

TLA7Bxx Logic Analyzer Module Service Manual

This document applies to TLA System Software Version 5.6 or higher

Warning

These 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

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- In North America, call 1-800-833-9200.
- Worldwide, visit 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.

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General Safety Summary

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

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

Only qualified personnel should perform service procedures.

While using this product, you may need to access other parts of a larger system. Read the safety sections of the other component manuals for warnings and cautions related to operating the system.

To Avoid Fire or Personal Injury

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

Observe All Terminal Ratings. To avoid fire or shock hazard, observe all ratings and markings on the product. Consult the product manual for further ratings information before making connections to the product.

The inputs are not rated for connection to mains or Category II, III, or IV circuits.

Do not apply a potential to any terminal, including the common terminal, that exceeds the maximum rating of that terminal.

Power Disconnect. 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.

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

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

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.

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.*



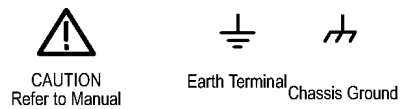
CAUTION. *Caution statements identify conditions or practices that could result in damage to this product or other property.*

Symbols and 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.

The following symbol(s) may appear on the product:



Service Safety Summary

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

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

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

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

To avoid electric shock, do not touch exposed connections.

Preface

This manual contains information needed for periodic maintenance of the TLA7Bxx logic analyzer modules. It provides information for the removal and replacement of circuit boards, assemblies, and mechanical parts listed in the parts lists. It does not support component-level fault isolation and replacement.

Manual Conventions

This manual uses certain conventions that you should be familiar with before service the instrument.

Acquisition Board The acquisition board is one of the circuit boards inside the instrument module. The circuit board receives and stores acquisition data from the probes and works with the Local Processor Unit (LPU) board to provide information to the operator.

LPU Board The Local Processor Unit (LPU) board is one of the circuit boards inside the instrument module that provides the main communications interface with the acquisition board and the mainframe.

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

Modules Throughout this manual, the terms “module” and “instrument module” refer to a logic analyzer, serial analyzer, or pattern generator unit that mounts inside a mainframe. A module is composed of circuit boards, interconnecting cables, and a user-accessible front panel.

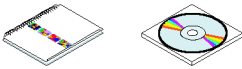


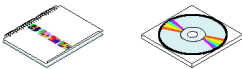





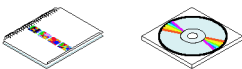
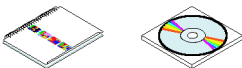
Replaceable Parts This manual refers to any field-replaceable assembly or mechanical part specifically by its name or generically as a replaceable part. In general, a replaceable part is any circuit board or assembly that is listed in the replaceable parts list near the end of this manual.

Related Documentation

The following table lists related documentation available for your instrument. The documentation is available on the TLA Documentation CD, included with your instrument, and on the Tektronix Web site (www.Tektronix.com).

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

Related Documentation

Item	Purpose	Location
TLA Quick Start User Manuals	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	Logic analyzer basics	 www.Tektronix.com
Declassification and Security instructions	Data security concerns specific to sanitizing or removing memory devices from Tektronix products	 www.Tektronix.com
Application notes	Collection of logic analyzer application specific notes	
Product Specifications & Performance Verification Procedures	TLA Product specifications and performance verification procedures	
TPI.NET Documentation	Detailed information for controlling the logic analyzer using .NET	
Field upgrade kits	Upgrade information for your logic analyzer	
Optional Service Manuals	Self-service documentation for modules and mainframes	

Introduction

This manual contains information needed to service the TLA7Bxx logic analyzer modules.

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

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

Be sure to follow all warnings, cautions and notes.

Service Offerings

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

Tektronix service technicians are equipped to provide warranty and other services at Tektronix Services Centers or on-site at your facility, depending on your location.

Warranty Repair Service

Tektronix warrants this product for one year from date of purchase. The warranty is located at the beginning 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 which provide solutions to your service needs and quality standards compliance requirements.

The following services can be tailored to fit your requirements for calibration and/or repair of your portable mainframe.

Service Options. Tektronix Service Options can be selected at the time you purchase your instrument. You select these options to provide the services that best meet your service needs.

Service Agreement. If service options are not added to the instrument purchase, then service agreements are available on an annual basis to provide calibration services or post-warranty repair coverage. Service agreements can be customized to meet special turn-around time and/or on-site requirements.

Service on Demand. Tektronix offers calibration and repair services on a “per-incident” basis that is available at standard prices.

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

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

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

Maintenance



WARNING. *To avoid electric shock, always power off the instrument and disconnect the power cord before cleaning or servicing the instrument.*

Preventing ESD

When performing any service that requires internal access to the instrument, adhere to the following precautions to avoid damaging internal circuit boards and their components due to electrostatic discharge (ESD).



CAUTION. *Many components within the instrument are susceptible to static discharge damage.*

Service the instrument only in a static-free environment. Observe standard handling precautions for static-sensitive devices.

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

Inspection and Cleaning

The instrument is inspected mechanically and electrically before shipment. It should be free of marks or scratches and should meet or exceed all electrical specifications. To confirm this, inspect for physical damage incurred during transit. Retain the packaging in case shipment for repair is necessary. If there is damage or deficiency, contact your local Tektronix representative. Cleaning procedures consist of exterior and interior cleaning. Periodic cleaning reduces instrument breakdown and increases reliability. Clean the instrument as often as needed, based on your operating environment. Cleaning procedure are provided on the following pages.

Exterior Inspection

Thoroughly check modules that appear to have been dropped or otherwise abused to verify correct operation and performance. Immediately repair defects that could cause personal injury or lead to further damage to the benchtop controller, expansion module, or the mainframes that the module plugs into.

Table 1: External inspection checklist

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



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

Exterior Cleaning Procedure

Clean the exterior surfaces with a soft dry lint-free cloth or a soft-bristle brush. If any dirt remains, use a soft cloth or swab dipped in a 75% isopropyl alcohol solution. Use a swab to clean narrow spaces around controls and connectors. Do not use abrasive cleaning compounds.



CAUTION. *Avoid getting moisture inside the instrument during exterior cleaning; use just enough moisture to dampen the cloth or swab.*

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

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

Interior Inspection Remove the module covers to access the inside of the instrument for inspection and cleaning. (See page 5, *Top Covers*.) Inspect the internal portions of the modules and the mainframes for damage and wear. Defects should be repaired immediately.

Table 2: Internal inspection checklist

Item	Inspect for	Repair action
Circuit boards	Loose, broken, or corroded solder connections. Burned circuit boards. Burned, broken, or cracked circuit-run plating.	Return to a Tektronix Service Center.
Solder connections	Cold solder or rosin joints	Return to a Tektronix Service Center.
Wiring and cables	Loose plugs or connectors and burned, broken, or frayed wiring	Firmly seat connectors. Repair or replace parts with defective wires or cables.
Chassis	Dents, deformations, and damaged hardware	Straighten, repair, or replace defective hardware.



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

Interior Cleaning Procedure Use a dry, low-velocity stream of air to clean the interior of the modules and the mainframes. Use a soft-bristle brush for cleaning around components. If you must use a liquid for minor interior cleaning, use a 75% isopropyl alcohol solution and rinse with deionized or distilled water.

Removal and Installation

This section provides detailed instructions for removing or installing parts of the module after you have removed the module from the mainframe. Removal and installation instructions are not provided for all replaceable parts. (See page 25, *Parts List*.)



WARNING. *Before doing any procedures in this manual, read the Service Safety Summary and the General Safety Summary located at the front of this manual.*

These 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.

When performing any service which requires internal access to the instrument, avoid damaging internal circuit boards and their components by electrostatic discharge (ESD). (See page 1, Preventing ESD.)

Tools Required

The following table lists the tools needed to replace the internal components of the instrument.

Table 3: Tools required for circuit board replacement

Description	Example
Screwdriver with a T-15 and T-10 Torx tips	Standard tool
1/4-inch nut driver	Standard tool
9/16-inch nut driver	Standard tool
Needle-nose pliers	Standard tool

Torque Requirements

Tighten all T-15 screws to 8 in-lbs. Tighten standoff posts to 8 in-lbs.

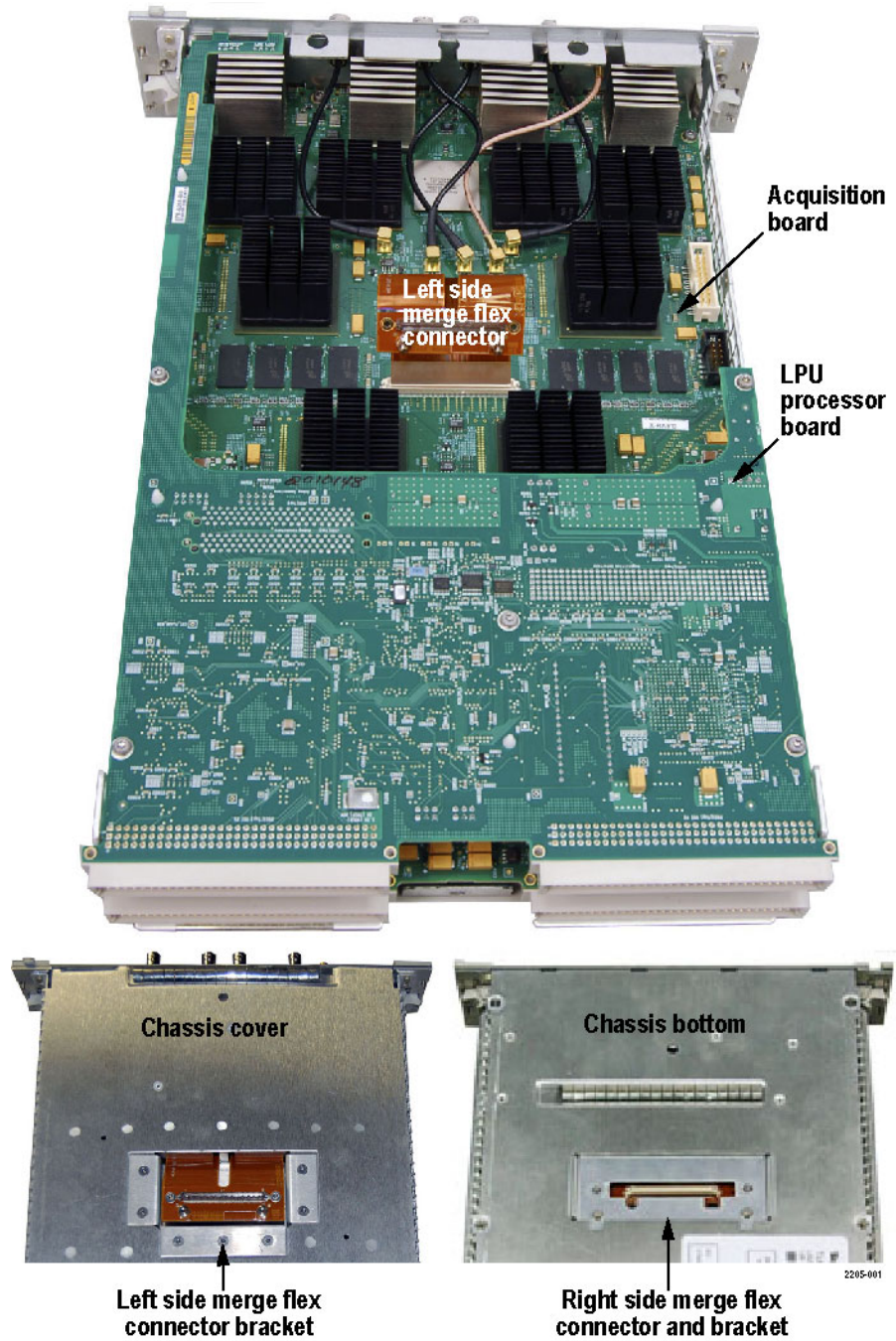
Tighten all T-10 screws to 4 in-lbs.

Top Covers

Removal Refer to the exploded view of the module to remove the covers. (See Figure 3 on page 29.) To remove the merged bracket and cable, reverse the installation steps in step 8.



CAUTION. *To prevent damage to the board, do not push or pry the black heatsinks.*



Installation Refer to the following procedure and the exploded view of the module to install the covers. (See Figure 3 on page 29.)

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

1. Place the module on its right side.



CAUTION. *To prevent damage to the module during the installation process, reinstall the cover exactly as described in steps 2 through 8.*

If the cover is not properly seated, the module can be damaged when you install it in a mainframe.

2. Insert the cover at an angle such that the front edge of the cover engages with the EMI gaskets on the back of the front panel. Push the rear of the cover in place.
3. Make sure that the cover is fully seated (no gaps) against the front and rear chassis flanges.
4. While holding the cover in place, install the eight T-15 Torx-drive screws nearest the front of the module (four on each side of the cover), to attach the cover to the chassis.
5. Slide the rear panel on the chassis and install the two rear panel T-15 Torx-drive screws.
6. Gently squeeze the chassis flange and rear panel flange together while tightening the screws on the sides. This ensures that the rear panel does not rotate; otherwise the module may not seat properly when installed in the mainframe.
7. Install the two remaining T-15 Torx-drive screws nearest the rear of the module (one on each side of the cover).
8. Complete the following steps to install the left merge cable assembly: (See Figure 2 on page 28.)
 - a. Feed the merge cable through the cover.
 - b. Carefully connect the merge cable to the circuit board.
 - c. Insert the bracket assembly into the hole in the cover.
 - d. Install the seven T-10 countersunk screws on the bracket.
9. Check and tighten all screws.

Local Processor Unit (LPU) Board

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

Removal Refer to the exploded view of the module to remove the LPU board. (See Figure 4 on page 30.)



CAUTION. *Handle the LPU board gently to avoid breaking the front panel LED extension. Do not pry against the heat sinks on the Acquisition board.*

Installation Refer to the following bullets and the exploded view of the module to install the LPU board. (See Figure 4 on page 30.)

1. Place the LPU board (component side down) over the chassis and insert the tabs on the LPU board into the front subpanel.
2. Line up the pins on the 160-pin connector (JR751) from the LPU board to the acquisition board and gently press the LPU board in place.
3. Install the five T-10 Torx screws to secure the LPU board to the chassis.
4. Install the cover. (See page 5, *Top Covers.*)

NOTE. *After replacing the LPU board, you must verify the proper PowerFlex level. The PowerFlex configuration information is listed on the side panel of the module. This information should match the module-specific information on the System Properties tab in the TLA application.*

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

Acquisition Board

Removal Refer to the following procedure and the exploded view of the module to remove the acquisition board: (See Figure 5 on page 32.)

1. Remove the top cover. (See page 5, *Top Covers*.)
2. Remove the Local Processor Unit Board. (See page 8, *Local Processor Unit (LPU) Board*.)
3. To remove the merge cable assembly, turn the chassis over and remove the two T-10 screws from the merge cable assembly bracket.
4. Using a 1/4 nut driver, remove the five spacer posts from the Acquisition board.
5. Disconnect the five coaxial cables on the Acquisition board.
6. Remove the five T-10 screws located near the front of the Acquisition board.
7. Do these two tasks simultaneously:
Carefully slide the Acquisition board away from the front panel until the probe connectors clear the front panel. Then slide the bottom merge connector along the rail until it is free.
8. Lift the circuit board out of the chassis and unplug the bottom merge connector from the back of the Acquisition board.

Installation Refer to the following procedure and the exploded view of the module to install the Acquisition board: (See Figure 5 on page 32.)

1. Place the Acquisition board into the chassis, connect the merge connector on the back side of the Acquisition board, and guide the merge connector into the sliding rails.
2. Carefully slide the Acquisition board into the chassis until the probe connectors fit snugly into the front panel slots.

NOTE. *The compression gasket in the bottom cover requires extra pressure and care to align the probe connectors on the Acquisition board to the front panel slots.*

3. Install the five T-10 screws located near the front of the Acquisition board.
4. Install the five spacer posts that secure the Acquisition board to the chassis.
5. Connect the five output cables from the front panel to the Acquisition board.
6. Complete the following steps to install the merge cable assembly:
 - a. Turn the chassis over.
 - b. Slide the bracket forward and install the two T-10 screws to hold the bracket in place.
7. Install the LPU board. (See page 8, *Local Processor Unit (LPU) Board*.)
8. Install the cover. (See page 5, *Top Covers*.)

EMI Gaskets

Removal Refer to the exploded view of the module to remove the EMI gaskets: (See Figure 1 on page 27.)

Installation Use the following procedure and the exploded view of the module to install the EMI gaskets: (See Figure 1 on page 27.)

1. Position each gasket so that the gasket fingers face the outside of the module.



CAUTION. *To avoid breaking the gasket fingers, do not lift the fingers very high.*

2. Pick up each gasket at the end where the gasket finger is curved upward. Rotate the gasket onto the module. As you do this, lift up any fingers that bind to the chassis or cover.
3. Slide each gasket gently from side to side to ensure that the gasket snaps in place.
4. Reinstall the Acquisition board and the LPU board if you removed them to install the rear EMI gaskets.
5. Install the cover. (See page 5, *Top Covers*.)

Troubleshooting

This section provides troubleshooting information at the circuit board level. Only the parts listed in the parts list are replaceable.

In most cases, faults are isolated to circuit boards or assemblies, but not to individual components on those boards. Fault isolation is to the following circuit boards and replaceable parts:

- LPU board
- Acquisition board
- Merge connectors



WARNING. *Before doing any procedures in this manual, read the Service Safety Summary and the General Safety Summary located at the beginning of this manual.*

When performing any service which requires internal access to the instrument, avoid damaging internal circuit boards and their components by electrostatic discharge (ESD). (See page 1, Preventing ESD.)

This section contains information and procedures designed to help isolate faults to within the module. The process is as follows:

1. Check for common problems. (See page 14, *Check for Common Problems.*)
2. Eliminate the mainframe, probes, and other modules as the source of the fault(s). (See page 15, *Eliminate Other Problem Sources.*)
3. Identify the failed replaceable part within the module. (See page 15, *Troubleshoot the Module.*)

Check for Common Problems

The following table lists common problems related to the instrument module and possible causes. The list is not exhaustive, but it may help you eliminate a problem that is easy to fix.



CAUTION. *To avoid damaging the instrument module or the mainframe, be sure to power down the mainframe before removing or reinstalling any modules.*

Table 4: Failure symptoms and possible causes

Symptom	Possible cause(s)
Modules not recognized	<p>Modules not fully inserted; make sure front of module is flush with front panel</p> <p>Mainframe power supply failure; contact local Tektronix service center</p> <p>Corrupted module firmware; reinstall firmware. (See page 23, <i>Updating the Module Firmware.</i>)</p> <p>Module logical address switches set to 00. Reset the switches to FF.</p>
Module does not pass the normal power on diagnostics (READY indicator not green)	<p>Module not fully inserted; make sure front of module is flush with front panel</p> <p>Module failure. (See page 15, <i>Troubleshoot the Module.</i>) If necessary, contact local Tektronix service center</p>
Module loses settings when power is turned off	<p>Module failure. (See page 15, <i>Troubleshoot the Module.</i>) If necessary, contact local Tektronix service center</p> <p>NV RAM failure. Replace the LPU board. (See page 8, <i>Local Processor Unit (LPU) Board.</i>)</p>
Module will not acquire data or the acquired data is incorrect	<p>Module failure. (See page 15, <i>Troubleshoot the Module.</i>) If necessary, contact local Tektronix service center</p> <p>Faulty probe, leadset, or probe adaptor</p>

Eliminate Other Problem Sources

The module is part of the Tektronix Logic Analyzer Family, which consists of one or more instrument modules installed in either a benchtop or portable mainframe. The following procedures will help you eliminate the mainframe and other modules as possible sources of failures.

Substitute Good Module If you have a known-good module available, perform the following procedure:

1. Remove the suspect module from the mainframe.
2. Install a known-good module in the same slot as the suspected module (verify that address switches on the rear of the module are set to same address as the module that you are replacing).
3. Power-on the instrument and check for normal operation.
4. If the failure symptoms are still present with the known-good module installed, the problem most likely is in the mainframe or in the attached probes, not in the module.
5. To eliminate the probes, use known-good probes and verify that the probes are properly connected to the SUT.

NOTE. *Viewing the diagnostic window from the TLA application can help you isolate failures to individual modules or to the mainframe.*

6. If the instrument operates normally with the known-good module and with known-good probes, the suspect module needs to be repaired. (See *Troubleshoot the Module*.)

Troubleshoot the Module

Follow the procedures in this section to identify the failed part within the module. These procedure require that the module is installed in a fully functional mainframe. If you have not determined that the mainframe is functional, or if you suspect the problem might be in a probe or in another module, you need to eliminate those possibilities. (See page 15, *Eliminate Other Problem Sources*.)

Equipment Required The basic troubleshooting procedures require minimal test equipment. There are no accessible test points to measure voltages.

Preparation The fault isolation procedure requires that you:

- Recognize codes flashed by the front-panel LEDs during power up
- Are familiar with the power-on diagnostics

To fill these requirements, read the following topics before performing the Fault Isolation Procedure. (See page 17, *Fault Isolation Procedure*.)

Diagnostic Procedures The following diagnostic procedures will help you diagnose problems.

Self Calibration. Use self calibration to calibrate the installed modules. Run the self calibration after a minimum of a 30 minute warm-up and before running the extended diagnostics.

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

You can display and run the calibration and diagnostics property sheet by selecting Calibration and Diagnostics from the System menu, even if no diagnostic failures occur when you power on the instrument.

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

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

One diagnostic test will fail if probes are attached. For best results, run the diagnostics with probes disconnected from the module.

To run the extended diagnostics, do the following steps:

1. Disconnect the probes from the instrument.
2. Start the TLA application if it is not already running.
3. From the System menu, select Calibration and Diagnostics.
4. Select the Extended Diagnostics property page.
5. Select the individual tests, group of tests, or all tests.
6. Click the Run button.

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

Merged Modules. The extended diagnostics include a special merge test that verifies the correct pipeline adjustment for the master module, inside slave module, and outside slave module. This test does not require the modules to be physically merged together.

Every time modules are merged in the System Configuration window, a calibration is performed between the merged modules. An error message will appear if there are any problems with the merge cables, circuit board traces, or if the calibration fails.

Fault Isolation Procedure

The Primary Troubleshooting Tree provides troubleshooting steps that test the module. Use the following procedure with the tree. To determine if module is recognized, perform the following steps:

1. Install the module into a known-good mainframe.
2. Before you power on the mainframe, look at the READY, ACCESSED ARM'D, and TRIG'D front panel indicators.
3. Power on the mainframe and note how the front-panel indicators respond.
 - a. Verify that the green READY indicator turns on while the diagnostics are being checked. If the green READY indicator does not turn on, the module is not being recognized, which indicates possible problems on the LPU board.
 - b. Verify that after a few seconds, the ACCESSED indicator turns on. The indicator stays on while the module is accessed by the controller. After the TLA application starts, the indicator blinks anytime the controller accesses the module.
4. If the previous steps are not verified, the module is not recognized. Proceed as the troubleshooting tree instructs.

5. If diagnostic failures occur, replace the circuit board indicated by the troubleshooting tree or see the diagnostics table. (See page 20, *Diagnostics Table*.)

Note from the tree, that if all the diagnostics pass, but self calibration fails, replace the Acquisition board.

If any of the Kernel test groups fail (for example, ROM check, LPU RAM, or LPU Address decode) replace the LPU board.

If the kernel group passes, but there are other failures, replace the acquisition board.

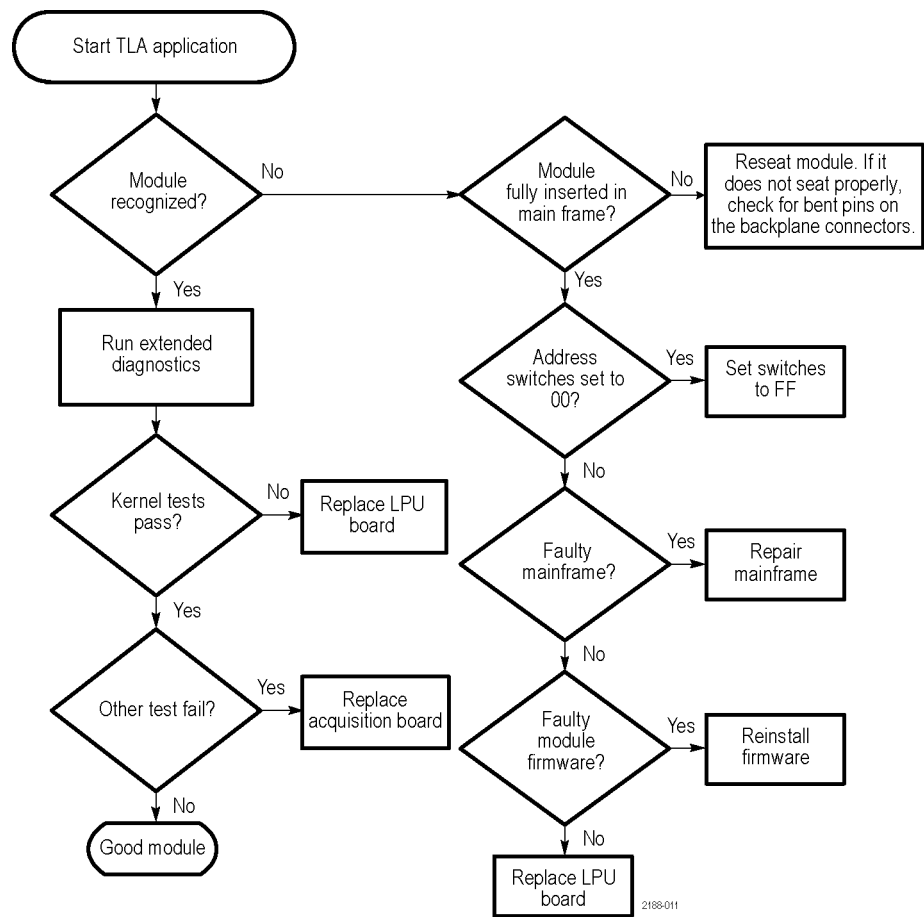
NOTE. *Ensure that the probes are disconnected from the module before running the diagnostics.*

If multiple tests fail, the problem could be related to power-supply problems or the mainframe. If replacing the Acquisition board does not remedy the failures, try replacing the LPU board.

NOTE. *Due to the module design, there are no accessible test points on the module to connect external test equipment to isolate faults to an individual circuit board.*

6. Replace the faulty circuit board. (See page 5, *Removal and Installation*.)

Primary Troubleshooting Chart



Diagnostics Table

The following table will help you isolate a problem to one of the circuit boards in the module.

Table 5: Diagnostic tests

Circuit board	Group & test	Power-on	Extended
LPU board	Kernel Tests		
	ROM Check	✓	✓
	LPU RAM	✓	✓
	LPU Address Decode	✓	✓
	NVRAM Check	✓	✓
Acquisition board	Startup Tests		
	Power On Status	✓	✓
	ICC Diagnostics	✓	✓
	Front-End Tests		
	Floating Stimulus		✓
	Clocking Tests		
	CSM RAM	✓	✓
	QC RAM	✓	✓
	Clock Group Detect		✓
	Glitch Detection		✓
	Edge Detection		✓
	Datapath Tests		
	Crosspoint		✓
	Data Login		✓
	Data Pipeline		✓
	Setup/Hold Counter		✓
	Trigger Tests		
	Backplane	✓	✓
	TSM RAM	✓	✓
	PSM RAM		✓
	Word Recognizer	✓	✓
	Transition Detector		✓
	Range Recognizer		✓
	TSM Counters		✓
	Snapshot Recognizer		✓
	Memory Tests		
	Fast Acquisition RAM	✓	✓
	Slow Acquisition RAM	✓	✓

Table 5: Diagnostic tests (cont.)

Circuit board	Group & test	Power-on	Extended
	Fast MagniVu Write		✓
	Acquisition Tests		
	Unpack		✓
	At-Speed 1	✓	✓
	At-Speed 2	✓	✓
	At-Speed 3	✓	✓
	Counter	✓	✓
	Store 1	✓	✓
	Store 2	✓	✓
	Post Processing Tests		
	Ring Communication		✓
	Internal Data Transfer		✓
	Merge Tests		
	Merge Pipeline		✓
	Merge Signal Interface		✓

Adjustment After Repair

After the replacing a circuit board or assembly due to electrical failure, perform the indicated procedures in the following table.

Table 6: Requirements after replacement

Board replaced	Adjustment required	Verification checks
LPU board	Adjustment: Powerflex ¹ Firmware level restoration ² Deskew, Self Calibration, Threshold tests	Self Calibration, Power-on and Extended Diagnostics, performance verification procedures
Acquisition board	Adjustment: Self Calibration, Deskew, Threshold tests	Self Calibration, Power-on and Extended Diagnostics, performance verification procedures

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

² Refer to the TLA7UP Mainframe Field Upgrade Instruction Manual for instructions for updating module firmware.

Updating the Module Firmware

After you install support software and restart the instrument, you might be prompted that your current module firmware is unsupported by the currently installed software. A new version of the firmware must be installed on the instrument so that it will work with the latest support software.

1. If you have not already done so, exit the TLA application.
2. Click Start >All Programs >Tektronix Logic Analyzer >TLA Firmware Loader.

3. Select your mainframe instrument from the TLA Connection dialog box.

You are given a choice to load Mainframe or Instrument Module Firmware. Click the Load button in the Instrument Module Firmware section (bottom part of the dialog box).

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

The instrument will scan the mainframe to detect all installed modules, and to determine which modules have firmware that needs to be upgraded.

5. Select your module(s) from the list displayed in the Supported list box near the top of the window. If you are updating the firmware for more than one module, note the locations of the modules in the mainframe and select them from the list.
6. Select Load Firmware from the Execute menu.
7. Navigate to C:\Program Files\TLA 700\Firmware and select the file named TLA7BBx.lod.

NOTE. *Be sure to correctly associate your module with this file. Note the slot number in the title bar so that you select the correct module.*

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

The program will begin to load the firmware. The process can take several minutes.

9. When the process is complete, the firmware has been loaded for the module. Exit the firmware loader program and power off the instrument. You must power off the instrument to allow the software application to start up properly.

Repackaging Instructions

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

Shipping the Instrument to the Service Center

Contact the Service Center to get an RMA (return material authorization) number, and any return or shipping information you may need.

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

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

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

Storage

When not used in a mainframe, store the logic analyzer module in a clean, dry environment. The following environmental characteristics apply for both shipping and storage:

- Temperature range: -40 °F to +160 °F (-40 °C to +71 °C)
- Altitude: To 9843 feet (3000 meters)

Using the Replaceable Parts List

The following table describes each column in the replaceable parts lists.

Table 7: Parts list column descriptions

Column number	Column name	Description
1	Figure & index number	Figure and index numbers in the exploded view illustrations.
2	Tektronix part number	Use this part number when ordering replacement parts from Tektronix.
3 and 4	Serial number	Column 3 indicates the serial number at which the part was first effective. Column 4 indicates the serial number at which the part was discontinued. No entries in either column indicates the part is good for all serial numbers.
5	Qty	Quantity of parts used.
6	Name & description	An item name is separated from the description by a colon (:). Because of space limitations, an item name may sometimes appear incomplete. Use the U. S. Federal Catalog Handbook H6-1 for further item name identification.

Abbreviations Abbreviations conform to American National Standard ANSI Y1.1-1972.

Fig. & index number	Tektronix part number	Serial no. effective	Serial no. discont'd	Qty	Name & description
1-1	407-5179-XX			1	BRACKET (MERGE, CHASSIS, RIGHT SIDE)
1-2	211-0409-XX			2	SCR, ASSEM WSHR; 4-40 X 0.312, PNH, 410 SS PASSIVATED, T-10 TORX DR
1-3	131-6643-XX			6	CONTACT,ELEC; GROUNDING,0.169 L,0.320 DEEP,ELECTROLESS NICKEL;TDS3012
1-4	870-6211-XX			1	CIRCUIT BD ASSY; MERGE, RIGHT, TESTED FLEX, 259019800
1-5	211-0409-XX			2	SCR, ASSEM WSHR; 4-40 X 0.312, PNH, 410 SS PASSIVATED, T-10 TORX DR
1-6	348-1537-XX			8	GASKET, EMI; CLIP-ON, 1.98 L, BE CU, TIN PLATED, W/T LANCES
1-7	348-1365-XX			1	SHLD GSKT, ELEC; SYMETRICAL SLOTTED FINGER, 0.350 W X 7.5 L, RIVIT MTG, SNAP-IN, RIVIT SPACING 1.5 INCH, BECU

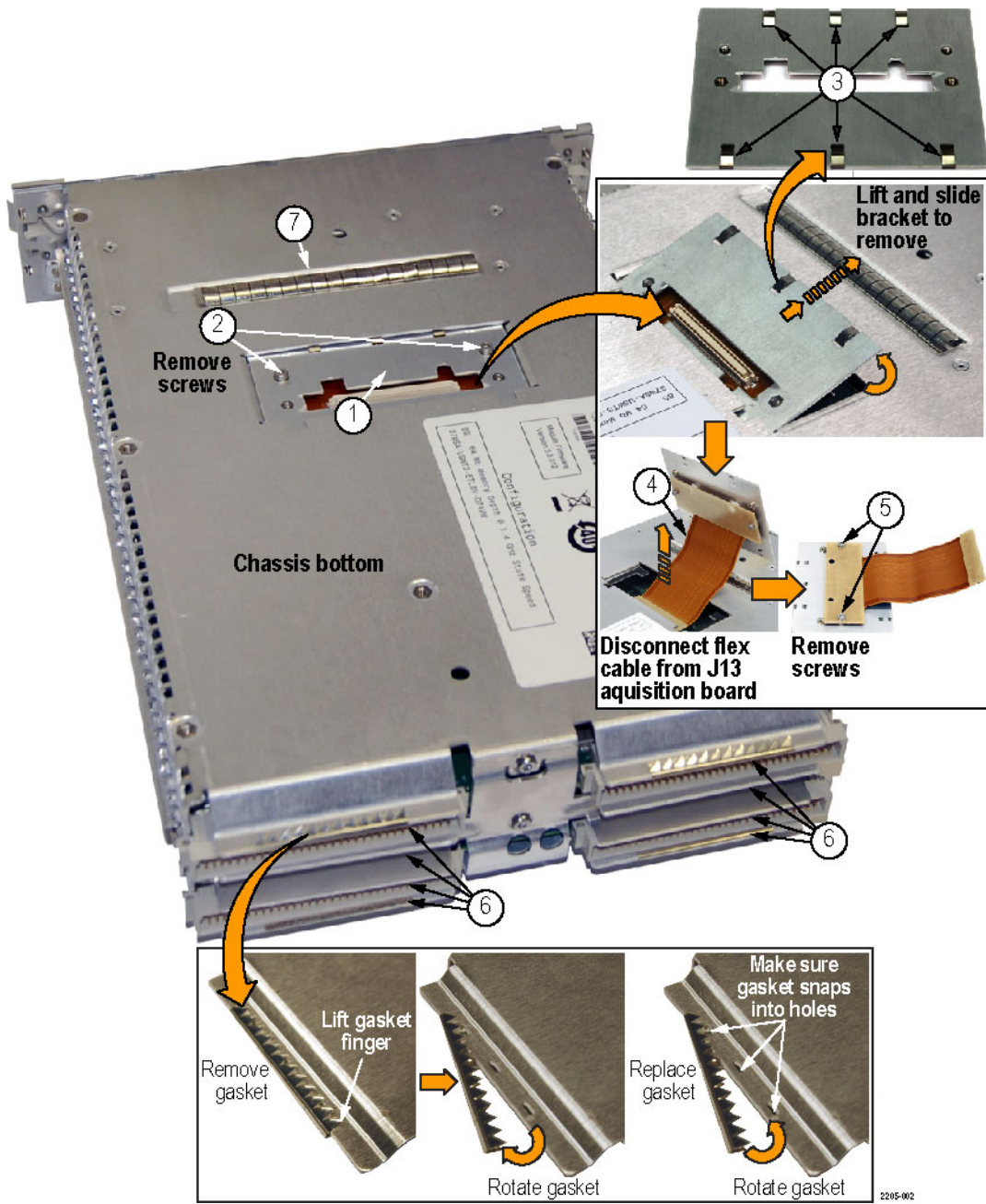


Figure 1: EMI gasket and bracket

Fig. & index number	Tektronix part number	Serial no. effective	Serial no. discont'd	Qty	Name & description
2-1	407-5177-XX			1	BRACKET (MERGE, COVER, LEFT SIDE)
2-2	211-0734-XX			7	SCREW, MACHINE; 6-32 X 0.250, FLH100, 410 SS PASSIVATED, T-10 TORX DR
2-3	211-0409-XX			2	SCR, ASSEM WSHR; 4-40 X 0.312, PNH, 410 SS PASSIVATED, T-10 TORX DR
2-4	870-6210-XX			1	CIRCUIT BD ASSY; MERGE, LEFT, TESTED FLEX, 259019700, LEAD FREE

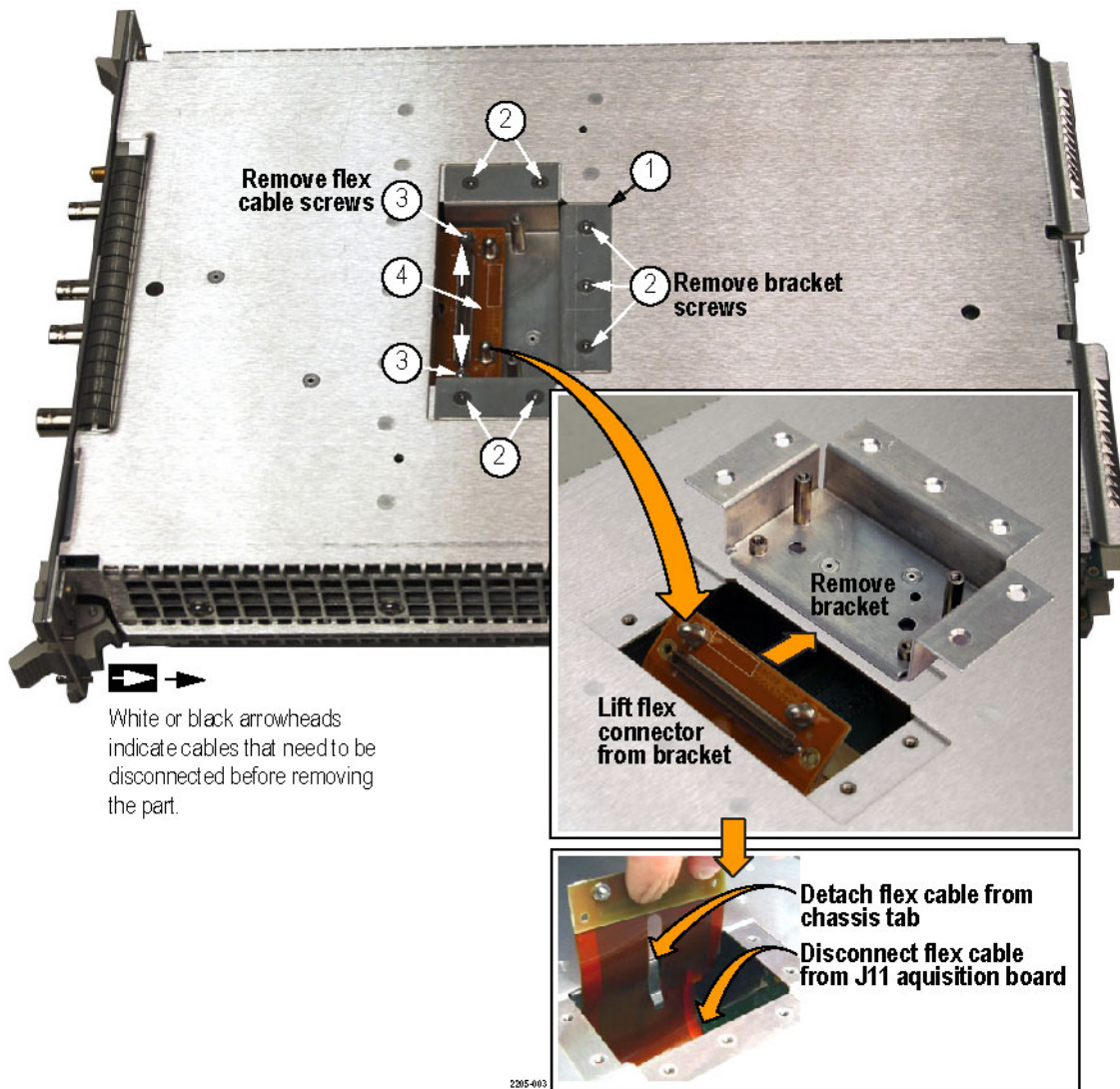


Figure 2: Flex cable and bracket

Fig. & index number	Tektronix part number	Serial no. effective	Serial no. discont'd	Qty	Name & description
3-1	200-5004-XX			1	COVER (TWO WIDE), SAFETY CONTROLLED
3-2	211-0722-XX			12	SCREW, MACHINE; 6-32 X 0.250, PNH, 410 SS PASSIVATED, T-15 TORX DR
3-3	348-1365-XX			1	SHLD GSKT, ELEC; SYMETRICAL SLOTTED FINGER, 0.350 W X 7.5 L, RIVIT MTG, SNAP-IN, RIVIT SPACING 1.5 INCH, BECU
3-4	386-7490-XX			1	BRACKET, END (TWO WIDE)

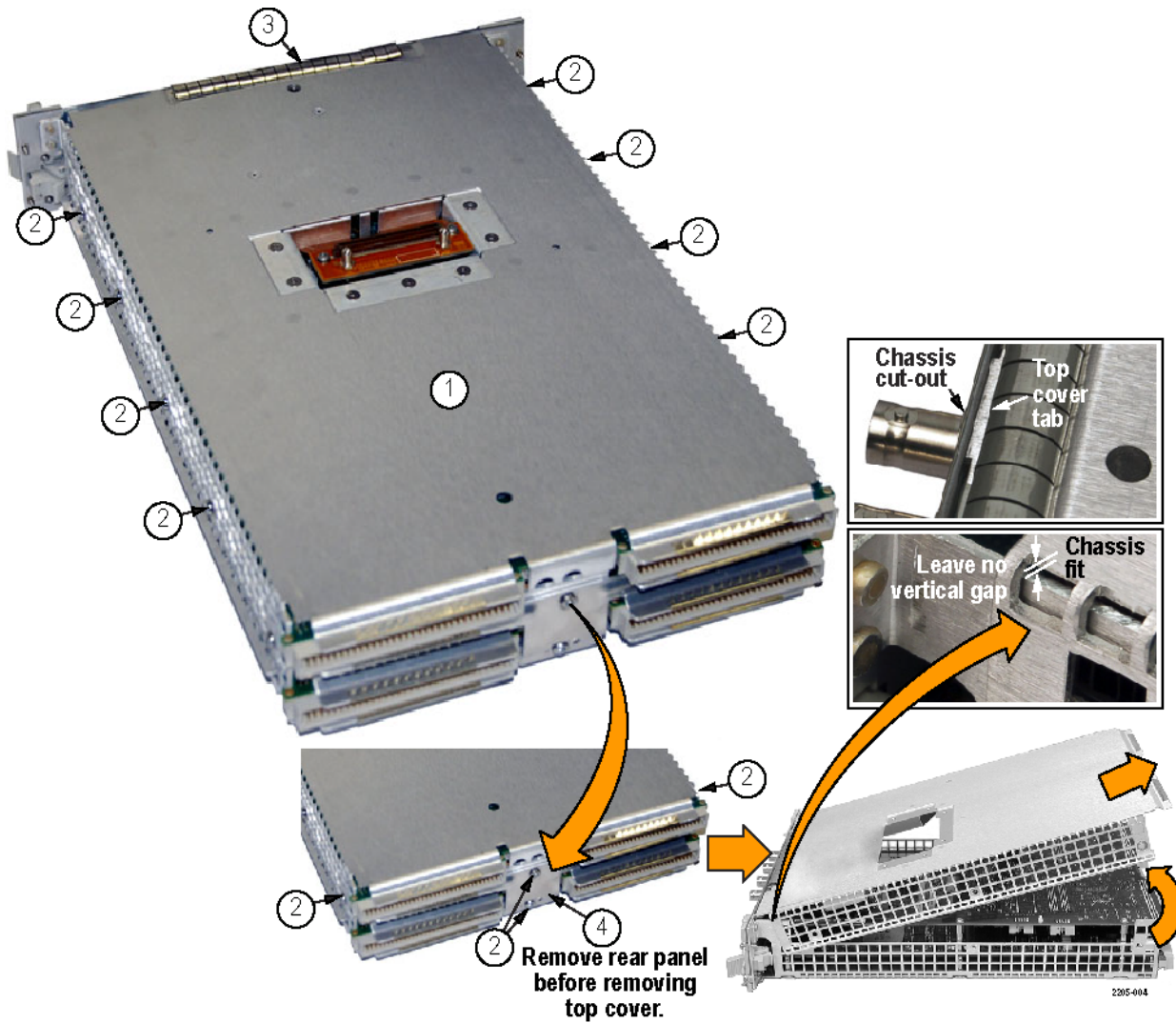


Figure 3: Top cover and rear panel

Fig. & index number	Tektronix part number	Serial no. effective	Serial no. discont'd	Qty	Name & description
4-1	870-6298-XX			1	CIRCUIT BD ASSY; LPU BOARD,TESTED,WIRED;389395700;LEAD FREE, BORG
4-2	211-0409-XX			5	SCR, ASSEM WSHR; 4-40 X 0.312, PNH, 410 SS PASSIVATED, T-10 TORX DR

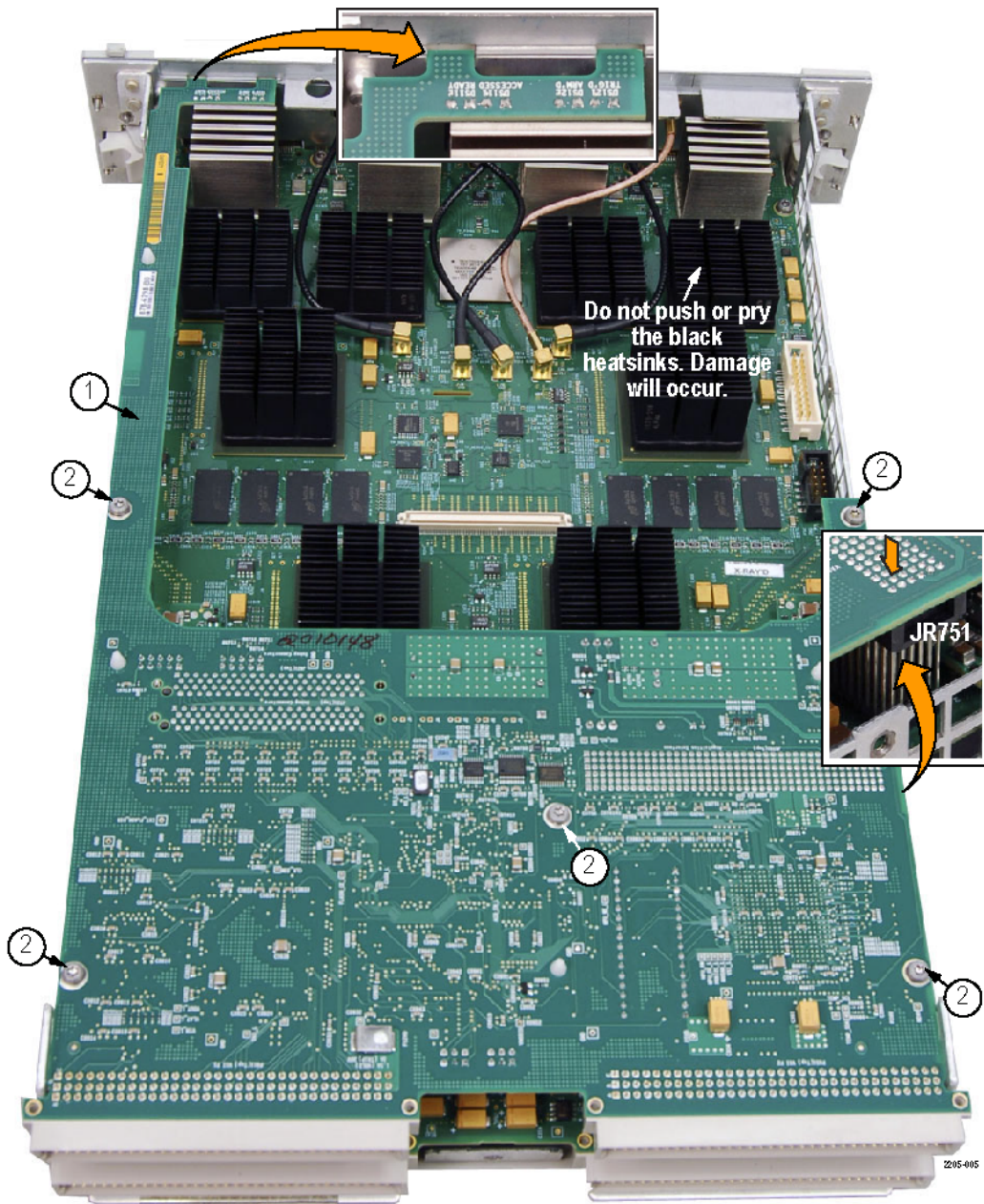


Figure 4: LPU board

Fig. & index number	Tektronix part number	Serial no. effective	Serial no. discontinued	Qty	Name & description
5-1	870-6199-XX			1	CKD BD ASSY; ACQ BD,68CH TESTED, TLA7BB2
	870-6201-XX			1	CKD BD ASSY; ACQ BD,102CH TESTED, TLA7BB3
	870-6202-XX			1	CKD BD ASSY; ACQ BD,136CH TESTED, TLA7BB4
	870-0282-XX			1	CKD BD ASSY; ACQ BD,136CH TESTED, TLA7BC4
5-2	129-1478-XX			5	SPACER, POST; 1.738 L,1.113 SPACING,W/ 0.35 L,0.25 HEX,W/ 4-40 INT THD X 6-32 EXTERNAL THD,NICKEL;
5-3	211-0409-XX			5	SCR, ASSEM WSHR; 4-40 X 0.312, PNH, 410 SS PASSIVATED, T-10 TORX DR
5-4	441-2481-XX			1	CHASSIS, ASSEMBLY (136 CHANNELS), SAFETY CONTROLLED

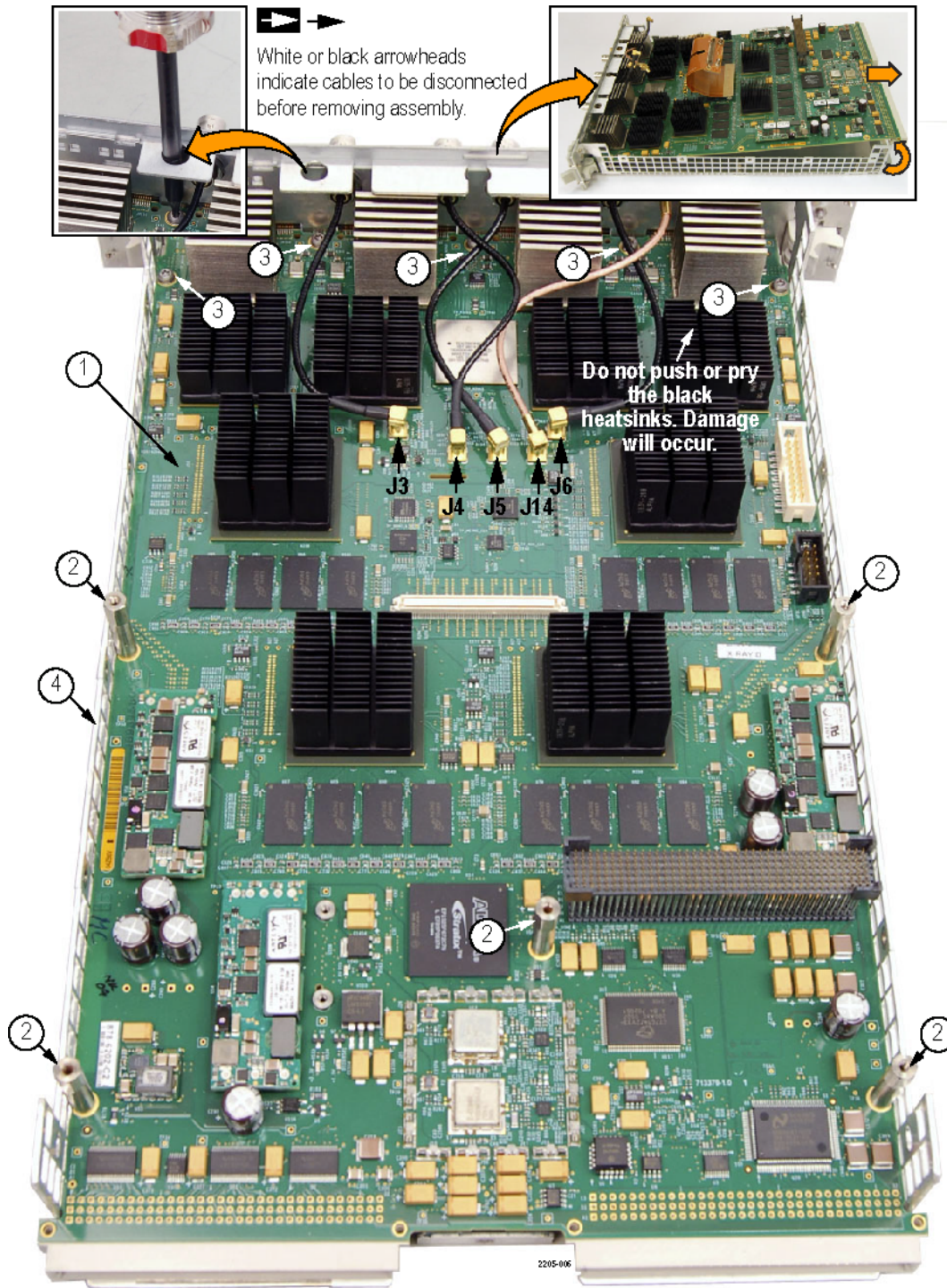


Figure 5: Acquisition board