that is printed on the label. You will need this information to see that the firmware version matches the label.
21. Reinstall the module in the mainframe and power on the mainframe.
22. After the instrument completes the power-on diagnostics, select System Properties from the System menu.
23. Click the module tab (for example, PG1).
24. Verify that the firmware version for the selected module matches the version on the label that you recorded in step 20.
25. If the firmware versions do not match, power off the mainframe, remove the module from the mainframe and update the label.

**Upgrading Firmware on  
the Slot 0 Controller and  
the TL708EX Hub**

Use the following procedure to upgrade the firmware on the benchtop mainframe controller and the TekLink hub.

1. Start the Firmware Loader.
2. A list of installed mainframes displays. Select the mainframe you want to upgrade and click Connect.
3. The Firmware Loader dialog box appears. You have the choice to load Mainframe or Instrument Module firmware. Click the Load button corresponding to Mainframe and TekLink firmware.
4. A list of all the currently installed Mainframe and TekLink firmware displays. The list shows the version currently running and the version available for installation. Select the items you wish to load.
5. Click the Update Firmware button. A file dialog box displays a list of firmware images available.
6. Select the appropriate file. Click Open to open the selected firmware image. You must do this for each firmware image selected.
7. The Firmware Load Progress dialog displays. Click the Start Flash Operation button to start the flash operation for the selected flash images. Once the flash operation is started it cannot be canceled.
8. As the flash operation runs, it identifies what steps are being performed. When complete, it will inform you to reboot the system you just flashed.
9. Turn off and restart the TLA system after the flash operation is complete.

# Appendix A: Mainframe Power Information

The benchtop mainframes come with one power cord and three fuses (one fuse is already installed).



**CAUTION.** You must determine the correct fuse for your configuration. This is important to avoid overloading the power distribution system and ensures that you comply with the National Electrical Code.

The power consumption depends on the number and type of instrument modules installed in the mainframes. Table 6 lists the power consumed for each module.

To determine the total power consumption, perform the following steps:

1. Use Table 6 to determine the power consumption for each module.
2. Add the power for each module to determine the total power consumption.
3. Determine at which line voltage you will be operating.
4. Refer to Figure 35 on page 63 to determine the proper line fuse for your mainframe.

**Table 6: Power for instrument modules**

Module type	Power (Watts)
One TLA7016 Benchtop Mainframe <sup>1</sup>	70
TLA7AA1	45
TLA7AA2	65
TLA7AA3	85
TLA7AA4	105
TLA7AB2	65
TLA7AB4	105
TLA7NA1	45
TLA7NA2	58
TLA7NA3	71
TLA7NA4	82
TLA7Q2	51
TLA7Q4	75
TLA7P2	50
TLA7P4	74

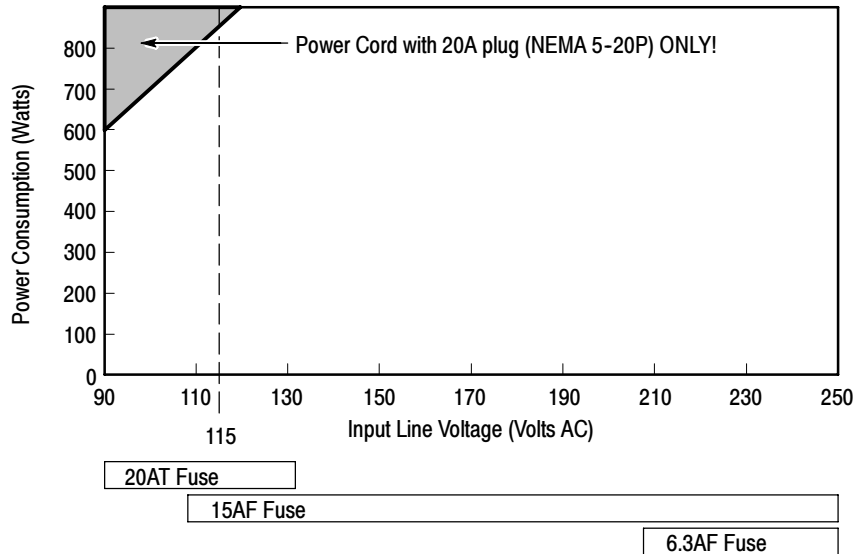
**Table 6: Power for instrument modules (Cont.)**

<b>Module type</b>	<b>Power (Watts)</b>
TLA7N1	45
TLA7N2	58
TLA7N3	71
TLA7N4	82
TLA7L1	55
TLA7L2	73
TLA7L3	94
TLA7L4	109
TLA7M1	57
TLA7M2	76
TLA7M3	99
TLA7M4	116
TLA7D1	80
TLA7D2	111
TLA7E1	90
TLA7E2	121
TLA7PG2	110

<sup>1</sup> Power for mainframe with fans operating at maximum speed.



Select the proper fuse based on the ranges shown in Figure 35.



**Figure 35: Fuse identification chart**



# Appendix B: User Service Procedures

This appendix describes high-level service information and procedures for the Tektronix logic analyzers. Mainframe and module service troubleshooting procedures are located in the service manuals.

## 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 logic analyzers. *Services are provided at Tektronix Service Centers and on-site at your facility, depending on your location.*

### Warranty Repair Service

Tektronix warrants this product as described in the warranty statements at the front of this manual. Tektronix technicians provide warranty service at most Tektronix service locations worldwide. The Tektronix product catalog lists all service locations worldwide.

### Calibration and Repair Service

In addition to warranty repair, Tektronix Service offers calibration and other services that 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.

## General Care

Protect the instrument from adverse weather conditions. The instrument is not waterproof. Do not store or leave the instrument where the LCD display will be exposed to direct sunlight for long periods of time.



---

**CAUTION.** *To avoid damage to the instrument, do not expose it to sprays, liquids, or solvents.*

---

## Preventive Maintenance

Once a year the electrical performance should be checked and the instrument accuracy certified (calibrated). This service must be performed by a qualified service technician using the procedures outlined in the appropriate service manual for the Tektronix Logic Analyzer product.

Preventive maintenance mainly consists of periodic cleaning. Periodic cleaning reduces instrument breakdown and increases reliability. Clean the instrument as needed, based on the operating environment. Dirty conditions may require more frequent cleaning than computer room conditions.

Refer to your logic analyzer probe instructions for specific cleaning procedures for the probes and probe connectors.

### Cleaning the Flat Panel Display

The LCD flat panel is a soft plastic display and must be treated with care during cleaning.



---

**CAUTION.** *Improper cleaning agents or methods can damage the flat panel display.*

*Do not use abrasive cleaners or commercial glass cleaners to clean the display surface.*

*Do not spray liquids directly on the display surface.*

*Do not scrub the display with excessive force.*

*Avoid getting moisture inside the instrument while cleaning the display; use only enough solution to dampen the wipe.*

---

Clean the flat panel display surface by gently rubbing the display with a cleanroom wipe (such as Wypall Medium Duty Wipes, #05701, available from Kimberly-Clark Corporation).

If the display is very dirty, moisten the wipe with distilled water or a 75% isopropyl alcohol solution and gently rub the display surface. Avoid using excess force or you may damage the plastic display surface.

### Exterior Surfaces

Clean the exterior surfaces with a dry, lint-free cloth or a soft-bristle brush. If dirt remains, use a cloth or swab dampened with a 75% isopropyl alcohol solution. A swab is useful for cleaning in narrow spaces around the controls and connectors. Do not use abrasive compounds on any part of the instrument.



---

**CAUTION.** *To avoid damaging the instrument follow these precautions:*

*Avoid getting moisture inside the instrument during external cleaning and use only enough solution to dampen the cloth or swab.*

*Do not wash the front-panel On/Standby switch. Cover the switch while washing the instrument.*

*Use only deionized water when cleaning. Use a 75% isopropyl alcohol solution as a cleanser and rinse with deionized water.*

*Do not use chemical cleaning agents; they may damage the instrument. Avoid chemicals that contain benzene, toluene, xylene, acetone, or similar solvents.*

---

## In Case of Problems

Review the following sections if you encounter any problems with your instrument. Detailed troubleshooting procedures are available in the service manuals for your logic analyzer product. For additional help, contact your local Tektronix Service Representative.

### Diagnostics

The logic analyzer runs power-on diagnostics every time you power on the instrument. You can view the results of the diagnostics by selecting Calibration and Diagnostics from the System menu. You can run more detailed diagnostics by selecting Extended diagnostics. Here you can run all tests, loop on one or more tests, or loop on a test until a failure occurs.

Before running the extended diagnostics, disconnect any attached probes.

**TLA Mainframe Diagnostics.** The TLA mainframe diagnostics program is a stand-alone application. These diagnostics check the operation of the mainframe beyond the basic PC circuitry. These diagnostics also check the front-panel knobs of the portable mainframe.

**CheckIt Utilities.** The CheckIt Utilities is a separate application located in the Windows Start Programs menu (Start > Programs > CheckIt Utilities). The diagnostics check the basic PC operations of the controller.

### Software Problems

Your logic analyzer comes with most software installed. Before running any of the diagnostics, check the online release notes to verify that the logic analyzer software is compatible with the module firmware.

Many software problems can be due to corrupted or missing software files. In most cases the easiest way to solve software problems is to reinstall the software

and follow the on-screen instructions. Refer to *Restoring and Reinstalling Software* beginning on page 45 for instructions on reinstalling or upgrading software.

### **Hardware Problems**

If you are certain that you have installed the logic analyzer correctly, run the extended diagnostics (located under the System menu) to identify any problems. If your logic analyzer powers on so that you have access to the desktop, run the CheckIt Utilities software to identify possible controller hardware problems.

You can also run the external TLA mainframe diagnostics to identify problems not covered by other diagnostics. The TLA mainframe diagnostics are located under the Start menu under the Tektronix Logic Analyzer programs.

## **Repacking for Shipment**

If a mainframe or module is to be shipped to a Tektronix service center for repair, attach a tag to the mainframe or module showing the owner's name and address, the serial number, and a description of the problem(s) encountered and/or service required. Always include the module and the probes so that the entire unit can be tested.

When packing an instrument for shipment, use the original packaging. If it is unavailable or not fit for use, contact your Tektronix representative to obtain new packaging.

# Appendix C: Accessories & Options

## Accessories

This section lists the standard and optional accessories available for the portable and benchtop instruments. Options to the compatible logic analyzer modules are also listed.

**Standard** Table 7 lists the standard accessories that are shipped with the portable mainframe:

**Table 7: Standard accessories, portable mainframe**

Quantity	Accessory	Part number
1 ea	U.S. power cord	161-0104-00
1 ea	Power cord clip	343-1213-00
1 ea	USB mini-keyboard with integral 2-port USB hub	119-7083-00
1 ea	USB optical wheeled mouse	119-7054-00
1 ea	Mouse pad	016-1524-00
1 ea	TekLink cable, 2 meters	174-5019-00
1 ea	LAN cable, 8 meters	174-5225-00
1 ea	VGA to DVI display adapter	013-0347-00
1 ea	Accessory pouch	016-1441-00
2 ea	Module filler panel	333-4206-00
1 ea	Front panel cover	200-4939-00
5 ea	Jumper with pull-tab (used for flashing module FW)	131-4356-00
	Quick Start User Manual	071-1236-xx
	Windows XP Professional with TLA Application Software V5.0	
	Product Software CD	
	Operating System Restore CD	
	TLA Documentation CD	
	NIST, Z540-1, and ISO9000 Calibration Certificate	

Table 8 lists the standard accessories that are shipped with the benchtop mainframe.

**Table 8: Standard accessories, benchtop mainframe**

Quantity	Accessory	Part number
1 ea	U.S. Power Cord	161-0104-00
1 ea	TekLink cable, 2 meters	174-5019-00
1 ea	LAN cable, 8 meters	174-5225-xx
1 ea	VGA to DVI display adapter	013-0347-00
6 ea	Module filler panel	333-4206-00
	Benchtop system mounting brackets:	
	Left side	407-5127-00
	Right side	407-5132-00
	Windows XP Professional with TLA Application Software V5.0	
	Product Software CD	
	Operating System Restore CD	
	TLA Documentation CD	
	NIST, Z540-1, and ISO9000 Calibration Certificate	



**Optional** The accessories in Tables 9 and 10 are orderable for use with the mainframes at the time this manual was originally published. Consult a current Tektronix catalog for additions, changes, and details.

**Table 9: Optional accessories, portable mainframe**

Quantity	Accessory	Part number
1 ea	Removable HDD assembly, 80 GB, w/o SW	650-4815-xx
1 ea	21-inch flat panel display kit	020-2665-00
1 ea	GBE switch	020-2666-00
1 ea	Wheeled transit case	161-1521-00
1 ea	Rackmount kit	020-2664-00

**Table 10: Optional accessories, benchtop mainframe**

Quantity	Accessory	Part number
1 ea	21-inch flat panel display kit	020-2665-00
1 ea	GBE switch	020-2666-00
1 ea	Wheeled transit case	161-1521-00
1 ea	Rackmount kit	020-2369-xx

## Options

The following options can be ordered for the instruments.

**Table 11: Instrument Options**

Option	Description	TLA7012	TLA7016
18	Add touchscreen	✓	
1C	Add iView External Oscilloscope Cable Kit	✓	✓
1K	Add LACART Instrument Cart	✓	✓
1N	On-site product installation service	✓	✓
1R	Rack Mount Kit (includes: hardware and instructions for converting to rackmount configuration)	✓	✓
88	Module installation by factory	✓	✓
Manuals (Quick Start User, Installation, TLA Documentation CD-ROM V5.0)			
L0	English Manuals	✓	✓
L99	No Manuals	✓	✓
Power cords			
A0	North America Power Cord	✓	✓
A1	Universal European 230 V, 50 Hz power cord	✓	✓
A2	United Kingdom 230 V, 50 Hz power cord	✓	✓
A3	Australian 230 V, 50 Hz power cord	✓	✓
A4	240 V North America power cord	✓	✓
A5	Switzerland 230 V, 50 Hz power cord	✓	✓
A6	Japan power cord	✓	✓
A10	China power cord	✓	✓
A99	No power cord	✓	✓
Field upgrades			
TLA7KUP	Many are available. Contact Tektronix (see the beginning of the manual for contact information) for a complete list of available TLA7KUP options	✓	✓
Service offerings			
C3	Calibration services extended to cover three years	✓	✓
C5	Calibration services extended to cover five years	✓	✓
D1	Calibration data report	✓	✓
D3	Test Data for calibration services in Opt. C3	✓	✓
D5	Test Data for calibration services in Opt. C5	✓	✓
R3	Repair warranty extended to cover three years	✓	✓
R5	Repair warranty extended to cover five years	✓	✓
S1	On-site service 1 year	✓	✓

**Table 11: Instrument Options (Cont.)**

Option	Description	TLA7012	TLA7016
S3	On-site service 3 years	✓	✓
S5	On-site service 5 years	✓	✓

Tables 12 through 14 list options that can be ordered with the logic analyzer modules.

**Table 12: Options for TLA7NAX Modules**

Option Number	Description
7S	Increase to 2 Mb record length
8S	Increase to 8 Mb record length
9S	Increase to 32 Mb record length
45	Increase state speed to 450 MHz
88	Factory configuration
L0	English Manuals
L5	Japanese User Manuals
L10	Russian User Manuals
L99	No manuals
R3	Repair warranty extended to cover 3 years
R5	Repair warranty extended to cover 5 years
C3	Initial certification plus two additional calibrations
C5	Initial certification plus four additional calibrations
D1	Add test data report
D3	Add test data report (must order Option D3)
D5	Add test data report (must order Option D5)
IN	On-site installation service

**Table 13: Options for TLA7Axx Modules**

Option Number	Description
1S	Increase to 512 Kb record length @120 MHz state speed
2S	Increase to 2 Mb record length @120 MHz state speed
3S	Increase to 8 Mb record length @120 MHz state speed
4S	Increase to 32 Mb record length @120 MHz state speed
5S	Increase to 128 Kb record length @235 MHz state speed
6S	Increase to 512 Kb record length @235 MHz state speed
7S	Increase to 2 Mb record length @235 MHz state speed
8S	Increase to 8 Mb record length @235 MHz state speed
9S	Increase to 32 Mb record length @235 MHz state speed
AS	Increase to 128 Kb record length @450 MHz state speed
BS	Increase to 512 Kb record length @450 MHz state speed
CS	Increase to 2 Mb record length @450 MHz state speed
DS	Increase to 8 Mb record length @450 MHz state speed
ES	Increase to 32 Mb record length @450 MHz state speed
L0	English Manuals
L5	Japanese User Manuals
L10	Russian User Manuals
L99	No manuals
88	Factory configuration
R3	Repair warranty extended to cover 3 years
R5	Repair warranty extended to cover 5 years
C3	Initial certification plus two additional calibrations
C5	Initial certification plus four additional calibrations
D1	Add test data report
D3	Add test data report (must order Option D3)
D5	Add test data report (must order Option D5)
IN	On-site installation service

**Table 14: Options for TLA7ABx Modules**

Option Number	Description
1S	Increase to 64 Mb record length @235 MHz state speed
2S	Increase to 64 Mb record length @450 MHz state speed
L0	English Manuals
L5	Japanese User Manuals
L10	Russian User Manuals
L99	No manuals
88	Factory configuration
R3	Repair warranty extended to cover 3 years
R5	Repair warranty extended to cover 5 years
C3	Initial certification plus two additional calibrations
C5	Initial certification plus four additional calibrations
D1	Add test data report
D3	Add test data report (must order Option D3)
D5	Add test data report (must order Option D5)
IN	On-site installation service

## Field Kit Options

The TLA7NAX Series modules offer PowerFlex, the ability to upgrade state speed and record length specifications at any time after the initial purchase of the corresponding logic analyzer (up to the end of long-term product support).

To access the field-kit options that can be ordered for your modules, run the PowerFlex utility on the modules you want to upgrade. The utility will provide the correct ordering information.



# Index

## A

- Accessories, 69
  - connecting, TLA7000 series, 15
  - optional, 71
  - standard, 69
- Autoconfiguration, module, 10

## B

- BIOS
  - configuring, 46
  - flashing, 46
- Bracket Kit, installing, 8

## C

- Calibration, service, 65
- Chassis ground location, 9
- Checking the shipping list, 1
- Cleaning, 66
  - LCD display, 66
- Configuring, P6470 pattern generator probes, 18
- Connecting
  - accessories, TLA7000 series, 15
  - LA probes, TLA7000 series, 17
- Connecting to a network, 24
- Connectors, external, TLA7000 series, 44
- Controller, 4
- Cover plate installation, 14
- Customer registration card, 1

## D

- Diagnostics, 67
  - mainframe, 67
- documentation, xii
- Dynamic autoconfiguration, 10

## E

- Extended diagnostics, 67
- External, signal connectors, TLA7000 series, 44
- External connectors, 44

## F

- Firmware, Upgrading, 53
- Front panel controls, portable mainframe, 43
- Fuse requirements, benchtop mainframe, 19, 63

## G

- General maintenance, 65
- Ground, chassis, 9
- Guidelines, for merging modules, 29

## H

- Hard disk
  - drive, removal, 23
  - image, installing, 48
  - reformatting, 49
- Hardware problems, 68
- Hub, TekLink, 6

## I

- Incoming inspection
  - checking probes, 22
  - checking the mainframe, 22
  - performing, 21
- Installing, software, 49
  - TLA application software, 51
  - TPI software, 52
- Interconnections, Mainframe, 3

## L

- LA module. *See* Logic analyzer
- Logic analyzer
  - chassis ground connections, 9
  - description, xii
  - installing software, 45
  - merge cable location, 36
  - merging, 29
  - merging rules, 29
  - probes, connecting LA probes TLA7000 series, 17
  - reinstalling software, 45
  - shipping list, 1
  - site considerations, 2
  - TLA7000 Series description, xi

Logical address  
  module, 10  
  setting, 10

## M

Mainframe  
  configuring P6470 pattern generator probes, 18  
  connecting accessories, TLA7000 series, 15  
  connecting LA probes, TLA7000 series, 17  
  diagnostics, 67  
  equipment required to merge modules, 36  
  fuse location, for the portable mainframe, 19  
  fuse requirements, 61  
    for the benchtop mainframe, 61  
  incoming inspection, 21  
  merging modules rules, 29  
  module installation  
    in the benchtop mainframe, 12  
    in the portable mainframe, 12  
  panel cover, 14  
Mainframe interconnections, 3  
Maintenance  
  BIOS configuration, TLA7000, 46  
  equipment required to merge modules, 36  
  installing software, 45  
  merging modules rules, 29  
Manuals, part numbers, 69  
Merged modules, rules, 29  
Merging modules, 29  
  equipment required, 36  
  merge cable location, 36  
  three-way merge procedure, 41  
  two-way merge procedure, 36  
Module  
  dynamic autoconfiguration of address, 10  
  installing  
    in the benchtop mainframe, 12  
    in the portable mainframe, 12  
  logical address, 10  
  merge cable location, 36  
  merging, 29  
  merging guidelines, 29  
  power requirements, 61  
  static logical address, 10  
  three-way merge procedure, 41  
  two-way merge procedure, 36

## N

Network switch, 4  
Networked Instrument, Connecting, 24

## O

Offline operation, 27  
On/Standby switch  
  benchtop mainframe, 20  
  portable mainframe, 20  
Optional accessories, 71

## P

Panel cover installation, 14  
Pattern Generator module  
  merging, 29  
  merging rules, 30  
  probes, configuring P6470, 18  
PC, operating the TLA application offline, 27  
PC card connector, TLA7000 series, 44  
Power requirements, benchtop mainframe, 61  
Power-on diagnostics, 67  
Power-on procedure  
  benchtop mainframe, 20  
  portable mainframe, 20  
  TLA7012, 20  
  TLA7016, 20  
Preventive maintenance, 66  
  cleaning, 66  
  LCD display, 66  
Probe, accessories, 71  
Probes  
  configuring P6470 pattern generator probes, 18  
  connecting LA probes, TLA7000 series, 17  
Problems  
  hardware, 68  
  software, 67  
Product, accessories, 69

## R

Registration card, 1  
Reinstalling software, 49  
  Pattern Generator application software, 51  
  TLA application software, 51  
  TPI software, 52  
Removing the hard disk drive, 23  
Repacking for shipment, 68  
Repair service, 65  
Requirements, site consideration, 2  
Rules, for merging modules, 29



**S**

- Service, mainframe diagnostics, 67
- Service offerings, 65
  - calibration and repair service, 65
  - warranty repair service, 65
- Service, user, preventive maintenance, 66
- Setting the logical address, 10
- Shipping, 68
- Shipping list, checking, 1
- Slot
  - covers, 14
  - fillers, 14
- Software
  - BIOS configuration, TLA7000, 46
  - installing, 45
    - Pattern Generator application software, 51
    - TLA application software, 51
    - TPI software, 52
  - mainframe diagnostics, 67
  - problems, 67
- Standard, accessories, 69
- Static logical address, 10

**T**

- TekLink, 5
- Three-way merge procedure, 41
- TL708EX Hub, 6
- TLA application software
  - installing, 49
  - operating offline on a PC, 27
- TLA7000, BIOS configuration, 46
- TLA7000 Series, logic analyzer description, xi
- Trigger, system, external signal, 44
- Troubleshooting, 67
- Two-way merge procedure, 36

**U**

- Upgrading firmware, 53
- User service
  - general maintenance, 65
  - preventive maintenance, 66

**W**

- Warranty repair service, 65

