TLA6400 Series
Tektronix Logic Analyzer

Service Manual

Tektronix

Contacting Tektronix

Warranty

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.

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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

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.

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

Connect the probe reference lead to earth ground only.

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.

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

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:

⚠	⚠	⏚	⏚	⏚	◯	│
CAUTION Refer to Manual	WARNING High Voltage	Protective Ground (Earth) Terminal	Earth Terminal	Chassis Ground	Mains Disconnected OFF (Power)	Mains Connected ON (Power)

⏻
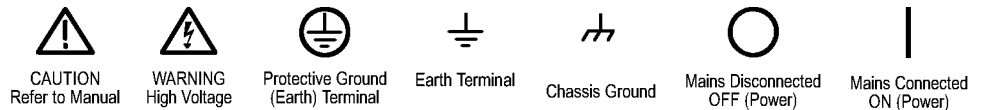
Standby

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 is the service manual for the TLA6400 Logic Analyzer Series products. Read this preface to learn how this manual is structured, what conventions it uses, and where you can find other information related to servicing this product. Read the Introduction following this preface for safety and other important background information needed before using this manual for servicing this product.

Manual conventions

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

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

Related documentation

The following list and table provide information on the related documentation available for your Tektronix product. For additional information, refer to the Tektronix Web site (www.tektronix.com/manuals).

Related documentation

Item	Purpose
TLA Quick Start User Manuals	High-level operational overview
Online Help	In-depth operation and UI help
Installation Reference Sheets	High-level installation information
Installation Manuals	Detailed first-time installation information
XYZs of Logic Analyzers	Logic analyzer basics
Declassification and Securities instructions	Data security concerns specific to sanitizing or removing memory devices from Tektronix products
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

Related documentation (cont.)

Item	Purpose
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 properly service the logic analyzer. This introduction contains information critical to safe and effective servicing.

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

- Read the *General Safety Summary* and *Service Safety Summary* found at the beginning of this manual.

- The procedures in this manual should only be performed by a qualified service person.

- Read the *Preface*.

- Read the *Operating Information* chapter.

Be sure to follow all warnings, cautions and notes.

Product description

The TLA6400 Series Logic Analyzers are stand-alone logic analyzers. The following list shows the base configurations; instrument functionality can be upgraded via PoweFlex options purchased separately:

- TLA6401–34 channel logic analyzer, with 40 ps MagniVu timing, 333 MHz state clock, 2 Mb record length

- TLA6402–68 channel logic analyzer, with 40 ps MagniVu timing, 333 MHz state clock, 2 Mb record length

- TLA6403–102 channel logic analyzer, with 40 ps MagniVu timing, 333 MHz state clock, 2 Mb record length

- TLA6404–136 channel logic analyzer, with 40 ps MagniVu timing, 333 MHz state clock, 2 Mb record length

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

The user interface operates under the Microsoft Windows operating system. Microsoft recommends the following to make sure your instrument is protected:

- Use an internet firewall.

- Install operating system updates regularly.

- Use up-to-date antivirus software.

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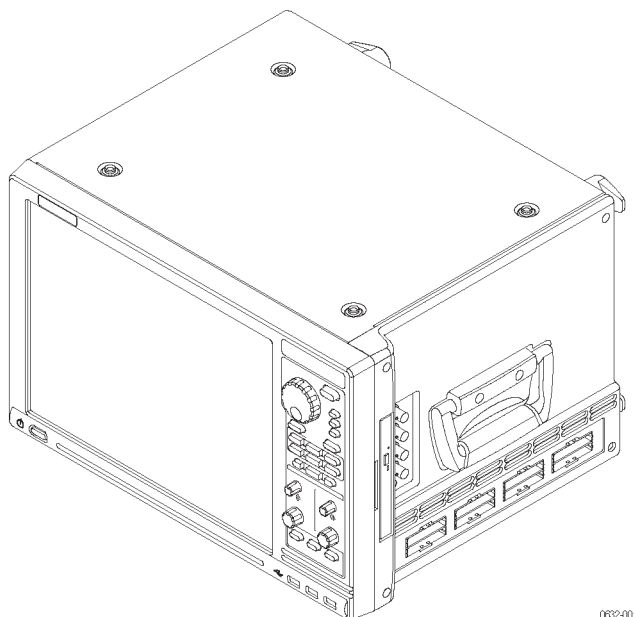
Figure 1: TLA6400 series logic analyzer

Adjustment and certification interval

Generally, you should perform the procedures described in the *TLA6400 Series Logic Analyzer Product Specifications & Performance Verification Technical Reference Manual* (Tektronix part number, 077-0634-xx) once per year, or following repairs that affect adjustment or calibration.

Service strategy

This manual supports and contains information needed for periodic maintenance or corrective maintenance of the logic analyzer:

■ Supports isolation of faults to the failed circuit board or assembly level shown in the *Replaceable Parts List*.

■ Supports removal and replacement of those boards or assemblies.

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

Service offerings

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

Whether providing warranty repair service or any of the other services listed below, Tektronix service technicians are equipped to service the logic analyzer. Services are provided at Tektronix Service Centers and on-site at your facility, depending on your location.

Tektronix warrants this product for one year from date of purchase. The warranty is located behind the title page in this manual. Tektronix technicians provide warranty service at most Tektronix service locations worldwide. The Tektronix product catalog lists all service locations worldwide, or you can visit us on our Customer Services World Center web site at:

`Tektronix.com/Measurement/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.

Table 1: Calibration and repair services

Item	Description
Service Options	Tektronix Service Options can be selected at the time you purchase your instrument. You select these options to provide the services that best meet your service needs. These service options are listed on the Tektronix Service Options page following the title page of this manual.
Service Agreements	If service options are not added to the instrument purchase, then service agreements are available on an annual basis to provide calibration services or post-warranty repair coverage. Service agreements may 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 with 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 curcuit boards for remanufactured ones. Tektronix ships updated and tested exchange boards. Each board comes with a 90-day service warranty.

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

Specification and performance verification

Refer to the *TLA6400 Series Logic Analyzer Product Specifications & Performance Verification Technical Reference Manual* for a complete list of specifications for the TLA6400 series logic analyzer products. This document is available on the Tektronix Logic Analyzer Family Product Documentation CD or can be downloaded from the Tektronix web site.

Operating information

Site considerations

Read this section before installing the logic analyzer. This section describes operating considerations and power requirements for your logic analyzer. The environmental considerations apply to all TLA6400 series products.

Table 2: Environmental considerations

Feature		Description
Temperature	Operating	+5 °C to +40 °C
	Nonoperating	–20 °C to +60 °C
Humidity	Operating	20% to 80% relative humidity, non-condensing
	Nonoperating	8% to 80% relative humidity, non-condensing
Altitude	Operating	To 3000 m (9843 ft.)
	Nonoperating	To 12,000 m (39,370 ft.)

⚠ *CAUTION. Allow a 15.3 cm (6-in) clearance at the back and sides of the instrument to allow proper cooling. Avoid blocking any exhaust or intake fans or vents when using the instrument on a cart or in an instrument rack. Avoid placing loose paper or other material near the bottom intake vents that could suck against the instrument and block air flow. Inadequate clearances can damage the instrument.*

Use the logic analyzer on a bench, in an instrument rack, 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.

Table 3: Instrument power considerations

Feature	Description
Voltage range and frequency	100-240 VAC ±10%, 50-60 Hz ±5%
Power consumption	400 W maximum

Chassis ground connection

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

(See Figure 2.)

⚠ *CAUTION.*

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

Accessory connections

After installing the logic analyzer in the desired location, connect the accessories such as an external monitor, keyboard, and printer. (See Figure 2.)
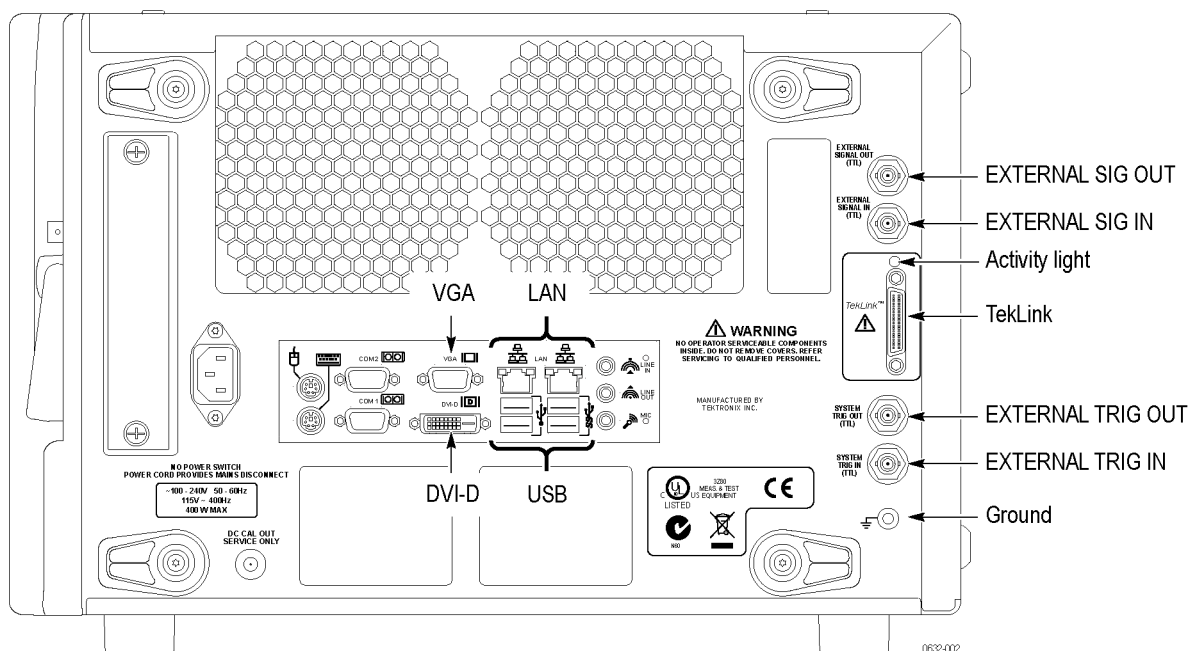

Figure 2: Accessories connections

Connect additional accessories as needed. (See Table 4 on page 7.)

Table 4: Additional accessory connection information

Item	Description
Monitor	There are two display ports on the logic analyzer: VGA, and DVI.
	To change the display settings, right-click the mouse on the desktop, and select **Screen Resolution**. Note that some of the display settings may not function until you connect an external monitor.
	To connect a VGA monitor to the DVI connector, use a VGA-to-DVI adapter. Part numbers for accessories and options are listed at the end of this manual. If you use a nonstandard monitor, you may need to change the Windows display settings to obtain the proper resolution.
LAN	Connect the logic analyzer to your network through the Gbit LAN connectors. Remotely control the logic analyzer through a LAN switch using a PC (loaded with the TLA application software).
Printer	The instruments send printer information to the USB ports. Use any of the four USB ports for your printer.

Operating information

This chapter describes the product controls and connectors of the logic analyzers. Refer to the *TLA Quick Start User Manual* for operating information on the logic analyzer.

⚠ *CAUTION. Connecting the accessories after turning on the logic analyzer may damage the accessories. Connect accessories before applying power to the logic analyzer.*

Power on the instrument

Follow these steps to power on the logic analyzer:

1. Connect the power cord to the logic analyzer.

2. If you have an external monitor, connect the power cord and turn on the monitor.

3. Press the On/Standby switch to turn on the logic analyzer. (See Figure 3 on page 8.)

4. Wait for the logic analyzer to complete the power-on self tests.
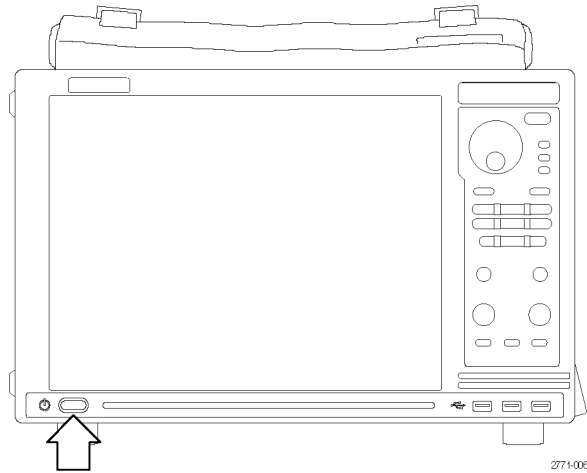
Figure 3: On/Standby switch location

Front panel controls   Use the front-panel controls to operate most of the logic analyzer. (See Figure 4.)
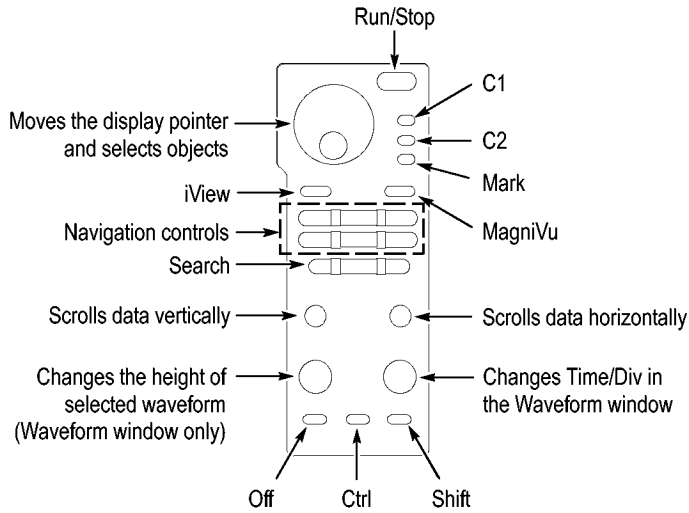
Figure 4: Logic analyzer front panel

Side panel connectors   The following connections are available on the side panel of the instrument. (See Figure 5.)

- Probe connectors. The number of connectors depend on your instrument type.

- Analog output connectors. Connect a BNC cable to one of these connectors to provide an analog output signal to another instrument. (Refer to the TLA online help for information on using the *iCapture Analog Feeds*.)

DVD Drive

Analog Probe Outputs

Carrying Handle

Tektronix

0632-005

Probe Connectors
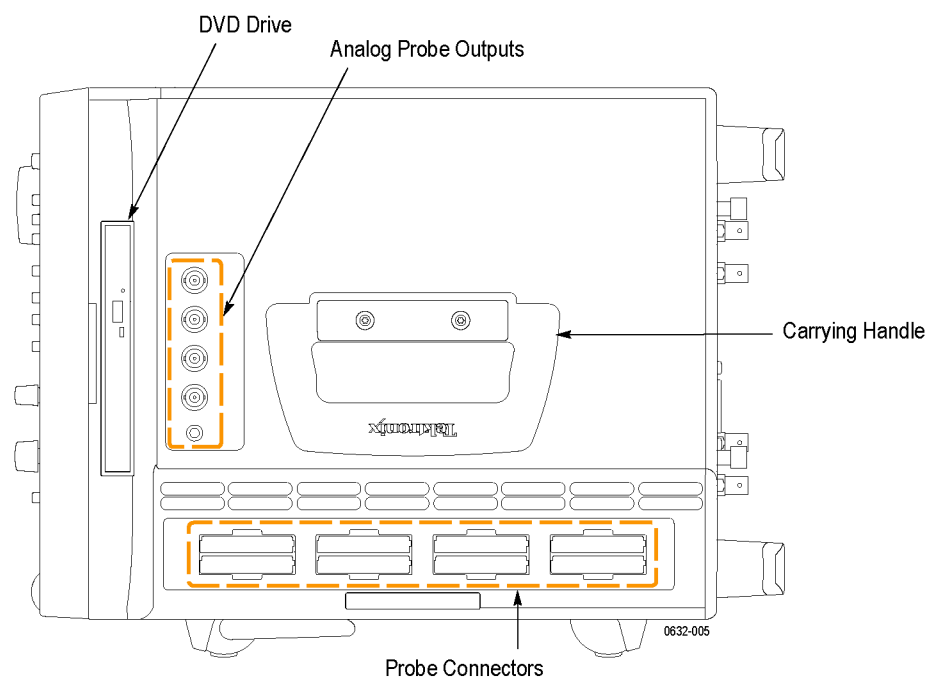
Figure 5: Side panel connectors

Rear panel connectors   The following external connections are available on the rear panel of the instrument. (See Figure 6 on page 10.)

- 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

- Accessory connections, such as USB, LAN, and audio/video outputs
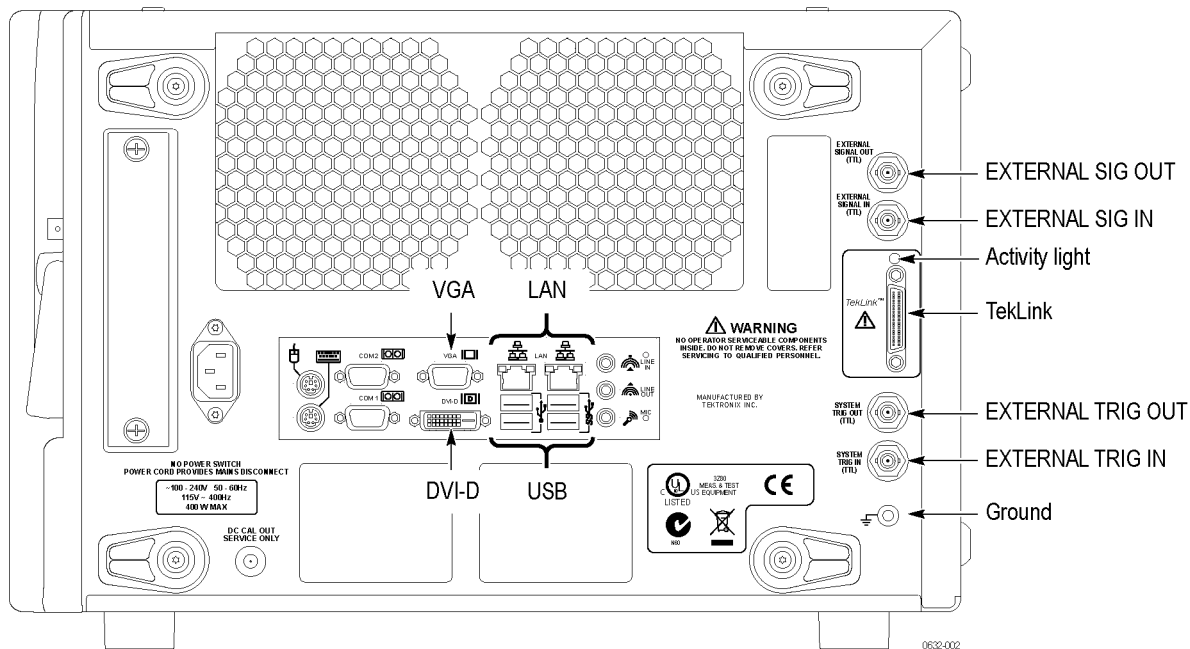
Figure 6: Rear panel connectors

Power off the instrument

To power off the logic analyzer, press the On/Standby switch. The logic analyzer has a built-in soft power-off function that safely powers off the logic analyzer when you press the On/Standby switch.

⚠ **WARNING.** *To avoid the chance of electrical shock when opening the instrument or accessing any location that may have a voltage applied, always unplug the instrument to disconnect it from the mains power. Do not unplug the instrument when it is powered on otherwise you can damage the instrument.*

Software installation

Most of the software is installed when your instrument is shipped from the factory. The latest version of the TLA Application software can be downloaded from the Tektronix Web site at (www.tektronix.com/software).

Go to the Web Site and search for the TLA application software. Then follow the on-screen instructions to download the software.

Additional documentation

For detailed information on using the logic analyzer refer to the online help. For additional information on the latest software version or other information, refer to the release notes. To access the release notes, click Start > Programs > Tektronix Logic Analyzer > TLA Release Notes.

Maintenance

Service overview

This chapter contains the information needed to do periodic and corrective maintenance on the instrument.

To repair the instrument, exchange or replace the failed part; this manual does not provide component-level procedures for isolating components on the failed part.

The information in this chapter is designed for use by qualified service personnel. Read the safety summaries at the front of this manual before attempting any procedures in this chapter.

Preventing ESD

When performing any service which 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 while servicing the instrument.

Always wear a grounded wrist strap, or equivalent, while servicing the instrument.

- Minimize handling of static-sensitive circuit boards.

- Transport and store static-sensitive circuit boards in their static protected containers or on a metal rail. 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. Service static-sensitive circuit boards only at a static-free work station.

- 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.

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

Inspection and cleaning overview

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 the chassis 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 of the instrument. Clean the instrument as needed, based on the operating environment.

Clean the exterior surfaces   Use the following guidelines for cleaning the exterior surfaces of the instrument.

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

Use only deionized or distilled 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 instrument. Avoid chemicals that contain benzene, toluene, xylene, acetone, or similar solvents.

- Clean the exterior surfaces of the instrument with a dry lint-free cloth or a soft-bristle brush.

  If any dirt remains, use a cloth or swab dipped in a 75% isopropyl alcohol solution. Do not use abrasive compounds that may damage the instrument.

- Use a swab to clean narrow spaces around controls and connectors.

- Clean the On/Standby switch using a dampened cleaning towel. Do not spray or wet the switch directly. If necessary, cover the switch while cleaning the instrument.

Clean the display   The instrument display is a soft plastic display and must be treated with care during cleaning.

> ⚠ **CAUTION.** *To prevent damage to the flat panel display, do not use improper cleaning agents or methods.*
>
> *Avoid using abrasive cleaners or commercial glass cleaners to clean the display surface.*
>
> *Avoid spraying liquids directly on the display surface.*
>
> *Avoid scrubbing the display with excessive force.*

Clean the flat panel display surface by gently rubbing the display with a clean-room 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.

Clean the interior   Use the following guidelines for cleaning the interior of the instrument.

- Use a dry, low-velocity stream of air to clean the interior of the instrument.

- Use a soft-bristle, nonstatic-producing 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 water.

Removal and installation procedures

This section contains procedures for removal and installation of field-replaceable parts.

Preparation

⚠ **WARNING.** *Before performing this or any other procedure in this manual, read the Safety Summary found at the beginning of this manual.*

To prevent possible injury to service personnel or damage to the instrument, read the Operating Information chapter, and review the electrostatic discharge (ESD) section. (See page 11, Preventing ESD.).

⚠ **WARNING.** *Before performing any procedure in this subsection, disconnect the power cord from the line voltage source. Failure to do so could cause serious injury or death.*

Required equipment

Most parts in the instrument can be removed using a screwdriver with a T-15 Torx tip.

Table 5: Tools required for removal and replacement procedures

Name	Description
Screwdriver handle	Accepts Torx-driver bits
T-15 Torx tip	Used for removing most of the instrument's screws. Torx-driver bit for T-15 size screw heads
T-10 Torx tip	Torx driver bit for T-10 size screw heads
3/16 inch nut driver	Used to remove the nut posts
9/16 inch open-end wrench	Used to remove BNC nuts
#0 Phillips screwdriver	Screwdriver for removing small Phillips screws, DVD
#1 Phillips screwdriver	Screwdriver for removing small Phillips screws, hard disk drive
Angle-Tip Tweezers	Used to remove front panel knobs
Cable clamps	To replace any that were removed

NOTE. *When installing the screws, use a torque screwdriver and tighten the screws to 8 in-lbs unless otherwise noted.*

Remove the hard disk drive

The instrument has a removable hard disk drive that is accessible from the rear of the instrument. Refer to the replaceable parts for information on removing the hard disk drive assembly from the chassis.

1. Power down the instrument and verify that the instrument completely shuts down before removing the hard disk drive from the rear of the instrument.

2. Remove the replaceable hard disk drive from the chassis by loosening the two thumb screws from the chassis and then pull out the hard disk drive.

3. Remove the two T-15 screws securing each of the hard disk drive guides to the hard disk assembly.

4. Remove the four screws securing the hard disk drive to the bracket and then remove the hard disk drive.

NOTE. When reinstalling the hard disk drive to the bracket, tighten the four screws to 4 in-lbs.

Remove the accessories pouch

Remove the accessories pouch to access the covers on the instrument. The remaining procedures assume that you have removed the accessories pouch.

1. Open the pouch and located the two snaps on the inside front side of the pouch.

2. Gently pull on each of the four tabs to unsnap the pouch.

3. Set the pouch aside.

4. To reinstall the pouch, perform these steps in reverse order.

Remove the instrument covers

Complete the following steps to remove the instrument covers. Refer to the exploded view as needed to remove the covers. (See Figure 8 on page 35.)

1. Disconnect all cords, cables, and probes from the instrument.

2. Set the instrument on the bottom feet.

3. Remove the accessories pouch from the top of the instrument.

4. Remove the four T-15 screws and the snap studs from the top of the instrument.

5. Remove the two T-15 screws securing the handle and handle base to the right side cover.

   Set the handle and handle base aside.

6. Remove the four T-15 screws from the right side cover and then remove the cover and set it aside.

7. Remove the four T-15 screws and skid feet from the left side of the instrument and then remove the cover and set it aside.

8. Remove the 12 T-15 screws from the top cover of the instrument and set the cover aside.

9. To reinstall the covers, perform these steps in reverse order. Tighten the T-15 Torx-drive screws to 8-in lbs.

Remove the front panel display

Complete the following steps to remove the front panel display. You need to perform the following steps to replace the DVD drive and the power supply. Refer to the exploded view as needed to remove the covers and display. (See Figure 8 on page 35.)

1. Remove the accessories pouch and the instrument covers.

2. Set the instrument on the back feet.

3. Remove the two T-15 screws above and below the DVD drive on the right side of the isntrument.

4. Remove the two T-15 screws on the left side of the instrument.

5. Remove the four T-15 screws on the bottom side of the instrument.

6. Carefully place the instrument on the bottom feet and gently pull off the front panel display assembly and set it in front of the instrument.

7. Disconnect the two display cables and the three USB cables from the front panel assembly as shown in the following illustration.
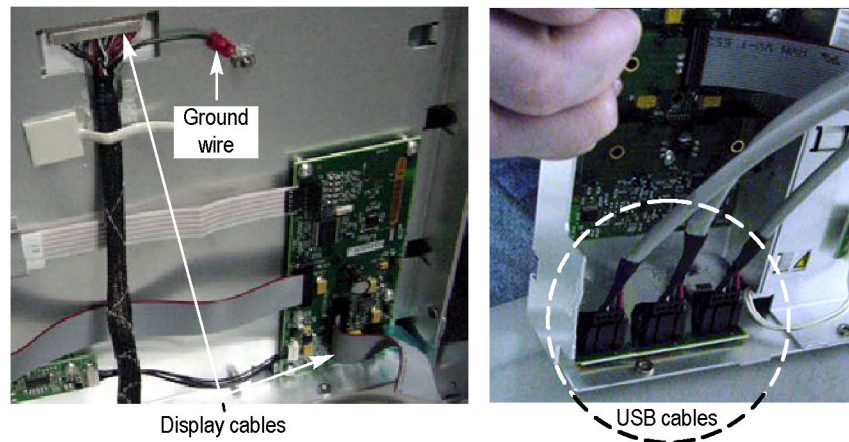
Figure 7: Front panel cable locations

8. Remove the ground wire with a 5/16 in. driver.

9. Remove the front panel assembly.

Note the following steps when reinstalling the front panel display:

− When connecting the display cable, carefully line up the centers of the plug and socket before pressing them together.

− To avoid damaging or pinching the USB or ribbon cables, dress the cables properly just before you attach the front panel to the chassis.

10. To reinstall the display and covers, perform these steps in reverse order. Tighten the T-15 Torx-drive screws to 8-in lbs.

Remove the DVD drive

Complete the following steps to remove the DVD drive. Refer to the detailed exploded view drawings as needed. (See Figure 9 on page 37.) Installation procedures are the reverse of the removal procedures.

1. Remove the accessories pouch and the instrument covers.

2. Remove the front panel display.

3. Disconnect the ribbon cable and the power cable from the DVD drive.

4. Remove the two screws securing the DVD drive to the chassis.

5. Slide the DVD drive out of the chassis.

6. Remove the four screws securing the DVD drive to bracket assembly and then slide the DVD drive out of the bracket.

NOTE. Tighten the four screws securing the DVD drive to the bracket assembly to 2.0 in-lbs.

Remove the power supply

Complete the following steps to remove the power supply. Refer to the detailed exploded view drawings as needed. (See Figure 9 on page 37.) Installation procedures are the reverse of the removal procedures.

1. Remove the accessories pouch and the instrument covers.

2. Remove the front panel display.

3. Remove the two T-15 screws on the left side of the instrument.

4. Remove the T-15 screw and the cable clamp from the inside of the instrument.

5. Disconnect the power connector from the power supply.

6. Remove the four T-15 screws securing the power supply to the chassis.

7. Gently pull the power supply assembly out of the instrument moving cables as necessary.

8. Remove the four nuts that secure the power supply to the bracket assembly and then gently slide the power supply out of the assembly.

Remove the fans

Complete the following steps to remove the fans. Refer to the detailed exploded view drawings as needed. (See Figure 9 on page 37.) Installation procedures are the reverse of the removal procedures.

1. Remove the accessories pouch and the instrument covers.

2. Determine the fan to replace and disconnect the appropriate fan cable at J17 or J18 from the interface board.

3. Remove any cable clamps that secure the fan cables to the fans and chassis as needed.

4. Remove the four T-15 screws and washers that secure each fan to the rear panel.

5. Gently move any cables out of the way to access the fans and then remove the fan from the rear panel.

NOTE. When replacing the fan, verify that the fan label faces the outside of the chassis, otherwise the fan will force air in the wrong direction.

Remove the computer board

Complete the following steps to remove the computer board. Refer to the detailed exploded view drawings as needed. (See Figure 10 on page 39.) Installation procedures are the reverse of the removal procedures.

1. Remove the Accessories pouch and the instrument covers.

2. Remove the four T-15 screws securing the rear panel I/O panel to the chassis.

3. Remove the eight T-15 screws securing the computer board to the chassis.

4. Note the location of the cables from the computer board to the interface board and then disconnect and pull all cables clear of the computer board.

5. Move the computer board forward to clear the USB grounding bracket and then lift board out.

When reinstalling the computer board refer to the exploded views for cable connection information. (See Figure 11 on page 41.)

Remove the acquisition board

Complete the following steps to remove the acquisition board. Refer to the detailed exploded view drawings as needed. (See Figure 11 on page 41.) Installation procedures are the reverse of the removal procedures.

1. Remove the cosmetic covers from the instrument and then place the instrument on the rear back feet.

2. Remove the 13 T-15 screws securing the bottom cover to the instrument.

3. Disconnect the deskew cable from the Deskew connector on the acquisition board and then disconnect the other end of the cable from the rear panel connector.

    Set the cable aside.

4. Disconnect the four analog output cables at the acquisition board.

5. Remove the ten T-15 screws securing the acquisition board to the chassis.

6. Remove the two T-15 screws that secure the acquisition bracket to the main chassis.

7. Grasp the acquisition board by the handle and pull up on the handle until the acquisition board disconnects from the interface board.

    Remove the acquisition board from the instrument.

Remove the interface board

Complete the following steps to remove the interface board. This procedure requires complete disassembly of the instrument to access the interface board. Refer to the detailed exploded view drawings as needed. (See Figure 11 on page 41.) Installation procedures are the reverse of the removal procedures.

1. Remove the Accessories pouch and the instrument covers.

2. Remove the four nuts and washers from the BNC connectors from the rear panel.

3. Remove the two jack screws from the TekLink connector on the rear panel.

4. Follow the procedures to remove the front panel display and the power supply.

    You need to remove the power supply to access some of the T-15 screws on the Interface board.

5. Temporarily, slide the front panel onto the instrument so that you can turn the instrument over to remove the Acquisition board from the bottom of the instrument.

    Make sure that you have removed the power supply from the instrument before removing the Acquisition board.

6. Follow the procedures to remove the Acquisition board from the instrument.

7. Turn the instrument over and note the cable connections on the interface board.

8. Disconnect and pull all cables clear of the interface board.

9. Carefully remove the six T-15 screws securing the Interface board to the inside of the instrument.

10. Remove the Interface board by clearing the BNC connectors on the rear panel and then lifting the Interface board clear of the instrument.

Verify proper operation

Perform the following procedures after reassembling the instrument to verify proper operation:

1. Plug the power cord in and turn the instrument on.

2. Verify that the instrument passes all power-up diagnostics.

    If the instrument fails any of the diagnostics, you may want to run the Extended diagnostics for more information on the failure.

3. Connect the probes to the instrument and to a signal source.

4. Go to the Setup Menu and verify that there is signal activity on the probe channels connected to the signal source.

Troubleshooting procedures

This section supports isolation of faults within the instrument to the replaceable-part level. In most cases, faults are isolated to circuit boards or assemblies, but not to individual components on those boards.

Check for common problems

Use the following table to quickly isolate possible failures. The table lists problems related to the instrument and possible causes. The list is not exhaustive, but it may help you eliminate a problem that is quick to fix, such as a loose cable.

Table 6: Failure symptoms and possible causes

Symptom	Possible causes and recommended action
Instrument does not turn on	Verify that the power cord is connected to the instrument and to the power source.
	Check that the instrument receives power when you press the On/Standby switch. Check that fans start and that front-panel indicators light.
	Check that power is available at the power source.
	Instrument failure: contact your local Tektronix service center.
External monitor does not turn on	Check the monitor power cord connection.
	Check for failed fuse, if one exists.
	Check external display connection.
	Monitor failure: contact the vendor of your monitor for corrective action.
Monitor display is blank	Check that the monitor is connected to the mainframe; replace the cable if necessary.
	If instrument display is blank, try connecting an external monitor; if both displays are blank, contact your local Tektronix service center.
	External monitor controls turned down; adjust monitor controls for brightness and contrast.
	Check the controller BIOS setups for the monitor.
	Faulty monitor: contact the vendor of your monitor for corrective action.
	Boot into Safe Mode. If the display is active, change the display settings to use the instrument and then restart the instrument (reboot).
Instrument turns on but does not complete the power-on sequence	Make sure that the instrument boots from the hard disk drive. Remove any discs from the disk drive.
	Possible software failure or corrupted hard disk drive. Try to restore the operating system. (See page 24, *Operating system restore information*.)
Power-on diagnostics fail	Instrument failure: contact your local Tektronix service center.
Instrument does not recognize accessories such as monitor, printer, or keyboard	Check that accessories are properly connected or installed. Try connecting other standard PC accessories or contact your local Tektronix service center.

Table 6: Failure symptoms and possible causes (cont.)

Symptom	Possible causes and recommended action
Windows comes up but the TLA application does not	Instrument not set up to start the TLA application at power-on. Start application from the desktop, by double-clicking the TLA icon located on your desktop.
	Faulty or corrupt software. Reinstall the application software.
Windows comes up in Safe mode	Exit the Safe mode and restart the instrument.
	Incompatible hardware and hardware driver software. Either install the hardware driver or remove the incompatible hardware.

Check the power-on diagnostics

The Power-on diagnostics check the basic functionality of the logic analyzer at power on. If any failures occur at power on, the screen displays the Calibration and Diagnostics property page. Use the results of the tests to help you isolate problems.

If there are no failures, you can view the results of the tests in the Calibration and Diagnostics page under the System menu.

Run the extended diagnostics

The extended diagnostics extend the tests of the power-on diagnostics. In some cases they are the same tests as the Power-on diagnostics but test more details. You can also run individual tests. To view and run the extended diagnostics, select the Extended tab from the Calibration and Diagnostics page from the system menu.

The extended diagnostics do not run automatically when you power on the instrument. You must run the diagnostics manually. After running the diagnostics the Pass or Fail status shows adjacent to each test.

Check the BIOS setup errror messages

The logic analyzer runs a BIOS test when you power on the instrument. If the BIOS test encounters a problem, the program displays the error on the display.

BIOS beep codes

When an error occurs during the power on self test (POST), the BIOS issues an audible beep code, usually consisting of one long tone followed by a series of short tones. There are several POST routines that issue a POST terminal error and shut down the system if they fail. Before shutting down the system, the terminal-error handler issues a beep code signifying the test point error. The following table lists some of the beep codes, possible causes of the error, and recommended action for the error.

Table 7: BIOS beep code information

Number of beeps	Error condition	Recommended action
1	Memory error or invalid password	Verify that the memory device is properly seated. If this does not solve the problem, contact your local service representative, for recommended action.
2, 3, 4,7, or 8	Internal error	Turn off the instrument, if it is running, and disconnect the power cord for two minutes. Reconnect the power cord and turn on the instrument. If the problem still occurs, contact your local service representative, for recommended action.
5	No display or input device found	Turn off the instrument, if it is running, and disconnect the power cord for two minutes. Reconnect the power cord and turn on the instrument. If the problem still occurs, contact your local service representative, for recommended action.

Set up the controller BIOS

This procedure is necessary 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 the **Delete** key before the logic analyzer boots the Windows operating system.

2. Press the **F3** function key, select Yes, and then press Enter to set all settings to their default values.

3. Press the **F4** function key to exit and save the BIOS setup.

Operating system restore information

The instrument contains an operating system restore file on a separate partition of the hard disk drive. This provides a means for restoring the operating system, if the need arises.

> ⚠ *CAUTION. Restoring the operating system reformats the hard disk drive. All saved data on the hard disk drive will be lost. Save important files to external media before restoring the operating system.*

Complete the following steps to restore the operating system:

1. Restart the instrument. During the startup process, you will see the following message at the top of the screen:

    ```
    Starting Acronis Loader press F5 for Acronis Startup
    Recovery Manager
    ```

    NOTE. To successfully complete the system restore process you must use the Windows version of the Acronis software. Using a generic MAC keyboard starts the DOS version of the Acronis software. Do not use a MAC keyboard.

2. Repeatedly press the F5 key until the Acronis True Image Tool opens.

    There is a short delay from the time the message appears until the instrument proceeds with the normal instrument startup. If the instrument does not open the Acronis application, power off the instrument, and then power on the instrument and try again.

3. Click Recover.

4. In the Confirmation dialog box, click Yes to restore the instrument operating system, or No to exit the restore process.

The restore process takes approximately 30 minutes; the actual time depends on the instrument configuration.

Reinstall the TLA application 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 the software. The TLA application software is available on DVDs that are shipped with the instrument. Alternately, the latest version of the TLA application software can be downloaded from the Tektronix Web site.

Complete the following steps to reinstall the latest version of the TLA application software.

NOTE. 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 DVD in the DVD 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.

5. If you have an older version of the software on the hard disk, the installation program will detect it and ask to remove it. Follow the on-screen instructions to remove the software, answering "Yes" to any prompts.

6. After the software is successfully installed, restart the instrument.

Upgrade or restore the firmware

You may have to upgrade the firmware on the logic analyzer if the firmware version is not compatible with the TLA application software version. This will be indicated by one or more messages 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.

Use the following procedure to upgrade the firmware:

1. Exit the logic analyzer application.

2. Click Start > All Programs > Tektronix Logic Analyzer > TLA Firmware Loader.

3. If the Connection dialog box appears, select the instrument that you want to upgrade (typically the Local instrument) and click Connect.

4. The Firmware Loader dialog box appears. Click the Load button.

5. A list of all the currently installed Mainframe firmware displays. The list shows the version currently running and the version available for installation. Select the items that you want to load. If all firmware versions are up-to-date, click Close and go to step 14.

6. Click the Update Firmware button. A dialog box displays a list of available firmware images.

7. Select the appropriate file. Click Open to open the selected firmware image. You must do this for each firmware image selected.

8. 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.

9. As the flash operation runs, it identifies what steps are being performed. When complete, it will inform you to restart the instrument.

10. Turn off and restart the instrument after the flash operation is complete.

11. Exit the logic analyzer application.

12. Click Start > All Programs > Tektronix Logic Analyzer > TLA Firmware Loader.

13. If the Connection dialog box appears, select the instrument that you want to upgrade (typically the Local instrument) and click Connect.

14. Click the Load button in the Instrument Module Firmware section (bottom part of the dialog box).

15. If the firmware version is less than the FW Required version, then select Load Firmware from the Execute menu.

16. Select the proper firmware file (TLA640X.lod).

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

18. When the process has completed, exit the firmware loader program and power off the logic analyzer. You must power off the logic analyzer to allow the TLA application to start up properly.

19. Locate the big label on the instrument.

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. Power on the logic analyzer.

22. After the logic analyzer completes the power-on diagnostics, select System Properties from the System menu.

23. Click the LA1 tab.

24. Verify that the firmware version matches the version on the label that you recorded in step 20.

25. If the firmware versions do not match, power off the instrument, and update the label.

Repackaging instructions

This section contains the information needed to repackage the instrument for shipment or storage.

Packaging information

When repacking the instrument for shipment, use the original packaging. If the packaging is unavailable or unfit for use, contact your local Tektronix representative to obtain new packaging.

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

Shipping information

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 and serial number of the instrument
- 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.

Options

Refer to the *TLA6400 Logic Analyzer Series Installation Manual* for a complete list of options and accessories. Additional information on options and accessories is available on the Tektronix Web Site.

Replaceable parts list

This section contains a list of the replaceable parts for the TLA6400 series logic analyzers. Use this list to identify and order replacement parts.

Parts ordering information

Replacement parts are available through your local Tektronix field office or representative.

Changes to Tektronix products are sometimes made to accommodate improved components as they become available and to give you the benefit of the latest improvements. Therefore, when ordering parts, it is important to include the following information in your order:

- Part number
- Instrument type or model number
- Instrument serial number
- Instrument modification number, if applicable
- If you order a part that has been replaced with a different or improved part, your local Tektronix field office or representative will contact you concerning any change in part number.

Replaceable parts list

This section contains a list of the mechanical and/or electrical components that are replaceable for the TLA6400 series logic analyzer Use this list to identify and order replacement parts. The following table describes each column in the parts list. Abbreviations conform to American National Standard ANSI Y1.1–1972.

Table 8: Parts list column descriptions

Column	Column name	Description
1	Figure and index number	Items in this section are referenced by figure and index numbers to the exploded view illustrations that follow.
2	Tektronix part number	Use this part number when ordering replacement parts from Tektronix.
3 and 4	Serial number	Column three indicates the serial number at which the part was first effective. Column four indicates the serial number at which the part was discontinued. No entry indicates the part is good for all serial numbers.
5	Qty	This indicates the quantity of parts used.
6	Name & description	An item name is separated from the description by a colon (:). Because of space limitations, an item name may sometimes appear as incomplete. Use the U.S. Federal Catalog handbook H6-1 for further item name identification.

Parts list

Table 9: External parts

Figure and index no.	Tektronix part no.	Serial no. effective	Serial no. discont'd	Qty.	Name and description
8-1	200-5232-00			1	COVER, TOP-LEFT (COSMETIC)
-2	355-0298-00			4	STUD.SNAP; 0.570 DIA,0.165 THK,STAINLESS STEEL
-3	211-0510-00			37	SCREW, MACHINE; 6-32 X 0.375, PNH, ZINC PLATED STEEL, T15
-4	348-1861-00			4	FOOT; REAR, ASSY. W/ CORD WRAP, THERMOPLASTIC,SRY
-5	211-0738-00			4	SCREW,MACHINE; 6-32 X 0.625,PNH,STL BLK ZI,TORX
-6	200-5233-00			1	COVER, RIGHT (COSMETIC)
-7	367-0528-00			1	HANDLE,CARRYING; DUAL DUROMETER MOLDED,POLYPROPYLENE,VINYL GRIP SECTION
-8	211-1265-00			2	SCREW, MACHINE, 8-32 X 1.000L PNH, BLACK OXIDE, T20, NYLOK, STEEL
-9	200-5231-00			1	COVER, BOTTOM (COSMETIC W/FEET)
-10	200-4939-00			1	COVER,FRONT;PROTECTIVE,PLASTIC
-11	850-0217-XX			1	DISPLAY/FRONT PANEL ASSY; 15 INCH LCD W/OUT TOUCH SCREEN, STANDARD
	850-0216-XX			1	DISPLAY/FRONT PANEL ASSY; 15 INCH LCD,WITH TOUCH PANEL
-12	200-5230-00			1	COVER, TOP (EMI)
-13	348-1817-00			4	FOOT, SKID
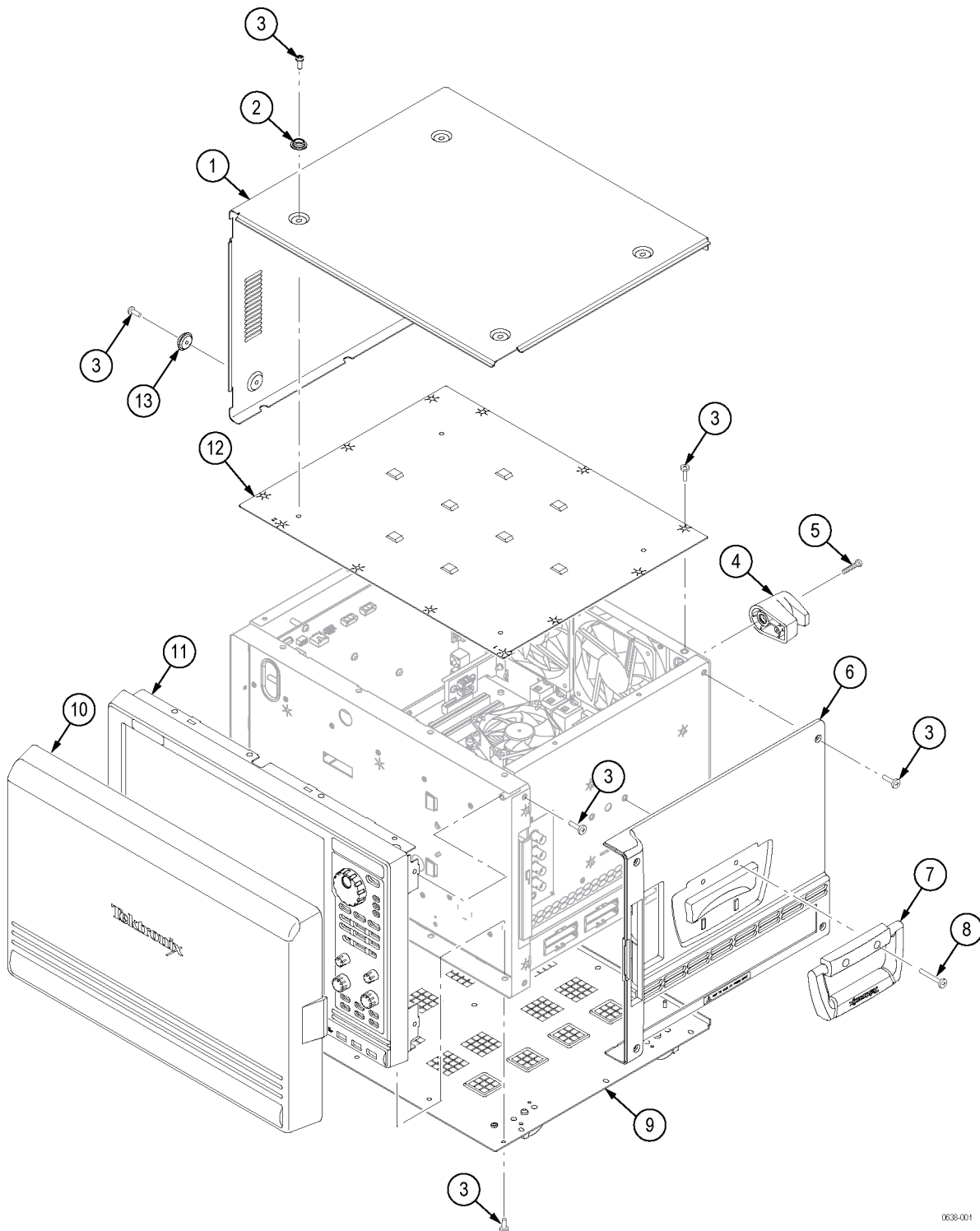
Figure 8: Instrument covers and external hardware

Table 10: Hard disk drive and power supply

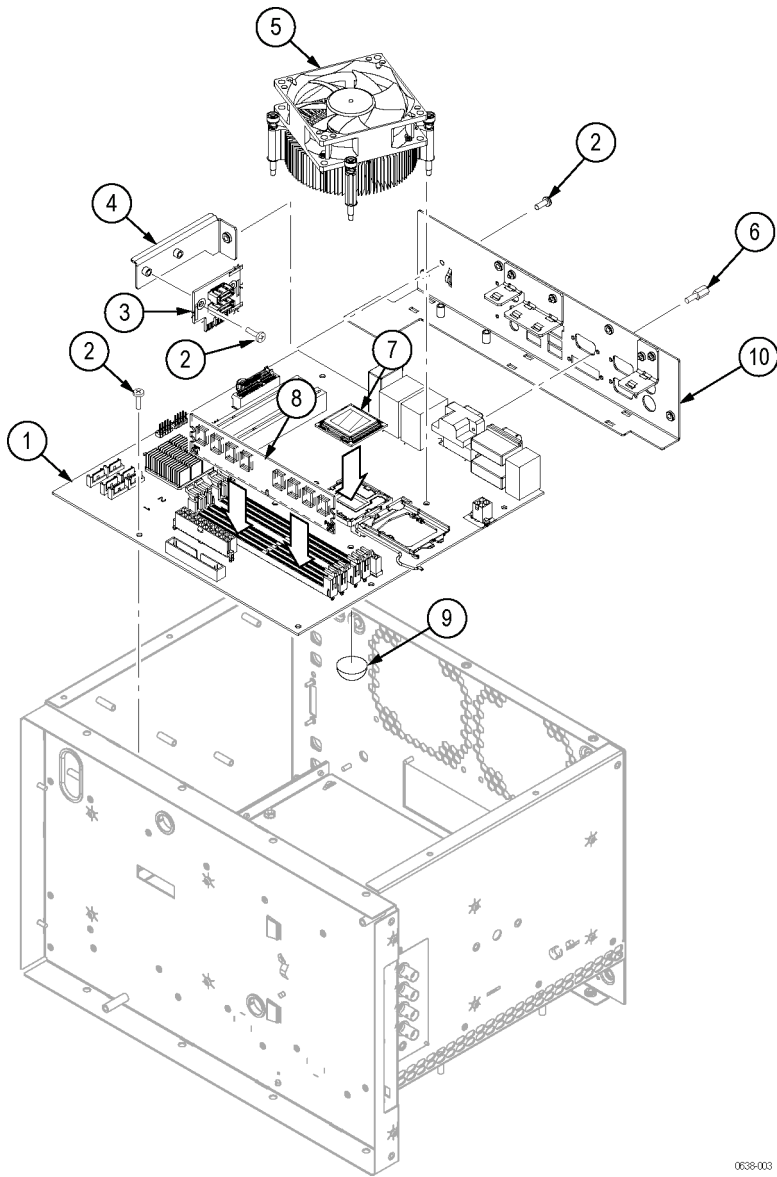| Figure and index no.	Tektronix part no.	Serial no. effective	Serial no. discont'd	Qty.	Name and description
9-1	119-7877-00			1	POWER SUPPLY: AC-DC; 90-264VAC,47-63HZ IN; +12V@36A, +12VSB@2A3, 460W OUT; REMOTE-ON, STATUS SIGNALS
-2	407-5673-00			1	BRACKET, POWER SUPPLY ADAPTER
-3	210-1568-00			5	NUT, PL, ASSEM WA; 6-32 X 0.312, W/LOCKWASHER, STL, ZNPL
-4	211-0510-00			18	SCREW, MACHINE; 6-32 X 0.375, PNH, ZINC PLATED STEEL, T15
-5	407-5067-01			1	BRACKET, ASSEMBLY, REMOVABLE 3.5 INCH HARD DRIVE CARTRIDGE
-6	351-1118-00			2	GUIDE, HARD DRIVE (REMOVABLE 3.5 HARD DRIVE CARTRIDGE)
-7	850-0176-00			1	HARD DISK DRIVE; PROGRAMMED 119788100, 500GB SATA, SW V6.0.XXX FOR AIMB-581QG2-00A1E
-8	131-8257-00			4	CONNECTOR, PANEL MOUNT; BNC TO MCX
-9	407-5650-00			1	BRACKET,DVD-CD/RW; ADAPTER FOR DVD-CD/RW,SLIMLINE
-10	211-0959-00			2	SCREW MACHINE; M4X5MM L,BDGH,STL ZN PL,CROSS REC
-11	343-1755-00			1	CLAMP, CABLE (LINE IN)
-12	119-7883-00			2	FAN, TUBEAXIAL;12VDC, 120MM (TERMINATED)
-13	174-6064-00			1	CABLE , LINE IN (WITH FILTER)
-14	213-1150-00			4	SCREW, FLAT HEAD, T15 FAN SCREW, M5X10
-15	337-4564-00			1	SHIELD, ELEC ANALOG MUX
-16	119-7678-70			1	DISK DRIVE; OPTICAL,CD-RW/DVD-R/RW DVD+R/RW,16.7 MB/SEC,650MEG/8.5GIG,IDE/ATAPI;TEAC MODEL DV-W28E-793
-17	679-5974-00			1	CKT BD SUBASSY; USB ADAPTER BOARD
-18	343-1701-00			2	CLAMP,CABLE; WITH ADHESIVE BACK
-19	384-1838-00			2	GROMMET, PLASTIC, BLACK, ROUND .625 ID
-20	174-5056-00			1	CABLE ASSY; 30 POSITION LVDS
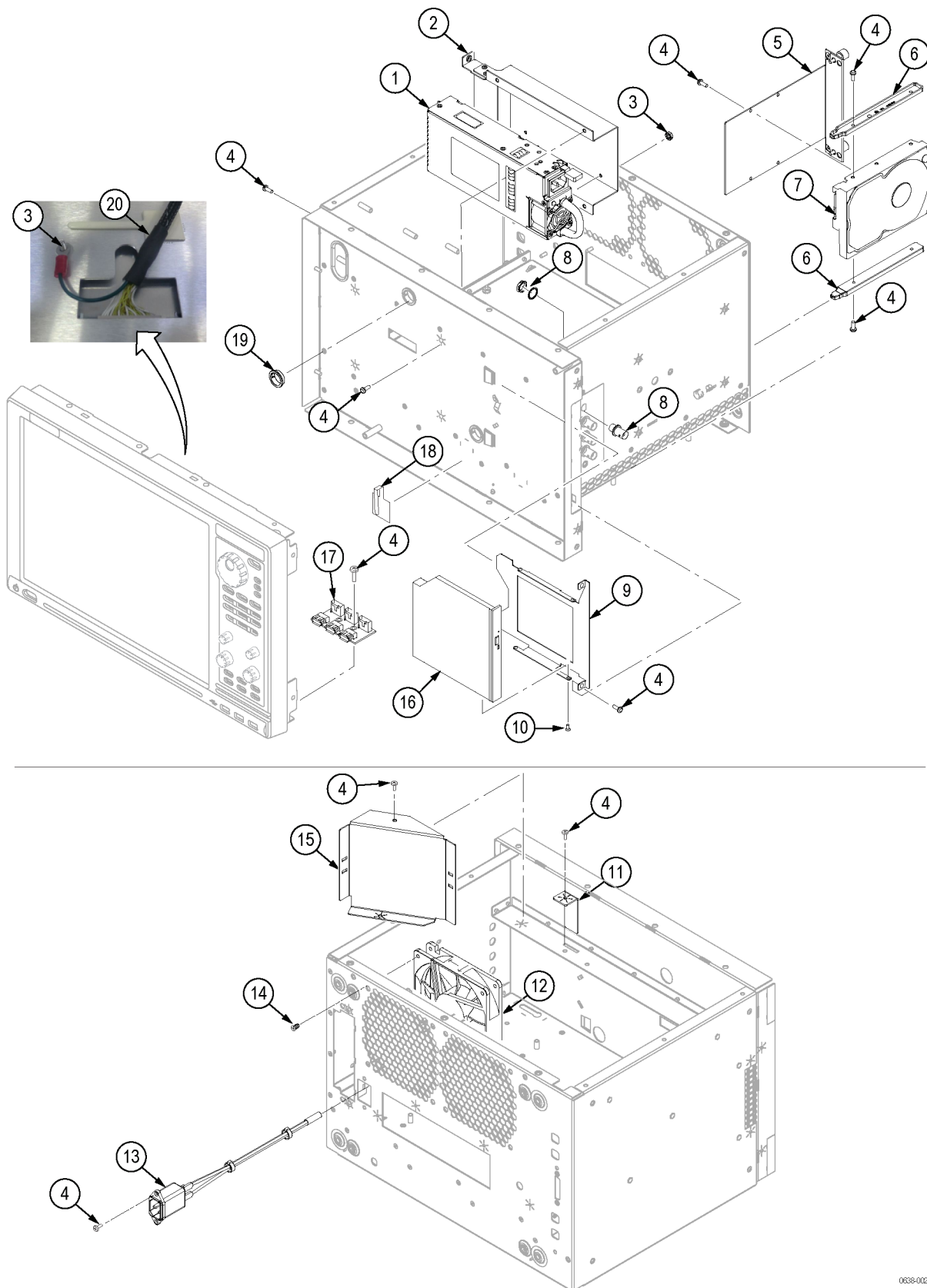
Figure 9: Internal components

Table 11: Mother board

Figure and index no.	Tektronix part no.	Serial no. effective	Serial no. discont'd	Qty.	Name and description
10-1	039-0199-00			1	COMPUTER BOARD;ADVANTECH, MICROATX, LGA 1156 NEHALEM PROC, DDR3, PCI-E X4, DUAL CH LVDS, DVI, SINGLE GBE LAN; ADVANTECH AIMB-581
-2	211-0510-00			12	SCREW, MACHINE; 6-32 X 0.375, PNH, ZINC PLATED STEEL, T15
-3	878-0640-00			1	CIRCUIT BOARD ASSY;PCI EXPRESS TO DUAL SATA ADAPTER,UNTESTED,WIRED
-4	407-5633-00			1	BRACKET, PCIE ADAPTER
-5	214-5317-00			1	FANSINK ASSEMBLY, INTEL LGA1156, I7 SERIES
-6	214-3903-00			8	SCREW, JACK; 4-40 X 0.312 LONG, 0.188 H HEX HEAD STAND OFF, 4-40 INT THD, X 0.312 THD EXT 4-40, STEEL, ZINC PLATED
-7	167-2015-00			1	PROCESSOR; CORE I3-2120 DESKTOP, 3.3GHZ, 2 CORES, 3M CACHE, 65W, LGA1155
-8	167-2017-00			2	IC, MEMORY, DRAM;256MBITX64, DDR3, 1066MHZ, PC3-8500, 2GB DIMM, 240-PIN MODULE
-9	348-2022-00			4	DAMPENER, VIBRATION: .750 HEMISPHERE, 30 DUROMETER
-10	407-5670-00			1	BRACKET, MOTHERBOARD ADAPTER (AIMB 581 STANDARD)

0638-003

Figure 10: Computer board

Table 12: Interface board and acquisition board

Figure and index no.	Tektronix part no.	Serial no. effective	Serial no. discont'd	Qty.	Name and description
11-1	174-6061-00			1	CABLE, POWER, 24 PIN (INTERFACE TO MOTHERBOARD)
-2	174-6060-00			1	CABLE, DISPLAY MODULE (INTERFACE TO DISPLAY ADAPTER)
-3	174-6070-00			1	CABLE, BACKLIGHT (MOTHERBOARD TO INTERFACE)
-4	174-5650-00			1	CABLE, SATA-DVD, DATA AND POWER
-5	174-5837-00			1	CABLE ASSY; DUAL USB 2.0 CABLE,2X5 TO 2 1X5 LATCH HOUSING,32.0 INCHES LONG
-6	174-6059-00			1	CABLE, ON STAND BY (MOTHERBOARD TO INTERFACE)
-7	878-0627-00			1	CIRCUIT BOARD ASSY;INTERFACE,UNTESTED,WIRED
-8	174-6059-00			1	CABLE, ON STAND BY (MOTHERBOARD TO INTERFACE)
-9	174-6062-00			1	CABLE, SATA (PCIE ADAPTER TO INTERFACE)
-10	175-8029-00			4	CABLE ASSEMBLY, RF (MCX-MCX)
-11	870-0626-00			1	CIRCUIT BOARD ASSY;ACQUISITION, 136 CH, TLA6404
	870-0666-00			1	CIRCUIT BOARD ASSY;ACQUISITION, 102 CH, TLA6403
	870-0667-00			1	CIRCUIT BOARD ASSY;ACQUISITION, 68 CH, TLA6402
	870-0668-00			1	CIRCUIT BOARD ASSY;ACQUISITION, 34 CH, TLA6401
-12	211-0510-00			18	SCREW, MACHINE; 6-32 X 0.375, PNH, ZINC PLATED STEEL, T15
-13	174-6176-00			1	CABLE ASSEMBLY, RF (MCX TO MCX)
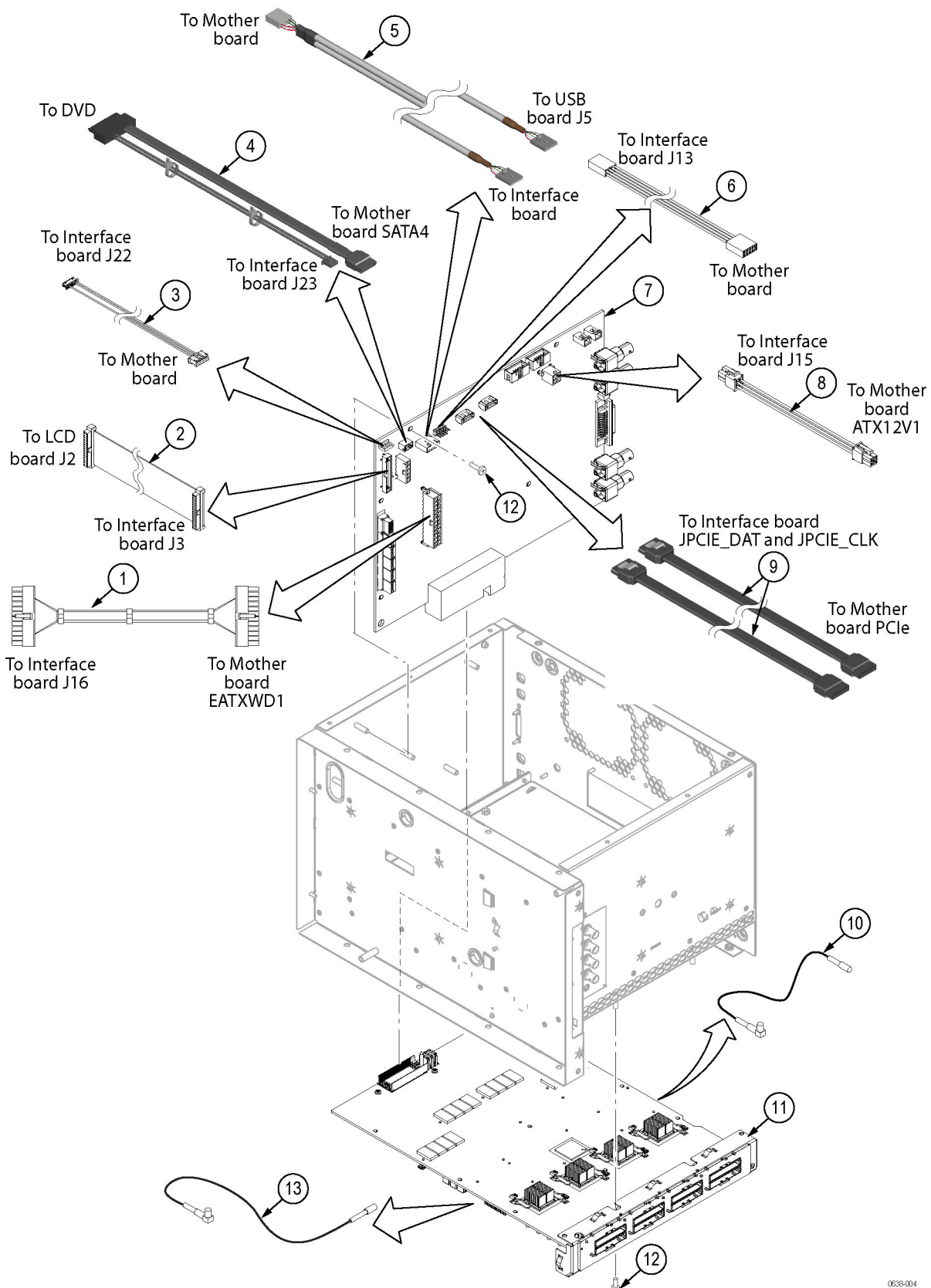
Figure 11: Interface board and acquisition boards and cables

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