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Service Manual

Tektronix

TLA 720
Benchtop Controller

071-0269-01

071026901

Service Manual

Tektronix

TLA 720
Benchtop Controller

071-0269-01

Warning
The servicing instructions are for use by qualified personnel only. To avoid personal injury, do not perform any servicing unless you are qualified to do so. Refer to all safety summaries prior to performing service.

CE

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Preface

This is the service manual for the TLA 720 Benchtop Controller. Read this preface to learn how this manual is structured, what conventions it uses, and where you can find other information related servicing this product.

Read the *Introduction*, which follows this preface, for safety and other important background information needed before using this manual for servicing this product.

Manual Structure

This manual is divided into chapters, which are made up of related subordinate topics. These topics can be cross referenced as sections.

Be sure to read the introductions to all procedures. These introductions provide important information needed to do the service correctly, safely, and efficiently.

Manual Conventions

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

Modules Throughout this manual, the term “module” refers to a TLA 700 Series Logic Analyzer, DSO, or Benchtop Controller that mounts inside a TLA 700 Series Benchtop Chassis. A module is composed of circuit cards, replaceable parts, interconnecting cables, and a user-accessible front panel.

Benchtop Controller A benchtop controller is a TLA 711 or TLA 720 Color Benchtop Controller. The benchtop controller is a module that is installed in the benchtop chassis.

Benchtop Chassis A benchtop chassis is a TLA 711 or TLA 720 Color Benchtop Chassis that the benchtop controller module plugs into.

Benchtop Mainframe A benchtop mainframe is a benchtop chassis with a benchtop controller installed.

Expansion Mainframe An expansion mainframe is a TLA 7XM expansion chassis with a TLA 7XM expansion module installed.

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 (field) replaceable part is any assembly that is listed in the replaceable parts list of Chapter 10. Also, see *Strategy for Servicing* on page xi.

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

Contacting Tektronix

Product Support	For questions about using Tektronix measurement products, call toll free in North America: 1-800-TEK-WIDE (1-800-835-9433 ext. 2400) 6:00 a.m. – 5:00 p.m. Pacific time Or contact us by e-mail: tm_app_supp@tek.com For product support outside of North America, contact your local Tektronix distributor or sales office.
Service Support	Tektronix offers extended warranty and calibration programs as options on many products. Contact your local Tektronix distributor or sales office. For a listing of worldwide service centers, visit our web site.
For other information	In North America: 1-800-TEK-WIDE (1-800-835-9433) An operator will direct your call.
To write us	Tektronix, Inc. 14200 SW Karl Braun Drive Beaverton, OR 97077 USA
Website	Tektronix.com

General Safety Summary

Review the following safety precautions to avoid injury and prevent damage to this product or any products connected to it. To avoid potential hazards, use this product only as specified.

Only qualified personnel should perform service procedures.

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

To Avoid Fire or Personal Injury

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

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

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

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

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

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

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

Do Not Operate in Wet/Damp Conditions.

Do Not Operate in an Explosive Atmosphere.

Keep Product Surfaces Clean and Dry.

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

Symbols and Terms

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



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



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

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

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

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

CAUTION indicates a hazard to property including the product.

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



WARNING
High Voltage



Protective Ground
(Earth) Terminal



CAUTION
Refer to Manual



Double
Insulated

Service Safety Summary

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

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

Disconnect Power. To avoid electric shock, disconnect the main power by means of the power cord or, if provided, the power switch.

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

To avoid electric shock, do not touch exposed connections.

Introduction

This manual contains information needed to properly service the benchtop controller. This introduction contains information critical to safe and effective servicing of the benchtop controller.

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

- The procedures in this manual should be performed only by a qualified service person.
- Read the *General Safety Summary* and *Service Safety Summary* found at the beginning of this manual.
- Read the *Preface* beginning on page v.
- Read *Operating Information* beginning on page 2–1.

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

Strategy for Servicing

This manual supports and contains all the information needed for periodic maintenance of the benchtop controller. This manual does not support component-level fault isolation and replacement.

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

- Supports isolation of faults to the failed circuit board or assembly level shown in the replaceable parts list of Chapter 10.
- Supports removal and replacement of those boards or assemblies.
- Supports removal and replacement of fuse, knobs, chassis, and other mechanical parts listed in the replaceable parts list.

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 benchtop controller. Services are provided at Tektronix Services Centers and on-site at your facility, depending on your location.

Warranty Repair Service

Tektronix warrants this product for one year from date of purchase. Tektronix technicians provide warranty service at most Tektronix service locations worldwide. The Tektronix product catalog lists all service locations worldwide.

Repair or Calibration Service

The following services can be purchased to tailor repair and/or calibration of the benchtop controller to fit your requirements.

At Depot Service

Tektronix offers several standard-priced adjustment (calibration) and repair services:

- A single repair and/or adjustment.
- Calibrations using equipment and procedures that meet the traceability standards specific to the local area.
- Annual maintenance agreements that provide for repair of the benchtop controller.

Of these services, the annual maintenance agreement offers a particularly cost-effective approach to service for many owners of the benchtop controller.

Self Service

Tektronix supports repair to the replaceable-part level by providing module exchange.

Specifications

Specifications

This chapter provides a brief product description, specifications and characteristics of the TLA 720 Color Benchtop Controller.

Product Description

The TLA 720 Color Benchtop Controller is a high-performance personal computer based controller that installs in the color benchtop chassis.

Characteristics Tables

This section lists only the specifications that are useful for servicing. All specifications listed here should be considered “typical”. Typical characteristics describe typical or average performance and provide useful reference information.

Refer to Appendix A of the *TLA 700 Series Logic Analyzer User Manual* for a complete listing of all specifications.

Table 1–1 lists the characteristics of the TLA 720 Color Benchtop Controller.

Table 1–1: Benchtop controller characteristics

Characteristic	Description
Operating System	Microsoft Windows 98
Microprocessor	266 MHz Intel Pentium with MMX
Main Memory	
Maximum Installed Configuration	128 MB (Two 64 MB SO DIMMs)
Style	144 Pin SO DIMM
Speed	60 ns
Cache Memory	512 Kbyte, level 2 (L2) write-back cache
Flash BIOS	512 Kbyte
Real-Time Clock and CMOS Setups NVRAM *(Typical)*	Real-Time clock/calendar, with typical 10-year life. Standard and advanced PC CMOS setups.

Table 1–1: Benchtop controller characteristics (cont.)

Characteristic	Description
Bootable Replaceable Hard Disk Drive	Standard PC compatible IDE (Integrated device Electronics) hard disk drive residing on an EIDE interface.
Size	MIN 2.1 GByte MAX 6.4 GByte Continually subject to change due to the fast-moving PC component environment. These storage capacities valid at product introduction.
Interface	ATA -4/Enhanced IDE (EIDE)
Average seek time	Read 13 ms
I/O data-transfer rate	33.3 MB/s max (U-DMA mode 2)
Floppy Disk Drive	Standard 3.5 inch, 1.44 Mbyte, double-sided, PC-compatible high-density floppy disk drive
CD ROM Drive	24X, Standard PC Compatible Continually subject to change due to the fast-moving PC component environment. Valid at product introduction.
Display Classification	Standard PC graphics accelerator technology (bitBLT based) capable of driving external color VGA, SVGA, or XGA monitors.
Display Memory	2 MB
Display Drive Display Size	One VGA, SVGA, or XGA compatible analog output port. User selected via Windows 98 Resolution (Pixels) / Colors / DDC1 640 x 480 / 256 / yes 640 x 480 / 64,000 / yes 640 x 480 / 16,800,000 / no 800 x 600 / 256 / yes 800 x 600 / 64,000 / yes 1024 x 768 / 256 / yes 1280 x 1024 / 256 / yes 1600 x 1200 / 256 / yes
SVGA Output Port (SVGA)	The SVGA port utilizing a 15-pin sub-D SVGA connector. Compliant with EIA RS 343A.
Dual USB Ports	Two USB Ports
Mouse Port	PS2 compatible pointing device port
Keyboard Port	PS2 compatible keyboard port
Parallel Interface Port (LPT)	Parallel interface port supports standard Centronics mode, Enhanced Parallel Port (EPP), or Microsoft high-speed mode (ECP) and utilizes a 36-pin high-density connector.
Serial Interface Port (COM)	The serial port utilizing a 9-pin male sub-D connector to support an RS232 serial port. Compliant with EIA/TIA 574.

Table 1–1: Benchtop controller characteristics (cont.)

Characteristic	Description
Card Bus 32	Standard Type I and II PC compatible PC card slot. Compliant with PCMCIA and JEDIA 4.1
Type I, II, and III PCMCIA PC Card Port	Standard Type I, II, and III PC compatible PC card slot. Compliant with PCMCIA and JEDIA 4.1

Table 1–2 lists the benchtop controller mechanical characteristics.

Table 1–2: Benchtop controller mechanical characteristics

Characteristic	Description
Weight	5 lb. 3 oz. (2.34 kg)
Size	Three slot-wide
Overall dimensions	
Height	10.32 in (262 mm)
Width	3.6 in (78 mm)
Depth	14.7 in (373 mm)

Table 1–3 lists the external signal interface characteristics for the benchtop mainframe.

Table 1–3: Benchtop mainframes external signal interface characteristics

Characteristic	Description
System Trigger Input	TTL compatible input via rear panel mounted BNC connectors (portable mainframe) or front panel mounted SMB connectors (benchtop mainframe).
Input Levels V_{IH} V_{IL}	TTL compatible input. $\geq$ 2.0 V $\leq$ 0.8 V
Input Mode	Falling edge sensitive, latched (active low)
Minimum Pulse Width	12 ns
Active Period	Accepts system triggers during valid acquisition periods via real-time gating, resets system trigger input latch between valid acquisition periods.
Maximum Input Voltage	0 to +5 Volt peak

Table 1–3: Benchtop mainframes external signal interface characteristics (cont.)

Characteristic	Description
External Signal Input	TTL compatible input via rear panel mounted BNC connectors (portable mainframe) or front panel mounted SMB connectors (benchtop mainframe).
Input Destination	Signal 1, 2, 3, 4
Input Levels V_{IH} V_{IL}	TTL compatible input. ≥ 2.0 V ≤ 0.8 V
Input Mode	Active (true) low, level sensitive
Input Bandwidth Signal 1, 2 Signal 3, 4	 50 MHz square wave minimum[1] 10 MHz square wave minimum[1]
Active Period	Accepts signals during valid acquisition periods via real-time gating
Maximum Input Voltage	0 to +5 Volt peak
System Trigger Output	TTL compatible output via rear panel mounted BNC connectors (portable mainframe) or front panel mounted SMB connectors (benchtop mainframe).
Source Mode	Active (true) low, falling edge latched
Active Period	Outputs system trigger state during valid acquisition period, resets system trigger output to false state between valid acquisitions.
Output Levels V_{OH} V_{OL}	50 Ohm back terminated TTL-compatible output ≥4 V into open circuit ≥ 2 V into 50 Ohm to ground ≥ 0.7 V sinking 10 ma
Output Protection	Short-circuit protected (to ground)
Intermodule Signal Line Bandwidth	Minimum bandwidth up to which the intermodule signals are specified to operate correctly Signal 1, 2 (ECLTRG0, 1) 50 MHz square wave minimum Signal 3, 4 (TTLTRG0, 1) 10 MHz square wave minimum
External Signal Output	TTL compatible outputs via rear panel mounted BNC connectors (portable mainframe) or front panel mounted SMB connectors (benchtop mainframe).
Source Selection	Signal 1, 2, 3, 4, or 10 MHz clock
Output Modes Level Sensitive	User definable Active (true) low or active (true) high
Output Levels V_{OH} V_{OL}	50 Ohm back terminated TTL output ≥ 4 V into open circuit ≥ 2 V into 50 Ohm to ground ≤ 0.7 V sinking 10 ma
Output Bandwidth Signal 1, 2 Signal 3, 4	 50 MHz square wave minimum[2] 10 MHz square wave minimum[2]

Table 1–3: Benchtop mainframes external signal interface characteristics (cont.)

Characteristic	Description
Active Period	Outputs signals during valid acquisition periods, resets signals to false state between valid acquisitions. Outputs 10 MHz clock continuously
Output Protection	Short-circuit protected (to ground)

1 **The input bandwidth only applies to signals to the modules, not round trip signals into the external signal Input and back out the external signal outputs.**

2 **The output bandwidth only applies to signals from the modules, not round trip signals out the external signal output and back into the external signal inputs.**

Table 1–4 lists the backplane interface characteristics for the benchtop mainframe.

Table 1–4: Benchtop mainframes backplane interface characteristics

Characteristic	Description
Slots	
Benchtop mainframe	13
CLK10 Frequency	10 MHz ±100 PPM

Table 1–5 lists the electromagnetic compatibility (EMC) characteristics.

Table 1–5: Electromagnetic compatibility (EMC) characteristics

Characteristic	Description
Emissions	Emissions shall be within the limits specified by the following requirements:
Enclosure	EN 55011 Class A limits for radiated emissions
Immunity, Enclosure, Radio Frequency Electromagnetic Field	No instrument failures when the instrument is subjected to a 3 V/m electromagnetic field over the frequency range of 80 MHz to 1000 MHz.
Immunity, Enclosure, Electrostatic Discharge (ESD)	Up to 8 kV with no change to control settings or impairment of normal operation. 4 kV contact discharge and 8 kV air discharge.
Immunity, Fast transients, Electrical	No loss of stored data, change to control settings, degradation of performance, or temporary loss of function will occur when the system is subjected to the transients as described below. Port — Peak Voltage — Tr/Th — Rep Frequency Signal & Control — 0.5 kV — 5/50 ns — 5 kHz AC Power — 1.0 kV — 5/50 ns — 5 kHz

Table 1–6 lists the atmospheric characteristics.

Table 1–6: Atmospheric characteristics

Characteristic	Description
Temperature: Operating and non-operating	Operating (no media in floppy disk drive) +5° C to +50° C, 15° C/hour maximum gradient, non-condensing (derated 1° C per 1000 feet above 5000 foot altitude) Non-operating (no media in floppy disk drive) –20° C to +60° C, 15° C/hour maximum gradient, non-condensing
Humidity: Operating and non-operating	Operating (no media in floppy disk drive) 20% to 80% relative humidity, non-condensing. Maximum wet bulb temperature: +29° C (derated relative humidity to approximately 22% at +50° C) Non-operating (no media in floppy disk drive) 8% to 80% relative humidity, non-condensing. Maximum wet bulb temperature: +40° C (derated relative humidity to approximately 55% at +50° C)
Altitude: Operating and non-operating	Operating: To 9144 feet (3000 meters), (derated 1° C per 1000 feet (305 meters) above 5000 feet (1524 meters) altitude) Non-operating: 39376 feet (12000 meters)

Table 1–7 lists the dynamic characteristics.

Table 1–7: Dynamic characteristics

Characteristic	Description
Random Vibration: Operating and non-operating	Operating: 0.27 g_{rms} total from 5 Hz to 500 Hz, 10 minutes each axis, 3-axes, 30 minutes total. Profile: 0.00015 g^2/Hz 5-350 Hz, –3dB/octave slope 350-500 Hz, 0.000105 g^2/Hz Non-operating: 2.28 g_{rms} total from 5 Hz to 500 Hz, 10 minutes each axis, 3-axes, 30 minutes total. Profile: 0.0175 g^2/Hz 5-100Hz, –3dB/octave slope 100-200 Hz, 0.00875g^2/Hz 200-350 Hz, –3dB/octave slope 350-500 Hz, 0.006132 g^2/Hz

Certifications and Compliances

Table 1–8: Certifications and compliances

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

Operating Information

Operating Information

Because the benchtop controller can not be operated outside of the benchtop chassis, this chapter contains limited information about operation.

Refer to the *TLA 700 Series User Manual* for complete information on how to operate and configure the benchtop controller.

The benchtop controller is a control module that is an integral part of the benchtop chassis. The benchtop controller hardware is a slot zero device and occupies three slots, 0 through 2.

Front Panel Components

The following is an overview of the benchtop controller front panel components.

LED Indicators

The benchtop controller has four LED indicators located on the front panel. Figure 2–1 shows the front panel with the location of the LED indicators and front panel connectors.

SLEEP Indicator. Indicates that the benchtop controller is in sleep mode.

RUN Indicator. Indicates that the memory is accessing data.

SYSTEM FAIL Indicator. Indicates a SYSFAIL condition exists on the communications bus.

TEST Indicator. Indicates that the benchtop controller is executing a power-on self test (POST) diagnostic test sequence.

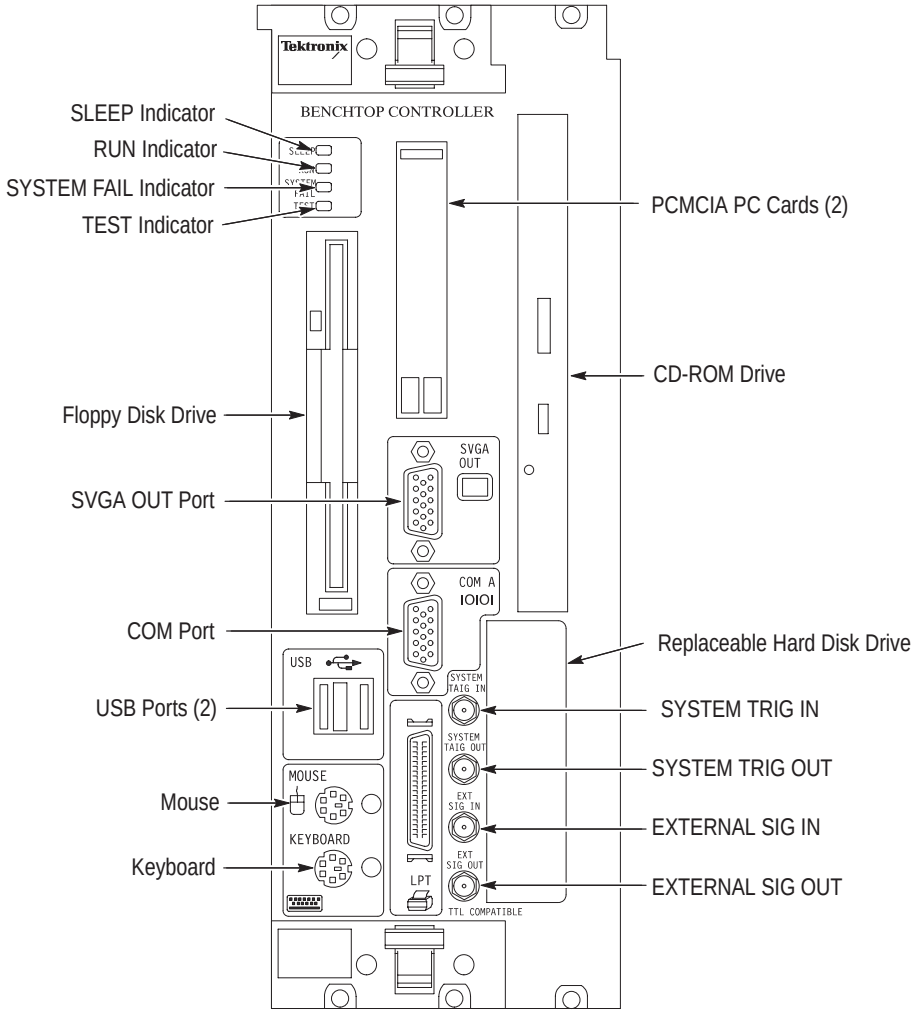


Figure 2–1: Front view of the Benchtop Controller

Main Memory

Memory SO DIMMs

The portable mainframe utilizes 144-pin SO DIMM memory devices. The memory devices must have gold pins. The maximum supported configuration is 128 MB.

Refer to the specifications for memory parameters.

Communications Ports

USB Port

There are two USB (universal serial bus) ports. The USB ports can be used for any USB complaint device.

Table 2–1: USB pin assignments

Pin number	Pin function	Pin number	Pin function
A1	Vcc	B1	Vcc
A2	A DATA –	B2	B DATA –
A3	A DATA +	B3	B DATA +
A4	GND	B4	GND

Mouse Port

The benchtop controller supports an external pointing device. The mouse connector is a standard six-pin, PS/2-compliant DIN connector. The mouse port can be connected to an external, standard PS/2-compliant three-button mouse.

Keyboard Port

The benchtop controller has an external keyboard port. The keyboard connector is a standard six-pin PS/2-compliant DIN connector. The keyboard port can be connected to an external, standard PS/2-compliant keyboard.

Replaceable Hard Disk Drive

There is one replaceable hard drive.

Because of the speed at which the PC industry evolves, the hard disk drive size is subject to change.

This service manual lists the size of the hard disk drive available at the time the product was introduced. Consult your Tektronix Sales Representative for the maximum hard disk drive available.

Fixed Hard Disk Drive

It is possible to add a fixed hard disk drive to the TLA 714 mainframe which is available through the TLA 7UP mainframe upgrade kit. Contact your Tektronix representative for more information on available upgrades to your mainframe.

Floppy Disk Drive

There is one standard high-density/double-sided floppy disk drive.

CD ROM

There is one CD ROM drive.

Because of the speed at which the PC industry evolves, the CD ROM drive is subject to change.

This service manual lists the speed of the CD ROM drive available at the time the product was introduced. Consult your Tektronix Sales Representative for the maximum CD ROM speed available.

PC Card Bus

There are two PC Card Bus slots. The PC card(s) can be inserted in either slot, or two cards can occupy both slots at the same time. The PC card port supports an optional Ethernet NIC (network interface card).

SVGA Port

The SVGA OUT port supports an industry standard SVGA color monitor. The connector is a 15-pin, sub-D SVGA-compliant connector. See Table 2–2 for pin assignments.

Table 2–2: SVGA OUT pin assignments

Pin number	Pin function	Pin number	Pin function
1	RED	2	GRN
3	BLU	4	NC
5	GND	6	GND
7	GND	8	GND
9	(KEY)	10	GND
11	NC	12	DDC DAT
13	HSYNC	14	VSYNC
15	DDD CLK		

COM Port

The COM port is an industry standard RS-232 serial port.

Pin number	Pin function	Pin number	Pin function
1	DCD	2	RXD
3	TXD	4	DTR
5	GND	6	DSR
7	RTS	8	CTS
9	Ring Indicator		

LPT Port

The LPT port is a parallel printer port. This parallel printer port supports standard Centronics mode, Enhanced Parallel Port (EPP), or Microsoft high-speed mode (ECP) and utilizes a 36-pin high density Centronics-compliant connector. See Table 2–3 for pin assignments.

Table 2–3: LPT (parallel interface) pin assignments

Pin number	Pin function	Pin number	Pin function
1	BUSY	19	GND
2	SLCT	20	GND
3	ACK*	21	GND
4	ERR*	22	GND
5	PE	23	GND
6	D0	24	GND
7	D1	25	GND
8	D2	26	GND
9	D3	27	GND
10	D4	28	GND
11	D5	29	GND
12	D6	30	GND
13	D7	31	GND
14	INIT*	32	GND
15	STB*	33	GND
16	SLIN*	34	GND
17	AFD*	35	GND
18	HI	36	H1
See IEEE specification P1284-C for pin connection definitions for other modes			

Input/Output Connectors

Test I/O SMBs There are four test I/O Sub-Miniature Bayonet (SMB) connectors: system trig in, system trig out, ext sig in, and ext sig out.

System Trig In Connector The system trigger input is a TTL compatible signal input that is user definable in software.

System Trig Out Connector The system trigger output is a TTL compatible output signal that is user definable in software.

Ext Sig In Connector The external signal Input is a TTL compatible input signal that is user definable in software.

Ext Sig Out Connector The external signal output is a TTL compatible output signal that is user definable in software.

Internal Components

There are allocations for two SO DIMM memory modules. The SO DIMM modules are located internally to the controller, but can be accessed by removing the side cover.

There is a replaceable button battery to backup the NVRAM.

Operating System and Application Interface

The benchtop controller ships with the Microsoft Windows operating system factory installed. Operations and capabilities when running on the benchtop controller are the same as with Windows running on a high-performance personal computer. Windows Help is available from the Start menu of the Windows Task Bar. Refer to the *TLA 700 Series Installation Manual* if you need to reinstall any software.

The TLA 700 Series application interface is used to control data acquisition and processing by the logic analyzer. The TLA 700 Series application software is included with the product.

Diagnostics

The benchtop controller performs power-on BIOS diagnostics every time you power on the mainframe. The diagnostics window displays when any of the diagnostic tests fail. To access the diagnostics tests, use the System pull-down menu.

There are two other utilities to aid in troubleshooting: QA+Win32 and the TLA 700 Mainframe Diagnostics. Refer to the Maintenance section for information on diagnostics.

Theory of Operation

Theory of Operation

Controller

The benchtop controller is a high-performance personal computer based controller.

The primary difference between the benchtop controller and a standard personal computer is the communications bus interface used to communicate with the benchtop chassis and the instrument modules.

Mass Storage

The benchtop controller has a replaceable hard disk drive, an internal fixed hard disk drive (optionally field installed via TLA 7UP kit) floppy disk drive, and a CD ROM drive.

Maintenance

Maintenance

This chapter contains information needed to perform periodic corrective maintenance on the benchtop controller.



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

Preventing ESD

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



CAUTION. *Static discharge can damage any semiconductor component in the benchtop controller*

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

Inspection and Cleaning

The benchtop controller 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 benchtop controller as needed, based on your operating environment.

Exterior Inspection

Inspect the outside of the benchtop controller for damage, wear, and missing parts. Use Table 4–1 as a guide. Modules that appear to have been dropped or otherwise abused should be checked thoroughly to verify correct operation and performance. Immediately repair defects that could cause personal injury or lead to further damage to the benchtop controller or the benchtop chassis that the module plugs into.

Table 4–1: External inspection check list

Item	Inspect for	Repair action
Front panel and side cover	Cracks, scratches, deformations, missing or damaged retainer screws, or ejector handles.	Replace defective or missing parts.
Front panel connectors	Broken shells, cracked insulation, and deformed contacts. Dirt in connectors.	Replace defective parts. Clear dirt out of connectors.
Rear connectors	Cracked or broken shells, damaged or missing contacts. Dirt in connectors.	Replace defective parts. 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 on any part of the benchtop controller.



CAUTION. *Avoid getting moisture inside the benchtop controller 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 cover to access the inside of the benchtop controller for inspection and cleaning. Refer to the *Removal and Installation Procedure* section on page 4–5 for detailed information on cover removal. Inspect the internal portions of the benchtop controller for damage and wear using Table 4–2 as a guide. Defects found should be repaired immediately.

Table 4–2: Internal inspection check list

Item	Inspect for	Repair action
Circuit boards	Loose, broken, or corroded solder connections. Burned circuit boards. Burned, broken, or cracked circuit-run plating.	Return to a Tektronix Service Center.
Resistors	Burned, cracked, broken, blistered condition.	Return to a Tektronix Service Center.
Solder connections	Cold solder or rosin joints.	Return to a Tektronix Service Center.
Capacitors	Damaged or leaking cases. Corroded solder on leads or terminals.	Return to a Tektronix Service Center.
Semiconductors	Loosely inserted in sockets. Distorted pins.	Firmly seat loose semiconductors. Remove devices that have distorted pins. Carefully straighten pins (as required to fit the socket), and reinsert firmly. Ensure that straightening action does not crack pins, causing them to break off.

Table 4–2: Internal inspection check list (cont.)

Item	Inspect for	Repair action
Wiring and cables	Loose plugs or connectors. 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 to the benchtop controller.*

Interior Cleaning Procedure

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

Basic monthly routine maintenance is as follows:

- Clean the exterior (face) of the floppy disk drive, CD ROM, and replaceable hard disk drive cartridge with a soft clean cloth and a mild detergent.
- To clean the floppy disk drive, use a commercially available floppy disk drive head cleaner kit, and follow the manufacturers instructions.

Removal and Installation Procedure

This section contains information needed to perform repair or corrective maintenance on the benchtop controller.



CAUTION. *The benchtop controller is not hot swapable.*

Do not remove or install the benchtop controller when the benchtop chassis is powered on.

Installing or removing the benchtop controller when the benchtop chassis is powered on may result in damage to the benchtop controller.

Preparation

Be sure to observe the following precautions to avoid damaging the benchtop controller while preparing to service it.



CAUTION. *Many components within the benchtop controller are susceptible to static-discharge damage.*

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

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

- Do not handle static-sensitive components on boards.
- Transport and store static-sensitive boards in their original containers or on conductive foam. Label any package that contains static-sensitive assemblies.
- Wear an anti-static wrist strap while handling the boards to discharge the static voltage from your body.
- Do not allow anything capable of holding or generating a static charge on the work surface.
- Do not slide a board over any surface.
- Avoid handling boards in areas that have a floor or work surface cover that is capable of generating a static charge.



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

Tools Required

Table 4–3 lists the tools you may need to replace modules in the benchtop controller.

Table 4–3: Tools required

Name
Small flat blade screwdriver
Screwdriver with a #0 Phillips head and a 6-inch long shaft
Screwdriver with a T-9 tip
Screwdriver with a T-10 tip
3/16 inch nut driver
Diagonal cutters (to remove cable ties)
Needle nose plier
Soldering iron
Solder wick or solder removing tool

Benchtop Controller Service Overview

The internal boards are not individually replaceable. If faults are isolated to the board level, the entire benchtop controller must be returned to a Tektronix Service Center for repair.

Replaceable Modules

The following sub-parts are replaceable:

- Replaceable hard disk drive and internal fixed hard disk drive
- Floppy disk drive
- CD ROM drive
- NVRAM backup button battery
- Front panel SMB connector assembly

Removing the Replaceable Hard Disk Drive

CAUTION. *Do not remove the replaceable hard disk drive when the mainframe is powered on.*

The replaceable hard disk drive may be permanently damaged if it is removed while the mainframe is powered on.

Always power down the mainframe before removing the replaceable hard disk drive.

Verify that the controller is powered down.

The replaceable hard disk drive cartridge is removed by depressing it to release the latch. Pull on the replaceable hard disk drive cartridge to remove it from the chassis. Refer to Figure 4–1, 4–2 and 4–3.

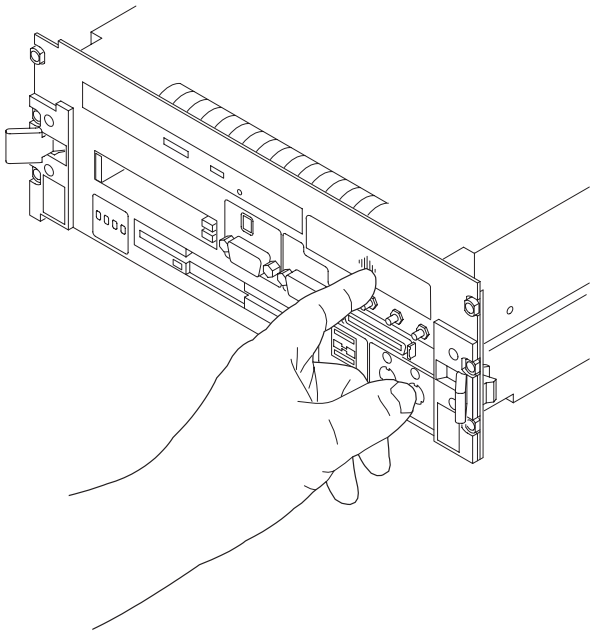


Figure 4–1: Depress the latch

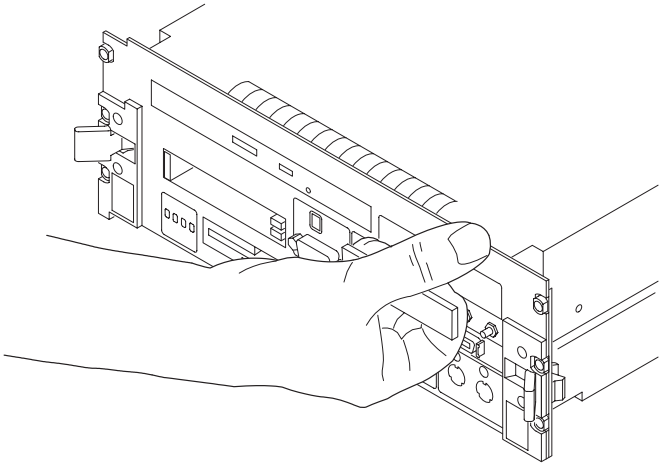


Figure 4–2: Unlatching the hard disk drive cartridge

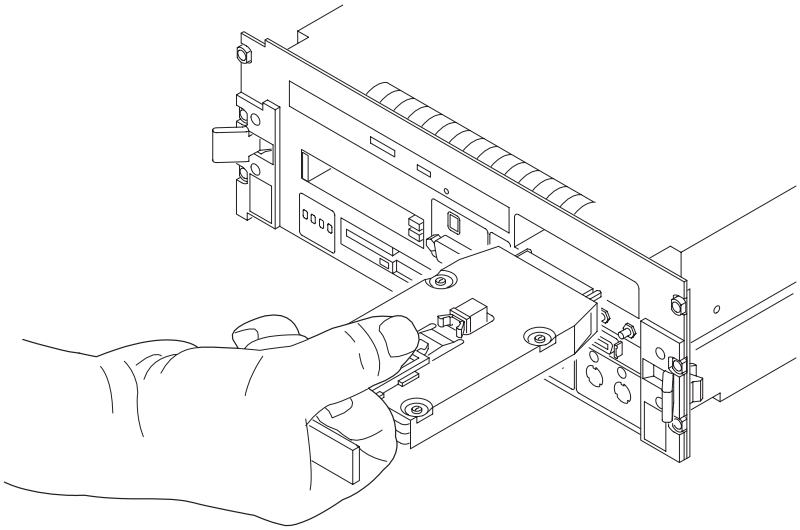


Figure 4–3: Removing the hard disk drive cartridge

Removing the Hard Disk Drive From The Cartridge

To remove the hard disk drive from the cartridge, refer to Figure 4–4 and follow these steps:

1. Remove the four screws that fasten the hard disk drive to the cartridge.
2. Carefully remove the hard disk drive from the cartridge, and remove the cable assembly from the connector on the hard disk drive.

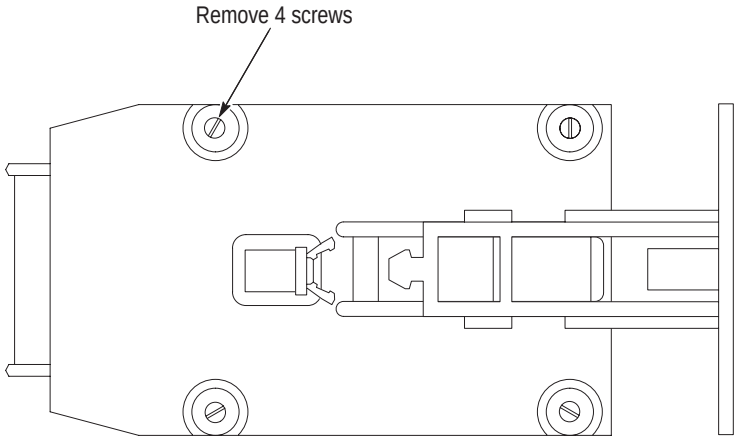


Figure 4–4: Removing the hard disk drive from the cartridge

Injector/Ejector Handles

You will need T-10 Torx tip driver to replace the injector/ejector handles.

NOTE. *The labels can be replaced without removing the handles.*

Removal

To remove the injector/ejector handles place the module on its right side as shown in Figure 4–5, and remove the screws and flat washers that secure the handle to the chassis. Remove the handle.

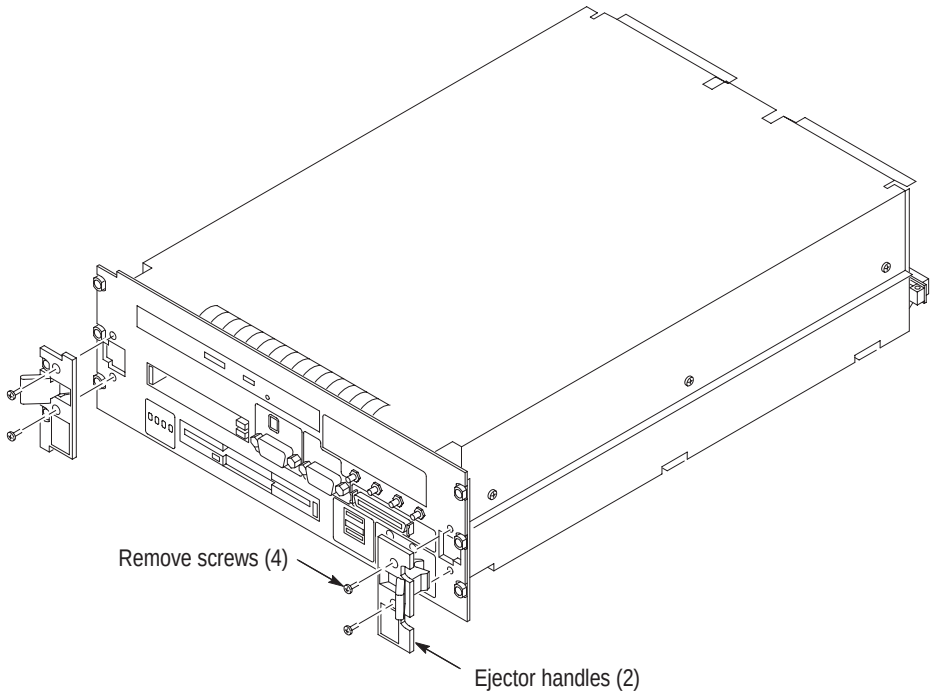


Figure 4–5: Removal and installation of the ejectors

Installation

Install the injector/ejector handle through the front panel cutout onto the mounting post, and install the screws and flat washers to secure the handle to the chassis.

NOTE. *The top and bottom injector/ejector handles are not interchangeable.*

Benchtop Controller Cover

Remove the cover to gain access internal modules and memory.

Removal Remove the screws shown in Figure 4–6 and lift the cover off.

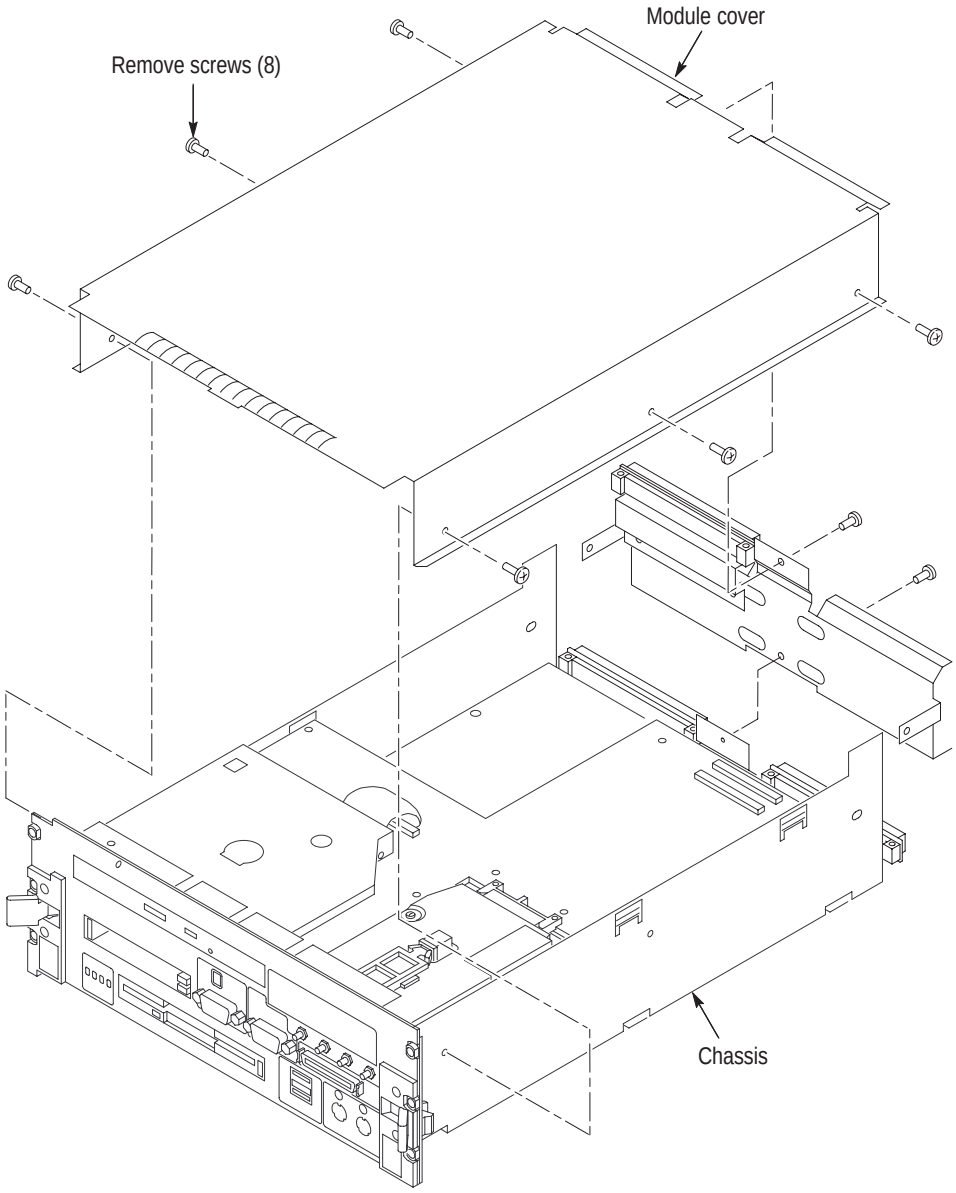


Figure 4–6: Removal and installation of the cover

Installation Place the cover on the chassis. Push forward on the cover so the tab on the front edge of the cover inserts into the rear of the front subpanel. Make sure that the cover is fully seated, with no gaps, against the front and rear chassis flanges.

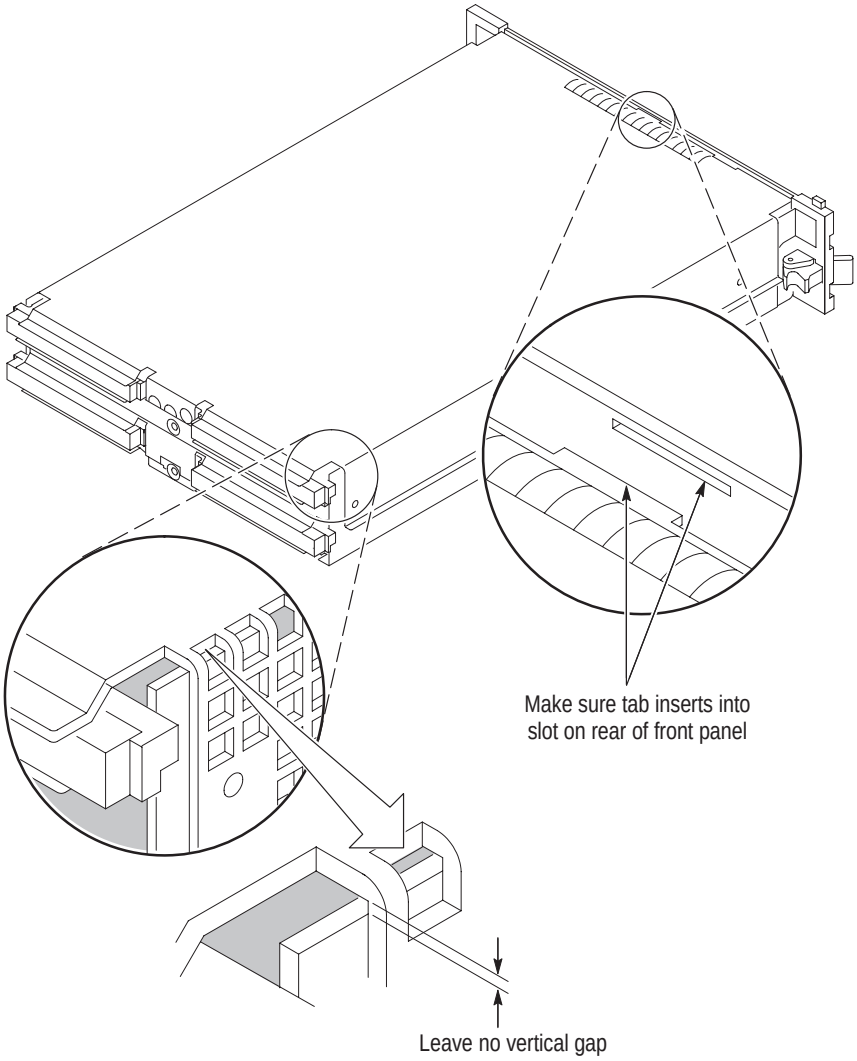


Figure 4–7: Seating the cover on the chassis

Secure the left side cover with the screws removed from the top and bottom of the enclosure.

Squeeze the sides together before tightening to ensure a good EMI seal and mechanical connection.

Button Battery

The button battery is located on the processor board.

To replace the button battery, slip the battery out of the clip.

Main Memory

Removal

The main memory SO DIMMs are located on the processor board. To access the memory SO DIMMs, follow these instructions:

1. Remove the cover following the instructions on page 4–11
2. Remove the SO DIMM by depressing the tabs on each side and lift it out of the socket.

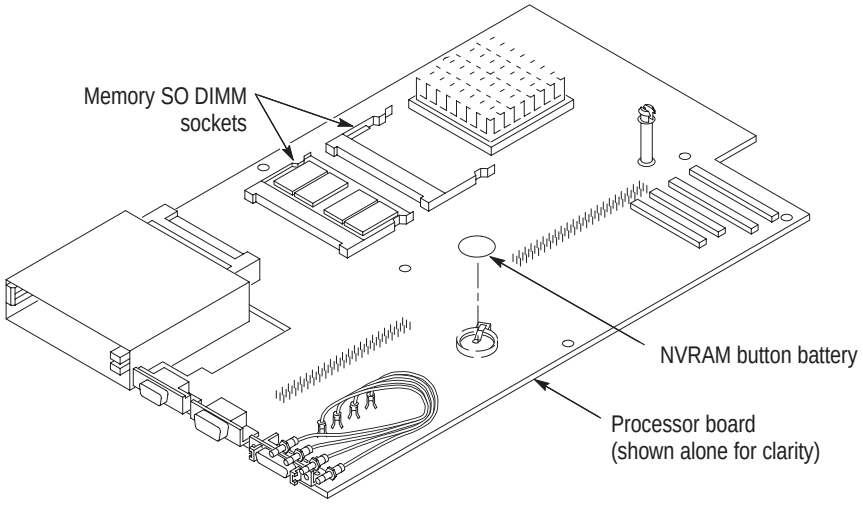


Figure 4–8: Removal and installation of the memory

Installation

To replace or add memory, follow these instructions:

CAUTION. *SO DIMM modules must have gold plated contacts.*

Use of SO DIMM modules that do not have gold plated contacts will result in eventual failure of the SO DIMM module.

Always use SO DIMM modules with gold plated contacts.

1. Populate SO DIMM 0 first.

2. Align the memory SO DIMM with the socket.
3. Gently push the SO DIMM into of the socket. The locking tabs on each side will engage.
4. Replace the cover following the instructions on page 4–12.
5. Install the controller into the benchtop chassis and power up.
6. Run the QAPlus/WIN diagnostic software to verify that all of the functions of the benchtop controller are functioning correctly.

Hard Drive Interface Board

NOTE. *The internal boards are not individually replaceable.*

If faults are isolated to the boards, the entire benchtop controller must be returned to a Tektronix Service Center for repair.

Removal

To remove the hard drive interface board, refer to Figure 4–9 and follow these instructions:

1. Remove the replaceable hard disk drive.
2. Remove the cover following the instructions on page 4–11
3. Disconnect the two ribbon cables located on the rear of the hard disk interface board.
4. Remove the screws as shown in Figure 4–9.
5. Remove the hard drive interface board.

Installation

To install the hard drive interface board, refer to Figure 4–9 and follow these instructions:

1. Locate the hard drive interface board as shown in Figure 4–9.
2. Install the screws.
3. Connect the two ribbon cables located on the rear of the hard disk interface board.
4. Replace the cover following the instructions on page 4–12.
5. Install the hard disk drive.

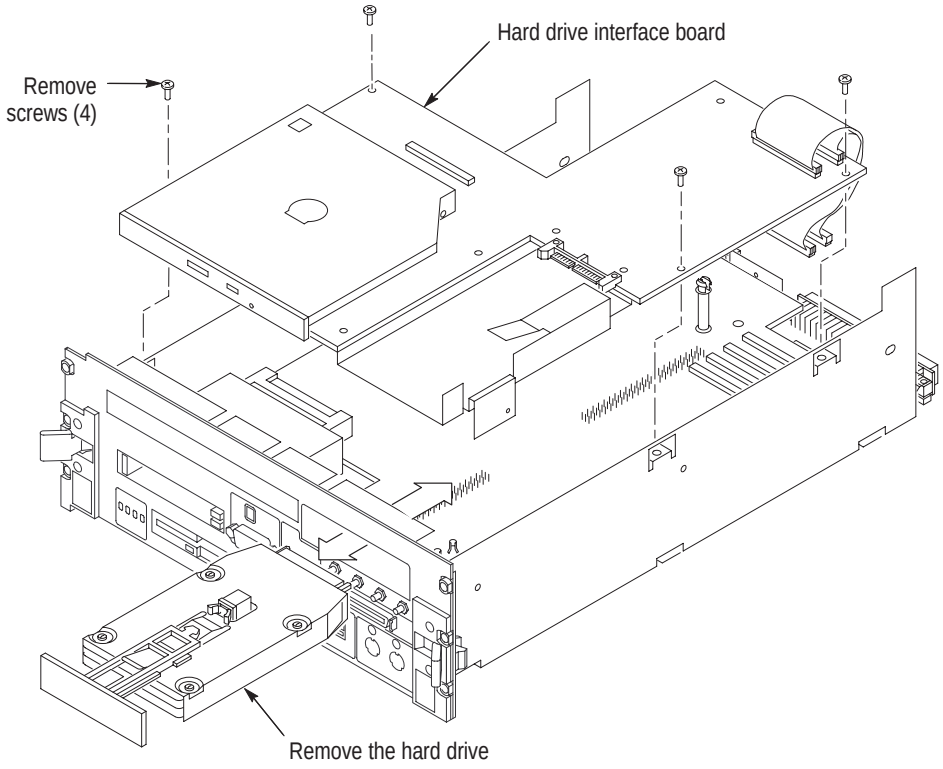


Figure 4–9: Removing the hard drive interface board

CD ROM Drive

Removal

The CD ROM drive is located on the hard drive interface board. Follow these instructions to remove the CD ROM drive:

1. Remove the replaceable hard disk drive and set it aside.
2. Remove the cover by following the instructions on page 4–11.
3. Using a #0 Phillips head screwdriver with a 6-inch long shaft, remove the two screws on the side of the CD ROM bracket by reaching through one of the holes on the bottom side of the benchtop controller.
4. Remove the two screws on the other side of the CD ROM bracket by reaching through one of the holes on the top side of the benchtop controller.
5. Remove the ribbon cable from the CD ROM drive.

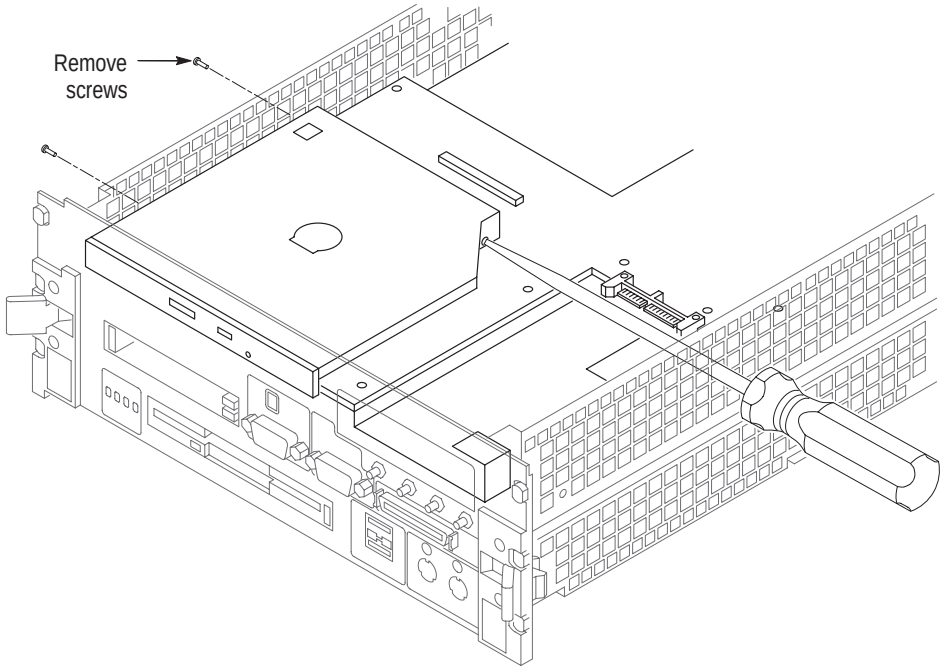


Figure 4–10: Remove screws from the CD ROM bracket

6. Remove the CD ROM drive.

Installation

To install the CD ROM, follow these instructions:

1. Attach the bracket to the CD ROM drive with the four screws you saved from the removal instructions.
2. Connect the CD ROM drive ribbon cable to the CD ROM drive. Verify that pin-1 of the cable is connected to pin-1 of the connector.
3. Using the screws saved from the removal process, secure the CD ROM drive to the circuit board.
4. Replace the cover following the instructions on page 4–12.
5. Install the hard disk drive.
6. Install the controller into the benchtop chassis and power up.
7. Verify that the BIOS setup information is correct. Enter the BIOS setup and verify the CD ROM drive type and size.
8. Run the QAPlus/WIN diagnostic software to verify that all of the functions of the benchtop controller are functioning correctly.

Processor Board and Interface Board

NOTE. *The internal boards are not individually replaceable.*

If faults are isolated to the boards, the entire benchtop controller must be returned to a Tektronix Service Center for repair.

The processor board and the interface board removal is a two part procedure. First remove the front panel hardware to relieve mechanical stress on the soldered-on connectors. Then remove the two boards from the enclosure.

You will need a T-9 Torx tip driver, and a 3/16 inch nut driver.

Removal

To remove the front panel hardware refer to Figure 4–11 and follow these steps:

1. Follow the instructions for removing the hard drive interface board found on page 4–14.
2. Disconnect the four SMB cables from the processor board.

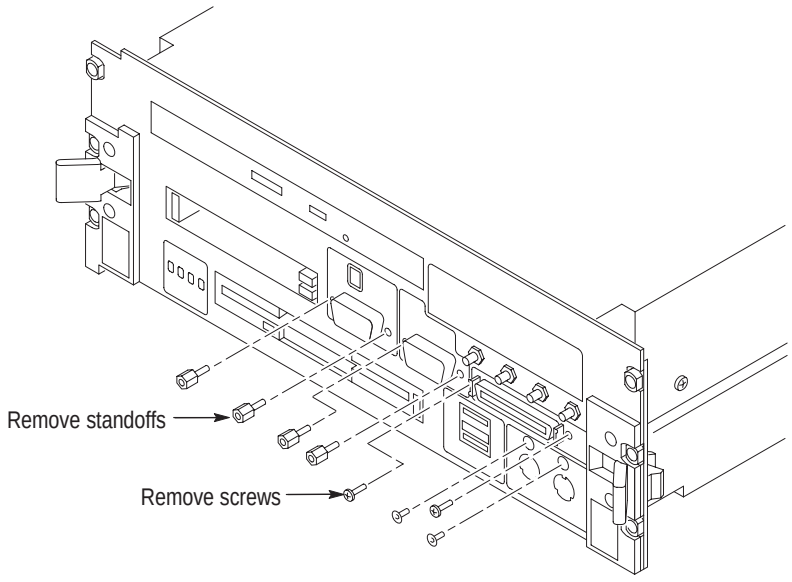


Figure 4–11: Removal and installation of the front panel hardware

3. Remove the standoffs and screws from the SVGA OUT, COM A, LPT, mouse and keyboard connectors, and the two screws securing the card slots in Figure 4–11.

4. Remove the screws from the interface (bottom) board that secures the two boards to the chassis.

5. Lift the two boards out of the chassis.

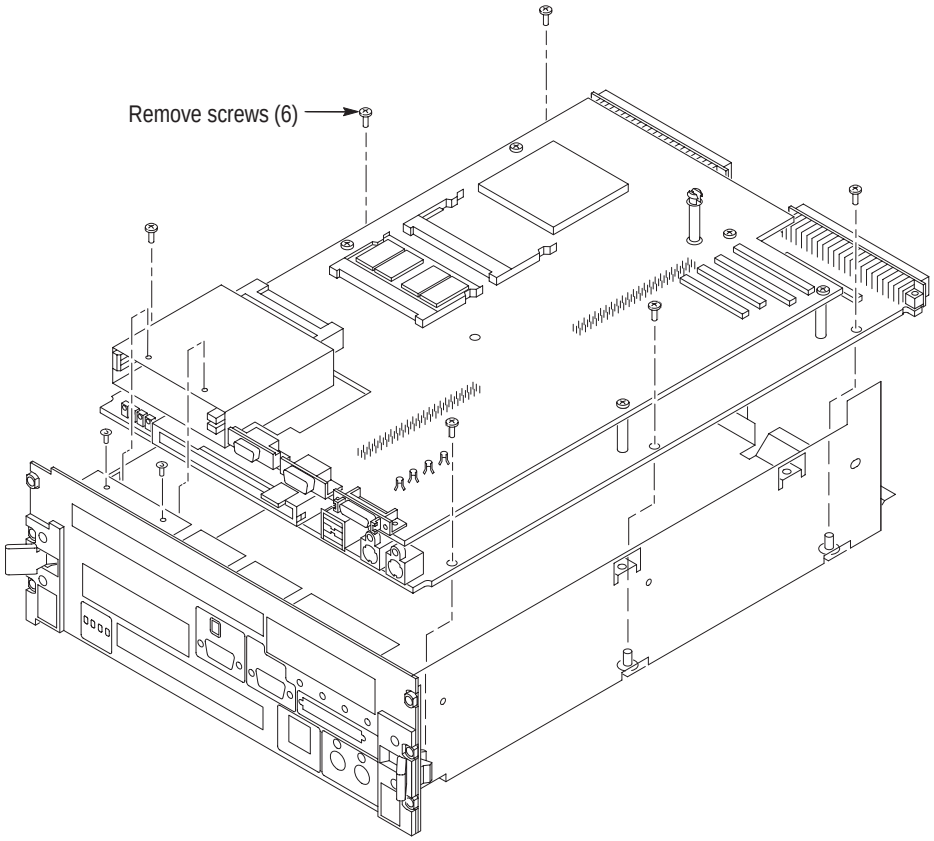


Figure 4–12: Removing the processor and interface boards

6. To separate the two boards, remove the screws and carefully separate. The boards are connected by two pass through connectors

Installation

To install the processor and interface boards refer to Figure 4–12 and follow these steps:

1. Place the two boards into the chassis as shown in Figure 4–12.

2. Install the standoffs and screws to the SVGA OUT, COM A, LPT, mouse and keyboard connectors.

3. Install the screws from the interface (bottom) board that secures the two boards to the chassis.

4. Connect the four SMB cables as listed in Table 4–4.

Table 4–4: Signal wire identification

Color	Signal
White	EXT SIG OUT
White / Brown stripe	EXT SIG IN
White / Red stripe	SYSTEM TRIG OUT
White / Orange stripe	SYSTEM TRIG IN

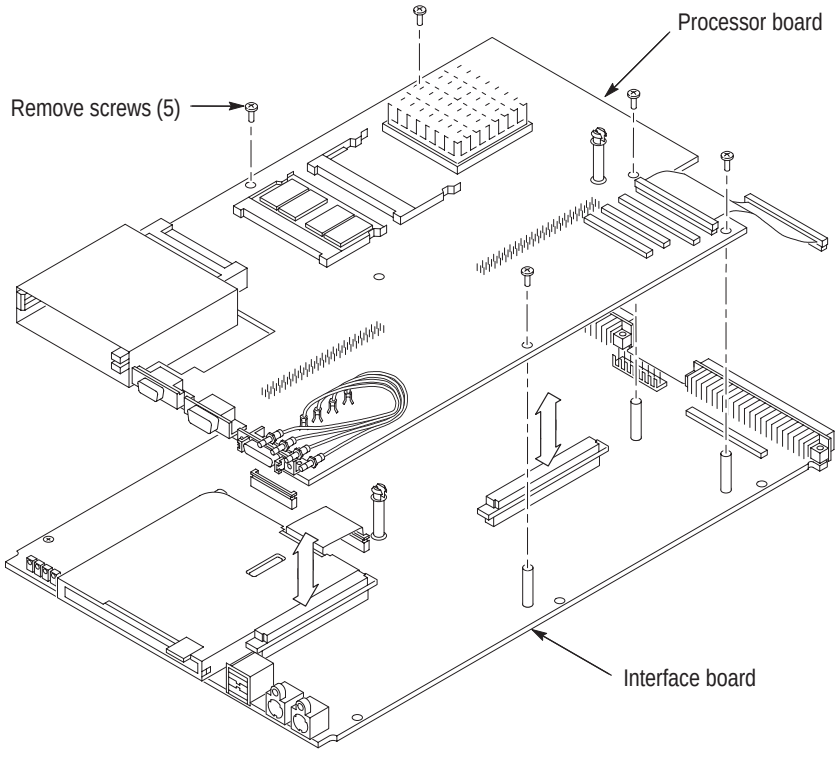


Figure 4–13: Separating the processor and interface boards

Floppy Disk Drive

Removal

The floppy disk drive is located on the interface board. To remove the floppy disk drive follow these instructions:

1. Remove the cover following the instructions on page 4–11.
2. Remove the processor and interface boards by following the board removal instructions on page 4–17.
3. Separate the two boards as shown in Figure 4–13.
4. Remove the screws that attach the floppy disk drive bracket to the circuit board.
5. Remove the ribbon cable from the floppy disk drive.

Installation

To install the floppy disk drive, follow these instructions:

1. Attach the floppy disk drive and secure it with the screws you saved from the removal instructions.
2. Connect the floppy disk drive ribbon cable to the floppy disk drive. Verify that pin-1 of the cable is connected to pin-1 of the connector.
3. Using the screws saved from the removal process, secure the floppy disk drive to the circuit board.
4. Connect the processor board to the interface board and secure with the screws removed in removal process.
5. Replace the processor and interface boards by following the board installation instructions on page 4–18.
6. Replace the cover following the instructions on page 4–12.
7. Install the hard disk drive.
8. Install the controller into the benchtop chassis and power up.
9. Verify that the BIOS setup information is correct. Enter the BIOS setup and verify the floppy disk drive type and size.
10. Run the QAPlus/WIN diagnostic software to verify that all of the functions of the benchtop controller are functioning correctly.

Soldered-On Connectors



CAUTION. *Removing soldered on components requires that a qualified service person is skilled in the servicing of through hole and surface mount technology on printed circuit boards.*

Self servicing may impact the warranty. Check with your Tektronix Service Center before servicing.

Every reasonable precaution shall be made by the service person to eliminate damage to the circuit board.

Removal and Installation

Soldered-on connectors are located internally on the boards. You will need to remove the board from the enclosure in order to replace a connector.

Fixed Hard Disk Drive Replacement

This section contains information needed to replace the optionally field installed fixed hard disk drive. For additional information, refer to the *TLA 7UP Mainframe Field Upgrade Kit Instruction Manual*.

Preparation

Be sure to observe the following precautions to avoid damaging the benchtop controller while preparing to service it.



CAUTION. *Many components within the benchtop controller are susceptible to static-discharge damage.*

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

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

- Do not handle static-sensitive components on boards.
- Transport and store static-sensitive boards in their original containers or on conductive foam. Label any package that contains static-sensitive assemblies.
- Wear an antistatic wrist strap while handling the boards to discharge the static voltage from your body.
- Do not allow anything capable of holding or generating a static charge on the work surface.
- Do not slide a board over any surface.
- Avoid handling boards in areas that have a floor or work surface cover that is capable of generating a static charge.



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

Tools Required

Table 4–3 lists the tools you may need to replace modules in the benchtop controller.

Table 4–5: Tools required

Name
Small flat blade screwdriver
Screwdriver with a #0 Phillips head and a 6-inch long shaft
Screwdriver with a T-9 tip
Screwdriver with a T-10 tip
3/16 inch nut driver

Removing the Replaceable Hard Disk Drive

Verify that the chassis is powered down.

The replaceable hard disk drive cartridge is removed by depressing it to release the latch. Pull on the replaceable hard disk drive cartridge to remove it from the chassis. Refer to Figure 4–14, 4–15 and 4–16.

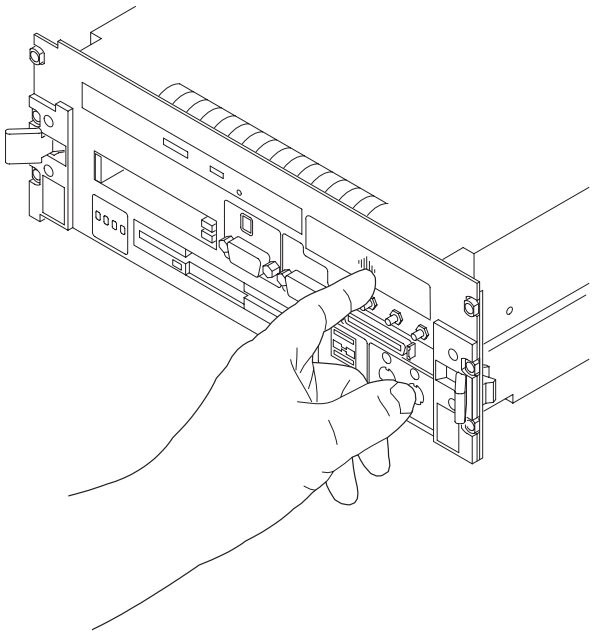


Figure 4–14: Unlatching the hard disk drive cartridge

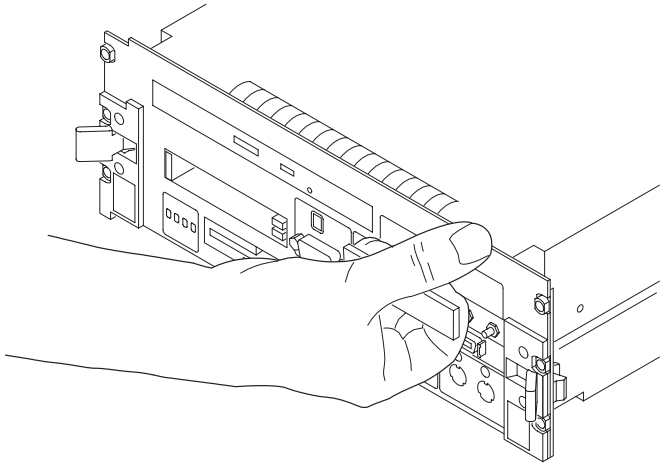


Figure 4–15: Grasp the hard disk drive cartridge

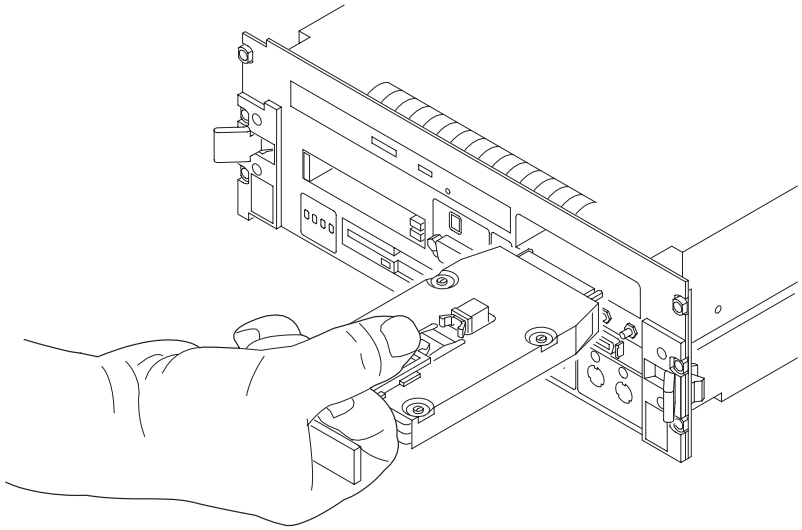


Figure 4–16: Removing the hard disk drive cartridge

Remove the Benchtop Controller Cover

Remove the cover to gain access internal modules and memory.

Removal Remove the screws shown in Figure 4–17 and lift the cover off.

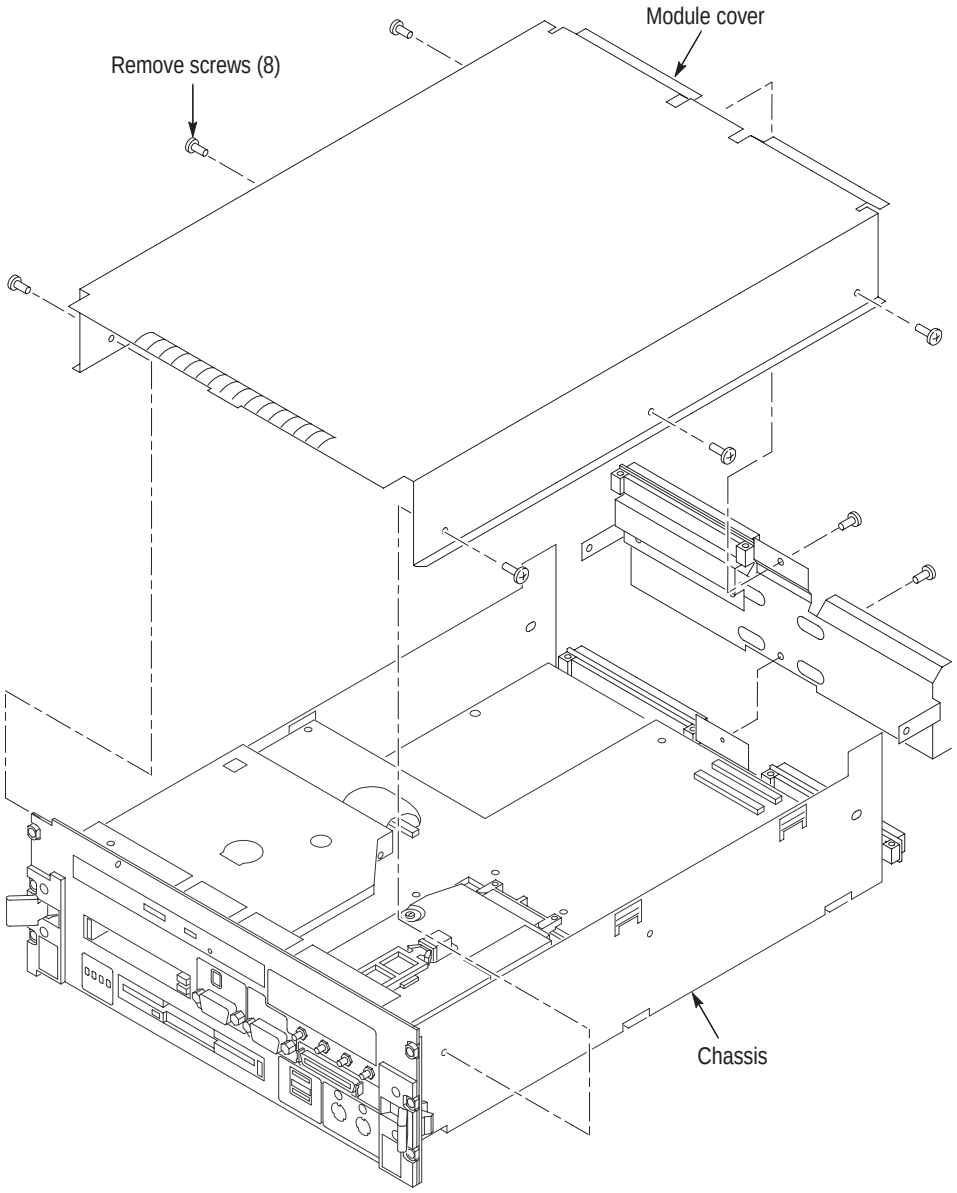


Figure 4–17: Removal and installation of the cover

Remove the Hard Drive Interface Board

Removal

To remove the hard drive interface board, refer to Figure 4–17 and follow these instructions:

1. Remove the cover.
2. Disconnect the two ribbon cables located on the rear of the hard disk interface board.
3. Remove the screws as shown in Figure 4–18.
4. Remove the hard drive interface board.

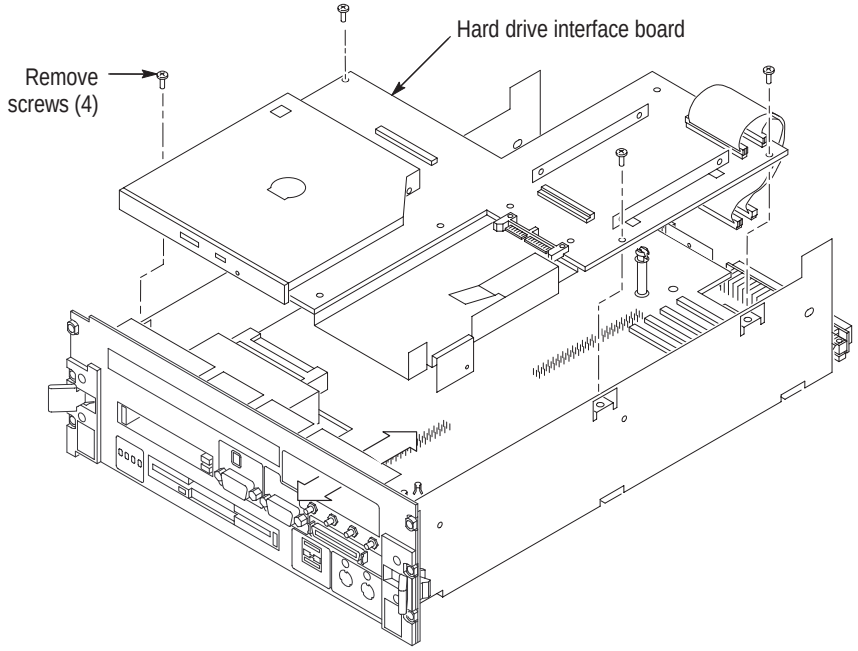


Figure 4–18: Removing the hard drive interface board

Install the Fixed Hard Disk Drive

1. Carefully align the connector pins on the back of the hard disk drive to the socket on the hard drive interface board. Gently slide the hard disk drive into the socket. Verify that all of the pins are fully engaged and that no pins are bent.
2. Install the four screws to secure the hard disk drive to the hard drive interface board as shown in Figure 4–20.

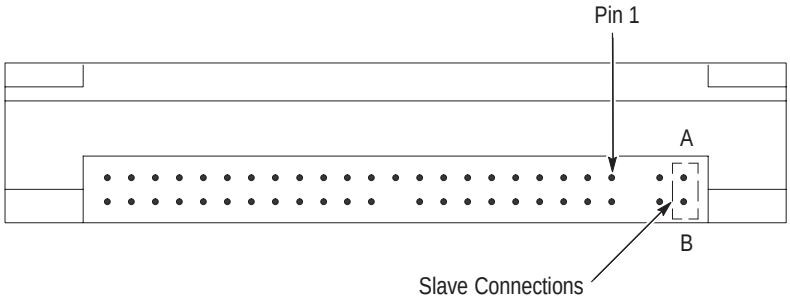


Figure 4–19: Master drive/slave drive jumper location

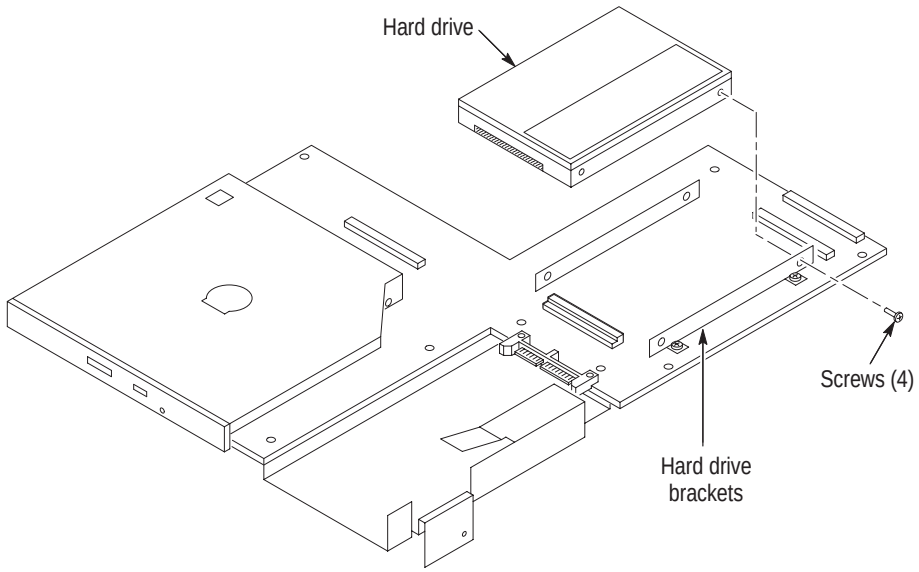


Figure 4–20: Installing the fixed hard disk drive

3. Connect the controller board to the hard drive interface board by aligning the two connectors between the controller board and the adapter board.

Locate the center standoff and center it on the hole on the controller board. Carefully apply pressure to both boards until the two connectors engage.

4. Connect the two ribbon cables to the component side of the controller board. Note the location of the ribbon cables from the disassembly procedure, step 1.

5. Install the screws to secure the controller board to the adapter board.

Install the Hard Drive Interface Board

Installation

To install the hard drive interface board, follow these instructions:

1. Place the hard drive interface board as shown in Figure 4–21.

2. Install the screws.

3. Connect the two ribbon cables located on the rear of the hard disk interface board.

4. Replace the cover following the instructions on page 4–12.

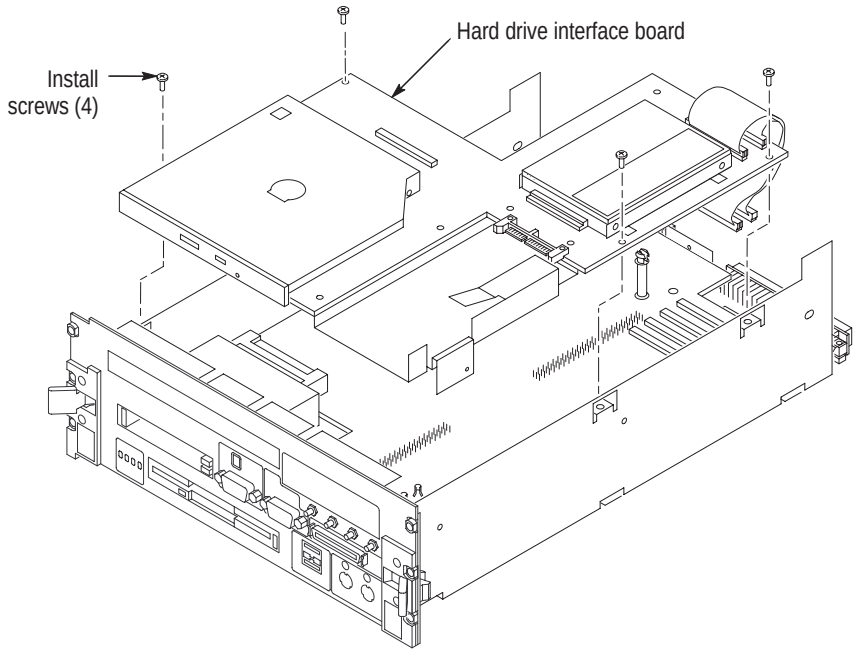


Figure 4–21: Installing the hard drive interface board

Install the Benchtop Controller Cover

Installation

To install the cover, follow these instructions:Place the cover on the chassis.

1. Push forward on the cover so the tab on the front edge of the cover inserts into the rear of the front subpanel. Make sure that the cover is fully seated, with no gaps, against the front and rear chassis flanges.

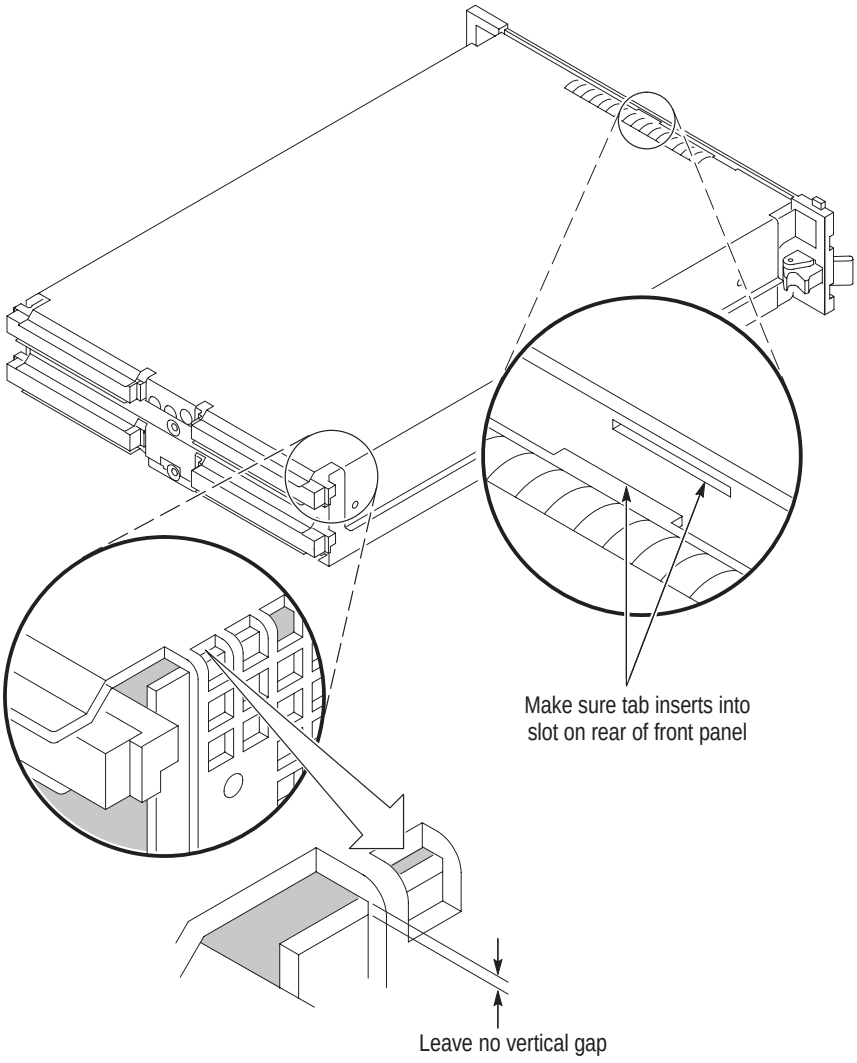


Figure 4–22: Seating the cover on the chassis

2. Secure the left side cover with the screws removed from the top and bottom of the enclosure.

3. Squeeze the sides together before tightening to ensure a good EMI seal and mechanical connection.
4. Install the replaceable hard disk drive.

Verify Operation

Follow the steps below to ensure proper operation of the instrument:

1. Reinstall all software. For help on software installation, refer to the *TLA 700 Series Logic Analyzer Installation Manual*.
2. Run memory and hard disk drive verification tests from the QA+Win32 diagnostics.

***NOTE**. To run QA+Win32 you must have either a working keyboard or working mouse (or other pointing device) and Windows 98 running.*

   a. Turn off all other applications.
   b. Click Start in the Windows tool bar.
   c. Select Programs from the Start menu.
   d. Select the QA+Win32 application from the Programs menu.
   e. Run the memory tests from the QA+Win32 menu. If needed, refer to the QA+Win32 online help for more information on running QA+Win32.

Troubleshooting



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

To prevent injury to service personnel or damage to electrical components, please read Preventing ESD *on page 4–1.*

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

1. *Check for Common Problems* on page 4–34 to eliminate easy to find problems first.
2. *Eliminate Other Problem Sources* on page 4–36 to eliminate the benchtop chassis and other modules as the fault(s) source next.
3. *Troubleshoot the Benchtop Controller Module* on page 4–36 to locate the failed replaceable part within the module.

If you have serviced this instrument using these procedures, you must perform any verification and adjustment procedures.

Service Level

This section supports isolation of faults within the benchtop controller to the replaceable part level that is reflected in the replaceable part list in Chapter 10. In most cases, faults are isolated to circuit boards or assemblies, but not to individual components on those boards. (See *Strategy for Servicing* on page xi.)

NOTE. *The circuit boards are not replaceable parts on their own.*

If there is a failure return the entire benchtop controller to a Tektronix Service Center for module exchange.

Check for Common Problems

Use Table 4–6 to quickly isolate possible failures. Table 4–6 lists problems related to the benchtop controller and possible causes. This list is not exhaustive, but it may help you eliminate a problem that are quick to fix, such as a blown fuse or loose cable.

Table 4–6: Failure symptoms and possible causes

Symptom	Possible cause(s)
Mainframe does not power on	■ Power connection faulty, check or substitute the power cord. ■ Fuse blown, check the line fuse on the benchtop chassis. ■ Benchtop chassis power supply failure, refer to the *TLA 720 Benchtop Chassis Service Manual* for troubleshooting procedures.
Hard disk drive related symptoms. Benchtop controller fails to boot up Benchtop controller not operating	■ Benchtop controller may not be not fully inserted, make sure the front of the benchtop controller is flush with front panel. Reseat the benchtop controller if necessary. Try booting to the floppy disk drive and/or the CD ROM drive. ■ Benchtop chassis power supply failure, refer to the *TLA 720 Benchtop Chassis Service Manual* for troubleshooting procedures. ■ Corrupted controller BIOS module firmware, reinstall firmware. Refer to *Upgrading Module Firmware* in the *TLA 714 and TLA 720 Installation Manual*. ■ Controller BIOS setup problem. See BIOS Settings. ■ Replaceable hard disk drive not installed. ■ Replaceable hard disk drive or optionally field installed fixed hard disk drive not configured as bootable (slave) master hard disk drive. ■ Faulty hard disk drive. ■ Faulty benchtop controller.
CD ROM related symptoms	■ Defective CD ROM. ■ Defective CD ROM drive cable. ■ Defective CD ROM board. ■ Incorrect CD ROM configuration in the BIOS setup.
Module(s) not recognized	■ Refer to the appropriate module(s) service manual.

Table 4–6: Failure symptoms and possible causes (cont.)

Symptom	Possible cause(s)
SYSTEM FAIL indicator is red	■ Benchtop controller may not be not fully inserted, make sure the front of the benchtop controller is flush with front panel. Power off the benchtop chassis and reseat the benchtop controller. ■ Follow the troubleshooting procedure and primary troubleshooting tree. ■ Benchtop chassis or benchtop controller failure, refer to the troubleshooting procedure in this manual for the benchtop controller, refer to the *TLA 720 Benchtop Chassis Service Manual* for troubleshooting procedures for the benchtop chassis.
Monitor does not power on	■ Verify monitor power cord is plugged in. ■ Failed fuse. ■ Monitor failure.
Benchtop controller appears to have no power	■ Benchtop controller may not be not fully inserted, make sure the front of the benchtop controller is flush with front panel. Power off the benchtop chassis and reseat the benchtop controller. ■ Memory DIMMs incorrectly installed, missing, or defective. ■ Defective controller board or adapter board. ■ Benchtop controller power connector loose or defective.
Monitor display is blank (no raster)	■ Monitor SVGA cable not connected or defective. ■ External monitor controls (brightness) turned down. ■ Monitor defective.
Modules not recognized	■ Module firmware incompatible with mainframe software version. Refer to the *TLA 700 Series Installation Manual* for software and module firmware update instructions. ■ TLA 700 system problem. Execute the internal resource manager program to determine if the mainframe recognizes any installed modules. Refer to instructions on page 4–40. ■ Faulty module. Refer to appropriate module service manual for further troubleshooting information.
BIOS error messages are displayed	■ Refer to the BIOS error message table, Table 4–9 on page 4–43.

Eliminate Other Problem Sources

This module is part of the TLA 700 Series Logic Analyzer, which comprises modules and the benchtop chassis (and in this case, the benchtop controller). The following procedures will help you eliminate the benchtop chassis and other modules as possible sources of the failure(s) before you troubleshoot the benchtop controller.

Substitute a Good Module

If you have available a known good controller, perform the following procedure:

1. Remove the suspect benchtop controller from the benchtop chassis. The benchtop controller is a VXIbus slot zero device. First verify that the benchtop controller is installed in slot zero.
2. Install the known good benchtop controller in slot zero.
3. Power on the benchtop chassis and check for normal operation.
4. If the failure symptoms are still present with the known good benchtop controller installed, the problem is most likely in the benchtop chassis, not in the benchtop controller. Refer to the *Troubleshooting* section in Chapter 6 of your *Benchtop Chassis Service Manual*.
5. If your benchtop chassis operates normally with the known good benchtop controller installed, then the suspect benchtop controller needs to be serviced. Refer to the *Troubleshoot the Benchtop Controller Module* on page 4–36.

Check the Benchtop Chassis

If you do not have a known good benchtop controller, perform the following procedure to make sure the benchtop chassis is not the source of the failure:

- Remove all plug-in modules from the benchtop chassis except the benchtop controller.
- Run “signs of life” tests (Primary Troubleshooting Tree in Chapter 6 of the *TLA 720 Color Benchtop Chassis Service Manual*).

Troubleshoot the Benchtop Controller Module

Follow the procedure in this section to identify the failed part within the benchtop controller. This procedure requires that the benchtop chassis is fully functional. If you have not determined that the benchtop chassis is fully functional, refer to *Eliminate Other Problem Sources* on page 4–36.

Equipment Required

The basic troubleshooting procedures require no test equipment. There are no accessible test points to measure voltages or signals within the benchtop controller.

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

Fault Isolation Procedure

The fault isolation procedure for the benchtop controller consists of following the the primary troubleshooting tree in Figure 4–23.

If you are unable to identify any problems through the troubleshooting tree or through the diagnostic programs refer to *Isolating System Problems* beginning on page 4–40 for further troubleshooting information.

Benchtop Controller Diagnostics

The benchtop controller diagnostics consist of the following tests:

- Power-on BIOS test
- Power-on diagnostics
- QA+Win32 diagnostics
- TLA 700 Mainframe Diagnostics

Power on BIOS test. On power up, the benchtop controller automatically runs the power on BIOS test. If the power on BIOS test detects a problem, BIOS error(s) will be displayed. The BIOS error messages are found in Table 4–9 on page 4–43.

Power-on Diagnostics. The power-on diagnostics check the basic functionality of the benchtop controller and mainframe at every power on. If any failures occur at power on, the screen displays the calibration and diagnostics property page. Table 4–7 lists a subset of the power on tests. Use the results of the tests to help you isolate problems.

The power on tests ensure that hardware is installed and can be accessed by the software. The tests do not provide any performance information, but they provide limited diagnostic information. The TLA 700 mainframe diagnostics provide more extensive tests than the power-on diagnostics.

The power on tests check the generic hardware including the keyboard, mouse, memory, CPU, and associated peripherals. The interrupt lines and trigger lines are tested for each installed application module.

If there are no failures, you can view the results of the tests in the Calibration and Diagnostics page under the System menu. To view the Extended diagnostics, click on the Extended tab.

Table 4–7: TLA 700 Power-on diagnostic tests

Component	Group & test	Power on	Extended
TLA 700 mainframe	VTC Reset Test	✓	
	VTC Walk1 Test	✓	
	ADG Register Test	✓	
	ADG VXI Addr Test	✓	
	ADG VXI Data Test	✓	
TLA 700 system	Interrupt Lines	✓	✓
	Trigger Lines	✓	✓

QA+Win32. If the benchtop controller passes all of the BIOS tests, the primary tree will have you run QA+Win32. To run QA+Win32 you must have either a working keyboard or a working mouse (or other pointing device) and have Windows running. QA+Win32 is a comprehensive software application to check and verify the operation. Repair or replace any failed component identified by QA+Win32.

TLA 700 mainframe diagnostics. If the benchtop controller passes all the QA+Win32 tests, the primary tree calls for you to run the TLA 700 Mainframe Diagnostics. The TLA 700 Mainframe Diagnostics are a comprehensive software test that checks benchtop chassis as well as benchtop controller functionality. If the TLA 700 Mainframe Diagnostics test fails to run correctly, the benchtop controller is defective.

To run the TLA Mainframe diagnostics, do the following steps:

1. Turn off all other applications.
2. Click on START in the tool bar.
3. Select Programs from the Start menu.
4. Select Tektronix TLA 700 from the Programs menu.
5. Select TLA 700 Mainframe Diagnostics from the Tektronix TLA 700 menu. (Refer to the help section in the TLA 700 Mainframe Diagnostics for more information on running the TLA 700 Mainframe Diagnostics).

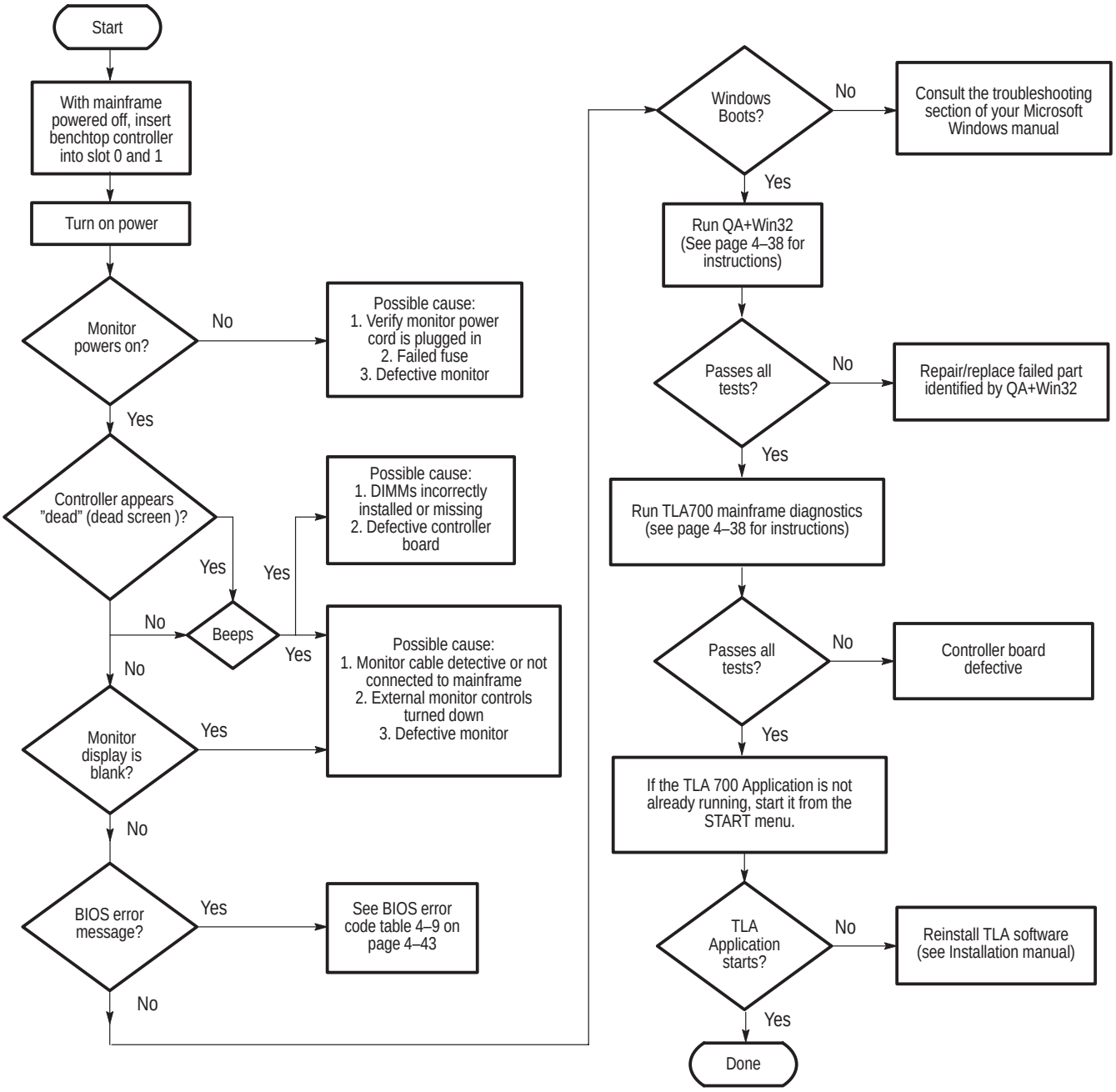


Figure 4–23: Primary troubleshooting tree

Isolating System Problems

If you have completed all of the troubleshooting procedures up to this point and the TLA 700 application fails to display any modules in the System Window, you may have a system problem. Check for the following:

- Verify that all modules are properly installed.
- Verify that the module address switches are set correctly. Power off the mainframe and remove the modules. Set the address switches to FF and reinstall the modules.
- Verify that the modules do not have the flash programming jumper installed on the rear of the module. Power off the mainframe and remove the modules. Remove the jumper and reinstall the modules.
- Try placing a suspected module in a different slot to verify slot dependency problems. For example, if you have a single module in slots 2 and 3, power off the mainframe, move the module to slots 3 and 4, and try the tests again If the module works in the new location, you have identified a faulty slot in the mainframe.
- Check for bent or broken pins on the backplane of the mainframe.
- Faulty module. Replace the suspected faulty module with a known good module, or contact your local Tektronix service center.
- Incompatible module firmware and mainframe software versions. Refer to the *TLA 714 and TLA 720 Installation Manual* for software and module firmware update instructions.
- Ensure that the CMOS Setup parameters are set correctly (refer to Appendix B of the *TLA 714 and TLA 720 Installation Manual* for a list of the correct setups).
- Check for computer viruses.

You can also execute the internal resource manager program (ResMan32.exe) to identify if any of the installed modules are being identified in the mainframe slots. Table 4–8 on page 4–41 lists some of the command line options for executing ResMan32.

Table 4–8: Command line options for ResMan32

Option	Description
–a, –A, –o ,–O	ResMan32 will not close the text window after executing and displaying the results the major functions (default).
–p, –P	ResMan32 will not execute the mainframe power-on self test diagnostics (default).
–v, –V	ResMan32 records the resource manager actions in the text window in a short form or nonverbose mode.
+a, +A, +o ,+O	ResMan32 will terminate the tests and display the resultant action information in the text window.
+p, +P	ResMan32 will perform the mainframe power-on self test diagnostics.
+v, +V	ResMan32 records all actions in a text window in the verbose mode (default).
+t, +T	ResMan32 will not display the text window and the tests will terminate after executing regardless of the error conditions.
+m, +M	ResMan32 displays in a minimized window.

1. Quit the TLA 700 application and any other applications on the desktop.
2. Click on the Window Start button and select Run.
3. In the dialog box enter the following path:

   `C:\Program Files\TLA 700\System\ResMan32.exe`

4. Click on OK.

   The ResMan32 program will check all of the installed modules and their address locations. The program will print out data similar to that in Figure 4–24 on page 4–42. In this example the mainframe has two logic analyzer modules installed.

   If ResMan32 encounters any errors (such as an unsupported instrument or application module), the resource manager will stop further communications and display information on why or at what point the instrument module was disabled.

```
#Resource Mgr
#09/09/97  08:48:49
Auto Exit - Off
Identify Static Configure Devices
       Found a device at LA 1
       Found a device at LA 2
Identify Dynamic Configure Devices
Matching Devices to Slots
       match la=1 to slot=1
       match la=2 to slot=3
Setting VISA Attributes
        la 1, slot 1: device_class 2, manf_id 0xffd, model_code 0x7f4, addr_spc 0
        la 2, slot 3: device_class 2, manf_id 0xffd, model_code 0x7f1, addr_spc 0
Setting VISA Address Maps
        A24 device @ la 1 - starting address 200000x, size 65536
        A24 device @ la 2 - starting address 210000x, size 65536
Enabling Events & Responses
       la 1: Int ID 1 assigned to IRQ 4
       Enabling Events: 16-32 124-125 127
       la 1: Asynchronous Enable succeeded
              **Responses are unsupported by this device
       la 2: Int ID 1 assigned to IRQ 4
       Enabling Events: 16-32 124-125 127
       la 2: Asynchronous Enable succeeded
              **Responses are unsupported by this device
Begin Normal Operation
     slot 1, LA 1, started successfully
     slot 3, LA 2, started successfully
VISA Data
        la_1=1,1,4093,2036,2,0,1,7,2097152
        la_2=2,3,4093,2033,2,0,1,7,2162688
```

Figure 4–24: ResMan32 program output

BIOS Error Messages

The benchtop controller runs a BIOS test on bootup. If the BIOS test encounters any problem the program displays the error on the external monitor. Table 4–9 lists the error codes, an explanation of each error code, and actions that can be taken. Refer to the *TLA 714 and TLA 720 Series Installation Manual* for information on BIOS setup parameters and feature settings.

For BIOS and other software and firmware setup information, refer to the *TLA 714 and TLA 720 Installation Manual*.

Table 4–9: BIOS error codes and explanations

Error code	Error code explanation	Action to be taken
Diskette drive A error	The BIOS test recognizes the presence of the floppy disk drive but the floppy disk drive fails the POST test. The floppy disk drive may be defined incorrectly in the CMOS setup. The floppy disk drive may not be connected correctly on the adapter board.	Verify the floppy disk drive is configured correctly in the CMOS setup. Verify that the floppy disk drive cable is connected on the floppy disk drive and the adapter board.
Extended RAM Failed at offset: nnnn	The extended memory may not be configured correctly or the extended memory is defective at HEX address nnnn.	Verify that the extended memory is configured correctly in the CMOS setup. Exchange the SO DIMMs, if one of the SO DIMMs are defective the error address should change.
Failing Bits: nnnn	The RAM address mapped to HEX nnnn in the system, shadow, or extended memory has failed. A 1 in the map indicates a failed bit.	Exchange the SO DIMMs, if one of the SO DIMMs are defective the error address should change.
Fixed Disk 0 Failure (or) Fixed Disk Controller Failure	The hard disk drive may not be defined correctly in the CMOS setup. The hard disk drive may not be connected correctly. The hard disk drive may be defective. The replaceable hard disk drive may not be installed.	Verify the hard disk drive is configured correctly in the CMOS setup. Verify that the hard disk drive cable is connected on the hard disk drive. Verify that the replaceable hard disk drive is installed.
Incorrect Drive A Type – run Setup	The floppy disk drive may not be defined correctly in the CMOS setup.	Verify the floppy disk drive is configured correctly in the CMOS setup.

Table 4–9: BIOS error codes and explanations (cont.)

Error code	Error code explanation	Action to be taken
Invalid NVRAM media type	The BIOS can not access the NVRAM.	Replace the memory SO DIMMs.
Keyboard controller error	The keyboard controller may be defective.	Swap keyboard with a known good keyboard. Replace the benchtop controller module.
Keyboard error	The keyboard may be missing or defective.	Swap keyboard with a known good keyboard.
Keyboard error nn	There may be a stuck or defective key. The BIOS returns the address of the key where HEX nn is the address of the key.	Swap keyboard with a known good keyboard.
Monitor type does not match CMOS – Run SETUP	The monitor type may be defined incorrectly in SETUP.	Verify that the monitor type is defined correctly in the CMOS setup.
Operating system not found	The operating system can not be found.	Insert a bootable disk into the floppy disk drive and try to reboot. Reload the Windows operating system.
Parity Check 1	A parity error was found on the communications bus. The BIOS will return the address of the error or display ???? if it cannot.	There may be a bad connection between the benchtop controller and the Benchtop Chassis, or the benchtop controller is not installed at slot zero and one. Turn the power off, remove the benchtop controller. Inspect the connectors on the rear of the benchtop controller. Install the benchtop controller into slot zero and one. Apply power and re-test.
Parity Check 2	A parity error was found on the I/O bus. The BIOS will return the address of the error, or display ???? if it cannot.	The controller board may be defective. Replace the benchtop controller.
Press <F1> to resume, <F2> to Setup	This message is displayed after a recoverable error message.	This is a information message. Press the <F1> key to restart the boot process, or press the <F2> key to enter the CMOS setup and make changes to the definitions. Verify that the CMOS setup is configured correctly.

Table 4–9: BIOS error codes and explanations (cont.)

Error code	Error code explanation	Action to be taken
Press <F2> to enter SETUP	This is an optional message that can be turned on and off in CMOS setup. It is only displayed during a POST test.	This is a information message.
Previous boot incomplete – Default configuration used	The previous POST test was not successful. If the POST test fails, POST will load default values then display a message to run the CMOS setup. If incorrect values are loaded, future boot attempts may fail.	This is an information message. Verify that the CMOS setup is configured correctly.
Real time clock error	The real time clock may be defective.	The controller board may be defective. Replace the benchtop controller.
Shadow Ram Failed at offset: nnnn	The shadow RAM has failed at Hex location nnnn.	The system will run without shadow RAM, but it will run slow. Exchange the SO DIMMs, if one of the SO DIMMs are defective the error address should change.
System battery is dead – Replace and run SETUP	The CMOS clock may be dead or disconnected. The CMOS setup may have to be reset.	The system battery is internal to the RAM/Calender component. To replace the system battery, replace the RAM/Calender component. Note: After replacing the RAM/Calendar component, you must reflash the BIOS. Refer to *Update the BIOS* and perform the procedures to reflash the BIOS.
System BIOS shadowed	The system BIOS was copied to shadow RAM.	This is an informational message. No action needs to be performed.
System cache error – Cache disabled	When the system BIOS failed the cache test the cache was disabled.	The system will run without cache RAM, but it will run slow. Reboot the system.
System CMOS checksum bad – run SETUP	The system CMOS settings may be incorrect or modified incorrectly by some application. The CMOS setup may have to be redefined.	This is an information message. Reboot the system first, then verify that the CMOS setup is configured correctly.

Table 4–9: BIOS error codes and explanations (cont.)

Error code	Error code explanation	Action to be taken
System RAM Failed at offset: nnnn	The system RAM at HEX address nnnn may be defective.	Exchange the SO DIMMs. If one of the SO DIMMs are defective the error address should change.
System timer error	The BIOS failed the timer test. The controller board may be defective.	Try rebooting the system first. If this message keeps reappearing the benchtop controller is defective. Replace the benchtop controller.

Adjustment After Repair

There are no adjustment procedures required after replacement of any part of the portable mainframe. Power on the portable mainframe to ensure that it, and any installed modules, pass their power-on diagnostics.

TLA 700 Startup Sequence

The following information is intended to provide troubleshooting hints in case the logic analyzer fails to complete the startup sequence. You may want to refer to Figure 4–25 on page 4–47 while reading the following paragraphs.

At power on, the mainframe software starts the mainframe and module kernel tests. If the mainframe passes the kernel tests, it attempts to boot the Windows operating system. If the mainframe fails the kernel tests, it displays the error code(s), beeps, and terminates the startup sequence.

The Windows operating system starts the resource manager. The resource manager performs the following tasks:

- Mainframe power-on self tests.
- Verifies the power-on self test status.
- Inhibits any failed modules.
- Records the power-on self test failures.
- Determines the logic analyzer configuration.
- Executes the system controller power-on diagnostics.

After completing all of the above tasks, the logic analyzer starts the TLA 700 application which performs the following tasks:

- Power-on diagnostics on all installed modules.
- Power-on diagnostics on the TLA 700 system.
- Records the Pass/Fail status in the Calibration and Diagnostics property sheet.

If no failures occur, the TLA 700 application is ready to use for regular tasks.

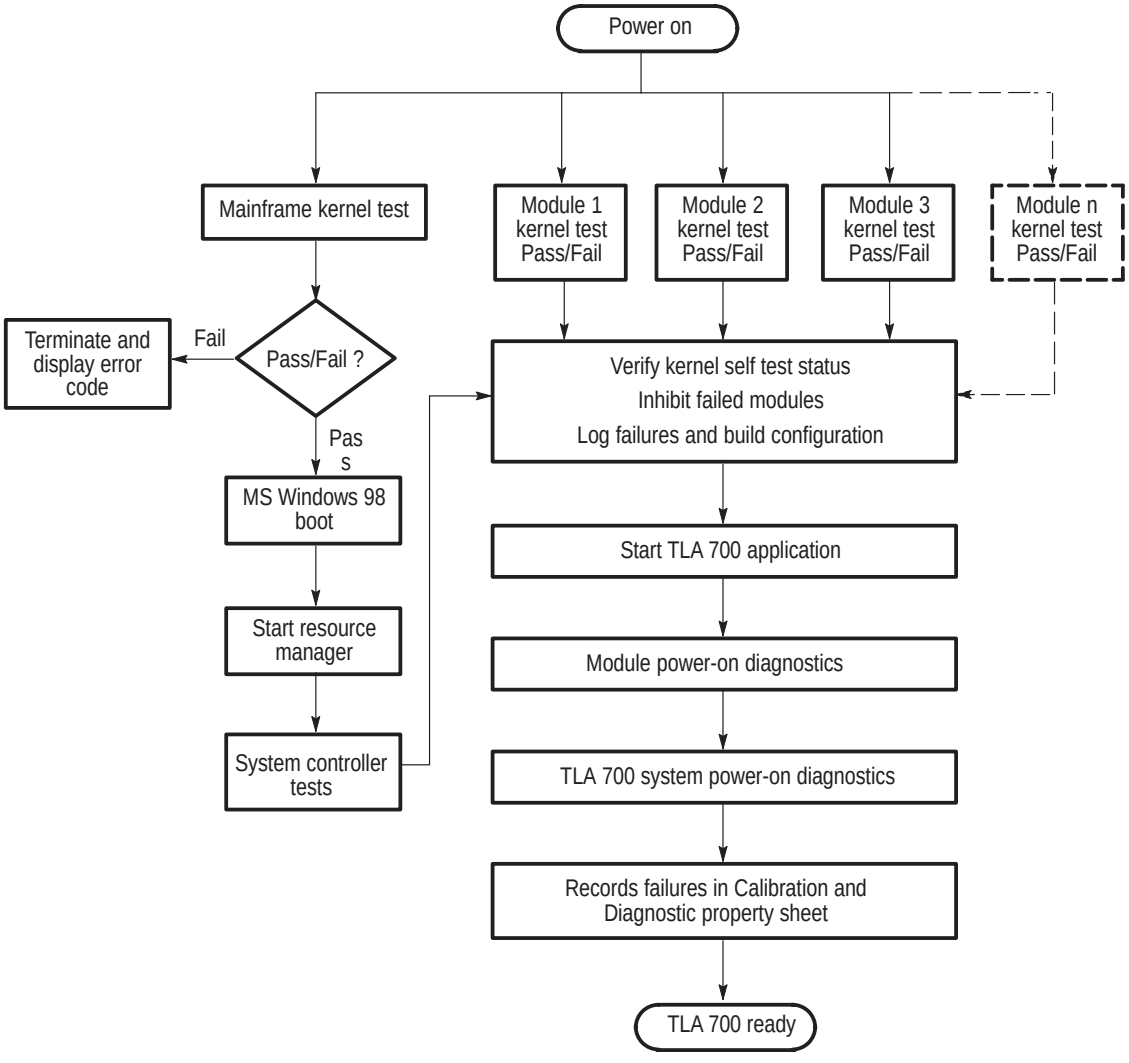


Figure 4–25: TLA 700 startup sequence

Mainframe Troubleshooting

This chapter provides information that addresses problems you may encounter while installing the logic analyzer.

This chapter does not identify module specific problems relating to performance verification or adjustments.

Diagnostics

The following diagnostic tools are available with your logic analyzer:

Power-On Diagnostics. Power-on diagnostics run when you first power-on the logic analyzer, or when you first start the TLA 700 Series application. If any diagnostic failures occur during power-on, the Calibration and Diagnostics property page appears.

Extended Diagnostics. Extended diagnostics test the logic analyzer more thoroughly than the power-on diagnostics. The extended diagnostics test the modules in the benchtop mainframe as well as the modules in the expansion mainframe(s). You can use the extended diagnostics to isolate problems to an individual module.

Before running the extended diagnostics, disconnect any attached probes.

TLA 700 Mainframe Diagnostics. The TLA Mainframe diagnostics program is a stand alone Windows application located in the TLA 700 program group. These diagnostics check operation of the mainframe beyond the basic PC circuitry. These diagnostics also check the front panel knobs of the portable mainframe.

Expansion Mainframe Diagnostics. At power-on, the expansion mainframe runs two power-on diagnostics: “Power, Cables A & B and config”, and “Cable C Connection Test”.

If either of these power-on diagnostics fail, none of the modules associated with the expansion mainframe, and possibly the expansion mainframe itself, will be recognized. The result will be as if the expansion mainframe was not connected.

Power down the mainframes. Remove the two blue expansion cables and the gray expansion cable. Examine the connectors for bent or missing pins.

Reconnect the two blue expansion cables and the gray expansion cable, and tighten the two connector screws. Power-up the mainframes and try again.

QA+Win32 Diagnostics. The QA+Win32 diagnostics are a separate Windows application located in the Windows Start Programs menu. The diagnostics check the basic operation of the controller.

Software Problems

Your TLA 700 Series Logic Analyzer comes with most software already installed. Before running any of the diagnostics, you should check the online release notes to verify the logic analyzer software matches the module firmware.

Run the QA+Win32 diagnostics software to identify hardware or software problems. Follow the QA+Win32 online help instructions for running the diagnostics software. The diagnostics are located in the Start menu under:

\Programs\QA+Win32

Many software problems can be due to corrupted or missing software files. In most cases the easiest way to solve software problems is to reinstall the software and follow the on-screen instructions. Refer to *Upgrading Software* for instructions on reinstalling or upgrading software.

If you suspect problems with the TLA 700 Series software, contact your local Tektronix representative or refer to *Contacting Tektronix* on page vi.

Hardware Problems

If you are certain that you have installed the logic analyzer correctly, run the TLA 700 Series extended diagnostics (located under the System menu) to identify any problems with the individual modules.

If your logic analyzer powers up so that you have access to the desktop, run the QA+Win32 diagnostics software to identify possible controller hardware problems. Follow the QA+Win32 online help instructions for running the diagnostics software. The diagnostics are located in the Start menu under:

\Programs\QA+Win32

You can also run the external TLA 700 Mainframe diagnostics to identify problems not covered by other diagnostics. The TLA 700 Mainframe diagnostics are located under the Start menu under the Tektronix TLA 700 programs.

Check for Common Problems

Use Table 4–10 to quickly isolate possible failures. This list is not exhaustive, but it may help you eliminate a problem that are quick to fix, such as a blown fuse, loose cable, or defective module.



CAUTION. *Do not install or remove any modules while the mainframe is powered on. The modules are not hot swapable.*

Installing or removing modules when the mainframe is powered on can damage the modules and the mainframes.

Always power the mainframe off before attempting to install or remove modules.

Table 4–10: Failure symptoms and possible causes

Symptom	Possible causes and recommended action
Mainframe does not power-on	Verify that all power cords are connected to the mainframe and to the power source. Check that the mainframe 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. Check for failed fuses. Mainframe failure: contact your local Tektronix service center.
Expansion mainframe does not power-on	Verify that all power cords are connected to the expansion mainframe and to the power source. Check that all of the TLA 7XM expansion modules are firmly seated, and that the mounting screws on the TLA 7XM expansion modules are tightened. Check that the cables between the mainframe and the expansion mainframe are correctly connected: A → A, B → B, and C → C. Check that the TLA 7XM expansion module is in slot 0 of the TLA 7XM expansion chassis. Check that power is available at the power source. Check for failed fuses. Expansion mainframe failure: contact your local Tektronix service center.
Monitor does not power-on	Check the monitor power cord connection. Check for failed fuse. Monitor failure: contact the vendor of your monitor for corrective action.

Table 4–10: Failure symptoms and possible causes (cont.)

Symptom	Possible causes and recommended action
Monitor display is blank	Check that the monitor is connected to the mainframe; replace the cable if necessary. If portable mainframe display is blank, try connecting 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.
Mainframe powers on but does not complete the power-on sequence	Power off mainframe and check that all modules are fully inserted. If mainframe is a benchtop mainframe, check the status of the SYSTEM FAIL and TEST LEDs on the benchtop controller. If either LED stays on, contact your local Tektronix service center. Check the status of the READY and ACCESSED LEDs on the front panel of the application modules. The READY LED turns on when the module passes the power-on diagnostics and when the module is ready to communicate with the controller. The ACCESSED LED turns on any time the controller accesses the module. Check for disk in floppy disk drive; make sure mainframe boots from the hard disk drive. Check for faulty module. Remove modules one at a time and power-on the mainframe. If mainframe completes the power-on sequence, replace faulty module. Possible software failure or corrupted hard disk; see *Software Problems* at the beginning of this chapter.
Power-on diagnostics fail	Isolate problem to faulty mainframe or to faulty module. Multiple diagnostic failures across modules indicate a faulty mainframe. Diagnostic failures confined to an single module most likely indicate a faulty module. Contact your local Tektronix service center.
Mainframe 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.
LA Module merge not allowed in TLA 700 Application	Merge cable between LA modules not installed. LA modules are not compatible: TLA 7Nx and TLA 7Px LA modules may not be merged with TLA 7Lx and TLA 7Mx LA modules. Refer to the *Merge Rules*.
Windows 98 comes up but the TLA 700 application does not	Mainframe not set up to start TLA 700 application at power-on. Start application from the desktop, by double-clicking on the TLA 700 Final Setup icon located on the desktop. Faulty or corrupt software; reinstall the TLA 700 application software.
Windows 98 comes up in Safe mode.	Exit the Safe mode and restart the mainframe. Incompatible hardware and hardware driver software. Either install hardware driver or remove the incompatible hardware.

Table 4–10: Failure symptoms and possible causes (cont.)

Symptom	Possible causes and recommended action
TLA 700 application starts but modules do not display in System window	Module firmware has not been updated (reflashed). The flash jumper was not removed after the module firmware was reflashed. Power off mainframe and check that all modules are fully inserted. Module address switches not set correctly. Power off mainframe and remove module. Set address switches to FF and reinstall module. Module failure; replace with known-good module or contact your local Tektronix service center. Mainframe failure; contact your local Tektronix service center.
Expansion mainframe is not recognized by the system. Expansion mainframe does not show up in the system window.	Power down the mainframe and expansion mainframe(s). Check that both of the TLA 7XM expansion modules are firmly seated, and that the mounting screws on the TLA 7XM expansion modules are tightened. Remove the two blue expansion cables and the gray expansion cable. Examine the connectors on the cables for bent or broken pins. Examine the connectors on the expansion mainframe. Reconnect the two blue expansion cables and the gray expansion cable and tighten the screws on the connectors. Verify that the cables are not crossed; verify that the cables are connected: A $\rightarrow$ A, B $\rightarrow$ B, and C $\rightarrow$ C. Power-on the mainframe and expansion mainframe(s). (The mainframe power must be recycled in order for the ResMan32 (resource manager) application to correctly configure.) Expansion mainframe failure; contact your local Tektronix service center.
Expansion mainframe is recognized by the system, but installed modules are not.	Power down the mainframe and expansion mainframe(s). Power-on the mainframe and expansion mainframe(s). (The mainframe power must be recycled in order for the ResMan32 (resource manager) application to correctly configure.) Module address switches not set correctly. Power off mainframe and remove module. Set address switches to FF and reinstall module. Power-down all mainframes, install a known good module from the benchtop mainframe into the expansion mainframe where the modules were not recognized. Power up all mainframes and retry. Module failure; contact your local Tektronix service center.

Table 4–10: Failure symptoms and possible causes (cont.)

Symptom	Possible causes and recommended action
Portable Mainframe will not power-off with On/Standby switch.	The mainframe utilities may be set up to disable hard power-off. Check the setting of the mainframe utilities (the mainframe utilities are located in the Windows 98 Control Panel). This is a Windows operating system problem. Try powering-off the mainframe using the Windows 98 shutdown procedure. If the mainframe still does not power-off, disconnect power cord and reconnect after 10 seconds to reboot the mainframe.
Expansion Mainframe will not power-off with On/Standby switch.	If the expansion mainframe was incorrectly shut down (for example, the power cord was disconnected while the expansion mainframe was running) the expansion mainframe utility still "thinks" that the expansion mainframe is on. To correct this condition, press and hold the power switch for three to four seconds. The expansion mainframe will power-down on its own. Power-off the benchtop mainframe. Power-on the benchtop mainframe, the expansion mainframe will power-up normally.

TLA 700 Startup Sequence

The following information is intended to provide troubleshooting hints in case the logic analyzer fails to complete the startup sequence. You may want to refer to Figure 4–25 on page 4–47 while reading the following paragraphs.

At power-on, the mainframe software starts the mainframe and module kernel tests. If the mainframe passes the kernel tests, it attempts to boot the Windows operating system. If the mainframe fails the kernel tests, it displays the error code(s), beeps, and terminates the startup sequence.

The Windows operating system starts the resource manager. The resource manager (ResMan32) performs the following tasks:

- Mainframe power-on self tests.
- Expansion mainframe power-on self tests.
- Verifies the power-on self test status.
- Inhibits any failed modules.
- Records the power-on self test failures.
- Determines the logic analyzer configuration.
- Executes the system controller power-on diagnostics.

After completing all of the above tasks (if you have performed the TLA 700 Final Setup), the logic analyzer starts the TLA 700 application which performs the following tasks:

- Power-on diagnostics on all installed modules.

- Power-on diagnostics on the TLA 700 system.
- Records the Pass/Fail status in the Calibration and Diagnostics property sheet.

If no failures occur, the application is ready to use for regular tasks.

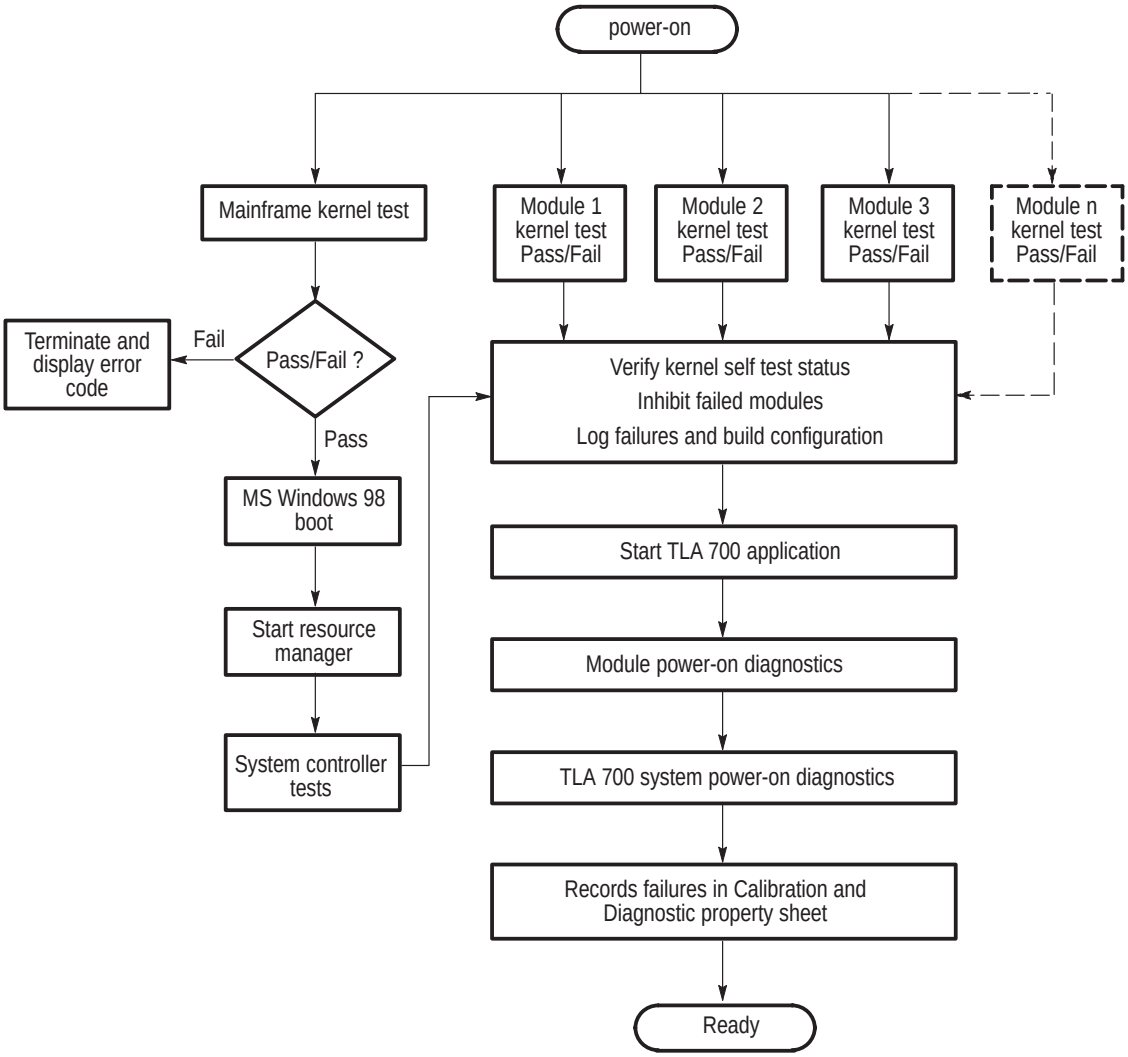


Figure 4–26: TLA 700 startup sequence

Isolating System Problems

If you have completed all of the troubleshooting procedures up to this point and the TLA application fails to display any modules in the System Window, you may have a system problem. Check for the following:

- Verify that all modules are properly installed.
- Verify that the module address switches are set correctly. Power off the mainframe and remove the modules. Set the address switches to FF and reinstall the modules.
- Verify that the modules do not have the flash programming jumper installed on the rear of the module. Power off the mainframe and remove the modules. Remove the jumper and reinstall the modules.
- Try placing a suspected module in a different slot to verify slot dependency problems. For example, if you have a single module in slots 2 and 3, power off the mainframe, move the module to slots 3 and 4, and try the tests again If the module works in the new location, you have identified a faulty slot in the mainframe.
- Check for bent or broken pins on the backplane of the mainframe.

You can execute the internal resource manager program (ResMan32.exe) to identify if any of the installed modules are being identified in the mainframe slots. Table 4–8 lists some of the command line options for executing ResMan32.

Table 4–11: Command line options for ResMan32

Option	Description
–a, –A, –o ,–O	ResMan32 will not close the text window after executing and displaying the results the major functions (default).
–p, –P	ResMan32 will not execute the mainframe power-on self test diagnostics (default).
–v, –V	ResMan32 records the resource manager actions in the text window in a short form or nonverbose mode.
+a, +A, +o ,+O	ResMan32 will terminate the tests and display the resultant action information in the text window.
+p, +P	ResMan32 will perform the mainframe power-on self test diagnostics.
+v, +V	ResMan32 records all actions in a text window in the verbose mode (default).

Table 4–11: Command line options for ResMan32 (Cont.)

Option	Description
+t, +T	ResMan32 will not display the text window and the tests will terminate after executing regardless of the error conditions.
+m, +M	ResMan32 displays in a minimized window.

1. Quit the TLA 700 application and any other applications on the desktop.
2. Click on the Window Start button and select Run.
3. In the dialog box enter the following path:

   `C:\Program Files\TLA 700\System\ResMan32.exe`

4. Click on OK.

   The ResMan32 program will check all of the installed modules and their address locations. The program will print out data similar to that in Figure 4–24 on page 4–42. In this example the mainframe has two logic analyzer modules installed.

   If ResMan32 encounters any errors (such as an unsupported instrument or application module), the resource manager will stop further communications and display information on why or at what point the instrument module was disabled.

```
#Resource Mgr
#09/09/97  08:48:49
Auto Exit - Off
Identify Static Configure Devices
       Found a device at LA 1
       Found a device at LA 2
Identify Dynamic Configure Devices
Matching Devices to Slots
       match la=1 to slot=1
       match la=2 to slot=3
Setting VISA Attributes
        la 1, slot 1: device_class 2, manf_id 0xffd, model_code 0x7f4, addr_spc 0
        la 2, slot 3: device_class 2, manf_id 0xffd, model_code 0x7f1, addr_spc 0
Setting VISA Address Maps
        A24 device @ la 1 - starting address 200000x, size 65536
        A24 device @ la 2 - starting address 210000x, size 65536
Enabling Events & Responses
       la 1: Int ID 1 assigned to IRQ 4
       Enabling Events: 16-32 124-125 127
       la 1: Asynchronous Enable succeeded
              **Responses are unsupported by this device
       la 2: Int ID 1 assigned to IRQ 4
       Enabling Events: 16-32 124-125 127
       la 2: Asynchronous Enable succeeded
              **Responses are unsupported by this device
Begin Normal Operation
     slot 1, LA 1, started successfully
     slot 3, LA 2, started successfully
VISA Data
        la_1=1,1,4093,2036,2,0,1,7,2097152
        la_2=2,3,4093,2033,2,0,1,7,2162688
```

Figure 4–27: ResMan32 program output

Expansion Mainframe Troubleshooting

Because the expansion mainframe adds a level of complexity to troubleshooting problems, this section will concentrate on tips and tricks to aid you in troubleshooting expansion mainframe related problems.

If you have exhausted all of the failure symptoms and possible causes that start on page 4–34, try some of the troubleshooting tips and tricks that follow.

Look and Listen for the Expansion Mainframe Power-On Sequence

There are certain signs that the expansion mainframe is not powering-on correctly. By looking and listening to these "signs of life" you can determine if the expansion mainframe is not powering-on because the expansion mainframe is not receiving a signal from the expansion module.

Upon powering-on the benchtop mainframe, a signal is sent from the expansion module in the benchtop mainframe, to the expansion module in the expansion mainframe via the three expansion cables. If the expansion mainframe does not receive this signal, the expansion mainframe will not be prompted to power-on.

If the power-on signal is received by the expansion mainframe the fan will start and the lamp on the mainframe will light. Further indications that the mainframe is receiving signals from the expansion module is that the lights on the expansion module and any other installed modules will blink, indicating that signals are being received.

Substitute a Known Good Expansion Module

If you have available a known good benchtop controller, perform the following procedure:

1. Remove the suspect benchtop controller from the expansion mainframe. The benchtop controller is a slot zero device when installed in the expansion mainframe. First verify that the benchtop controller is installed in slot zero and that the MODID switches on the back of the module are set to FF.
   or,
   Try swapping the benchtop controller from the benchtop mainframe with the expansion module from the expansion chassis. This sometimes works because one module is a sender while the other module is a receiver.

   The single-wide expansion module requires up to 60 lbs. of insertion force to engage it into the back plane.

***NOTE**. Do not use the mounting screws to engage the module into the backplane of the chassis. The mounting screws will not provide enough force to seat the expansion module, and you can easily be strip the threads.*

2. Install the known good benchtop controller in slot zero of the expansion chassis.

3. Power-on the benchtop mainframe and check for normal operation.
4. If the failure symptoms are still present with the known good benchtop controller installed, the problem is most likely in the expansion mainframe, not in the benchtop controller.
5. If your expansion mainframe operates normally with the known good benchtop controller installed, then the suspect benchtop controller needs to be serviced.

Check the Expansion Mainframe

If you do not have a known good benchtop controller, perform the following procedure to make sure the expansion mainframe is not the source of the failure:

- Remove all plug-in modules from the expansion mainframe except the benchtop controller.
- Power up the benchtop mainframe and determine if the expansion mainframe is recognized by the TLA system.

Replace the Expansion Module with a Benchtop Controller Module

Another way to isolate problems would be to "trick" the expansion mainframe into thinking it was a benchtop mainframe. You can do this by removing the expansion module from the slot zero position in the expansion mainframe and replacing it with a known good benchtop controller module from your benchtop mainframe.

Because the expansion mainframe is set up to power-on from a signal from the expansion module (which is no longer present) you will have to press and hold the power switch on the expansion mainframe for three to four seconds.

If the expansion mainframe powers-on correctly, the problem can be isolated to either the expansion module(s) or the expansion cable(s).

Repackaging Instructions

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

Packaging

When repacking the benchtop controller 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 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 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

Options

This chapter lists the advertised options for the color benchtop mainframe. Refer to the *Replaceable Mechanical Parts* chapter for a list of standard and optional accessories.

Tektronix Service Options

Tektronix offers maintenance options that cover calibration and repair services. Contact your local Tektronix representative for details.

Tektronix offers the following service options. These options are modular, flexible, and easy to order with your instrument. Designed to ease installation and start up, to support tracking of calibration to requirements of ISO9000, and to provide for extended repair coverage, these options help fix your long-term maintenance costs and eliminate unplanned expenditures. And these options can be converted from service at Tektronix service depots to service on-site (see Option S1 and S3), which helps keep downtime to a minimum.

Product installation service[1]	Option IN	Provides initial product installation/configuration and start-up training session including front panel and product familiarization.
Upgrade installation service[1]	Option IF	Provides installation of product upgrades performed at a Tektronix Service Center.
Three years of calibration services	Option C3	Provides factory calibration certification on delivery, plus two more years of calibration coverage. Throughout the coverage period the instrument will be calibrated according to its Recommended Calibration Interval.
Test data	Option D1	Provides initial Test Data Report from factory on delivery.
Test data	Option D3	Provides test data on delivery plus a Test Data Report for every calibration performed during 3 years of coverage – requires Option C3.
Three years repair coverage	Option R3	Extends product repair warranty to a total of three years.

One year upgrade to on-site service[1,2]	Option S1	Upgrades the standard one year, “return to depot” warranty to an on-site warranty.
Three year upgrade to on-site service[1,2]	Option S3	Upgrades any C3, D3, and R3 options purchased to on-site coverage for three years.

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

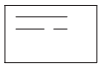
2 **Uplift options are ordered with the mainframe products and cover individual modules.**

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

Optional Accessories

Tektronix will ship the options shown in Table 5–1:

Table 5–1: Options

	Option #	Label	Description
	1A	Add LAN PC Card	10BaseT Add: LAN Package
	1K	Add LACART	Add logic analyzer cart
	1M	Add 17 inch Monitor	Add: 17” color monitor (includes 5’ monitor cable) Same 15A power cord ordered with TLA 711
	2M	Add 21 inch Monitor	Add: 21” color monitor (includes 5’ monitor cable) Same 15A power cord ordered w/TLA 711

Diagrams

Diagrams

Interconnection Block Diagram

This chapter contains the interconnection and block diagram for the benchtop chassis and controller.

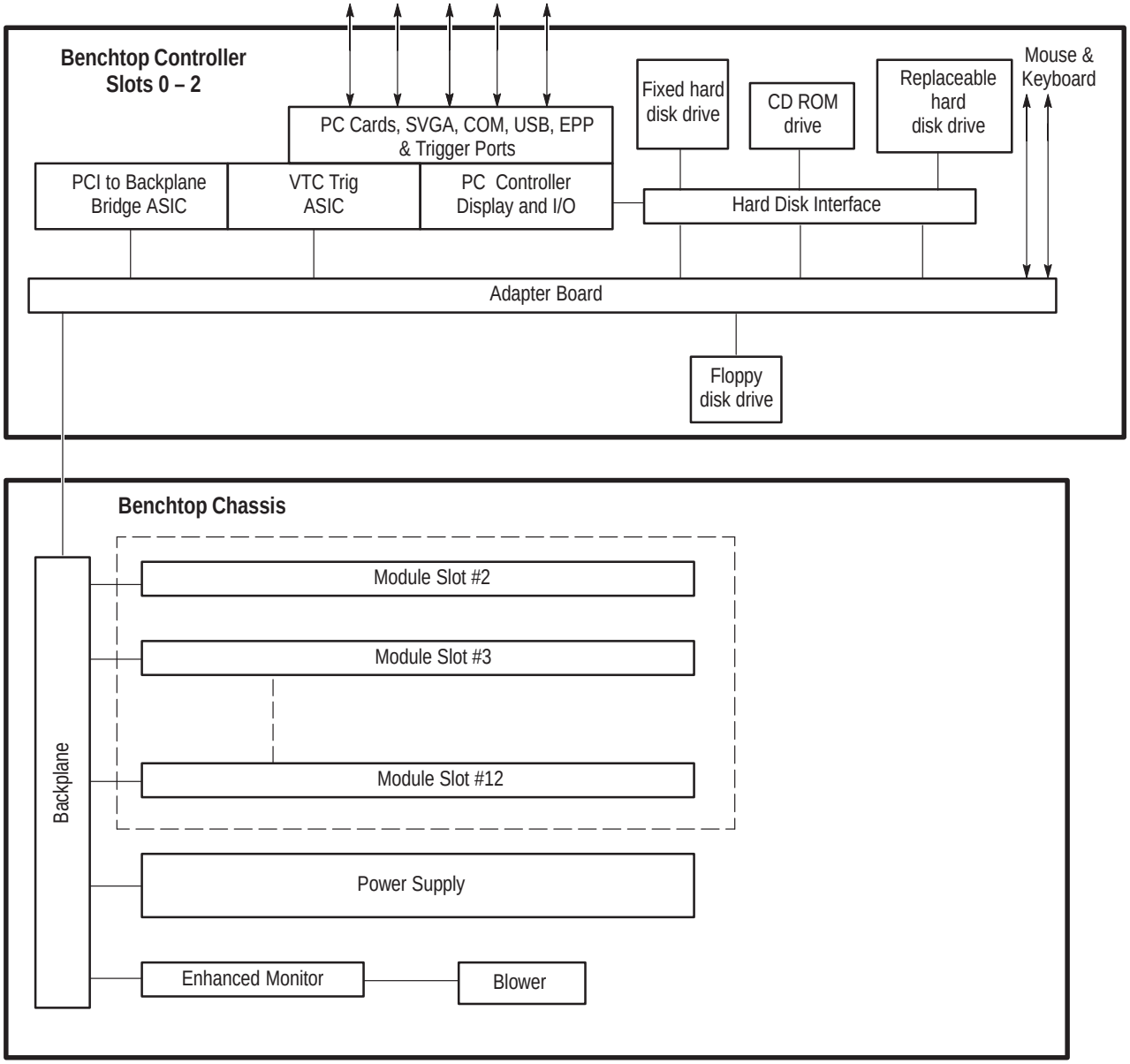


Figure 6–1: Interconnection block diagram

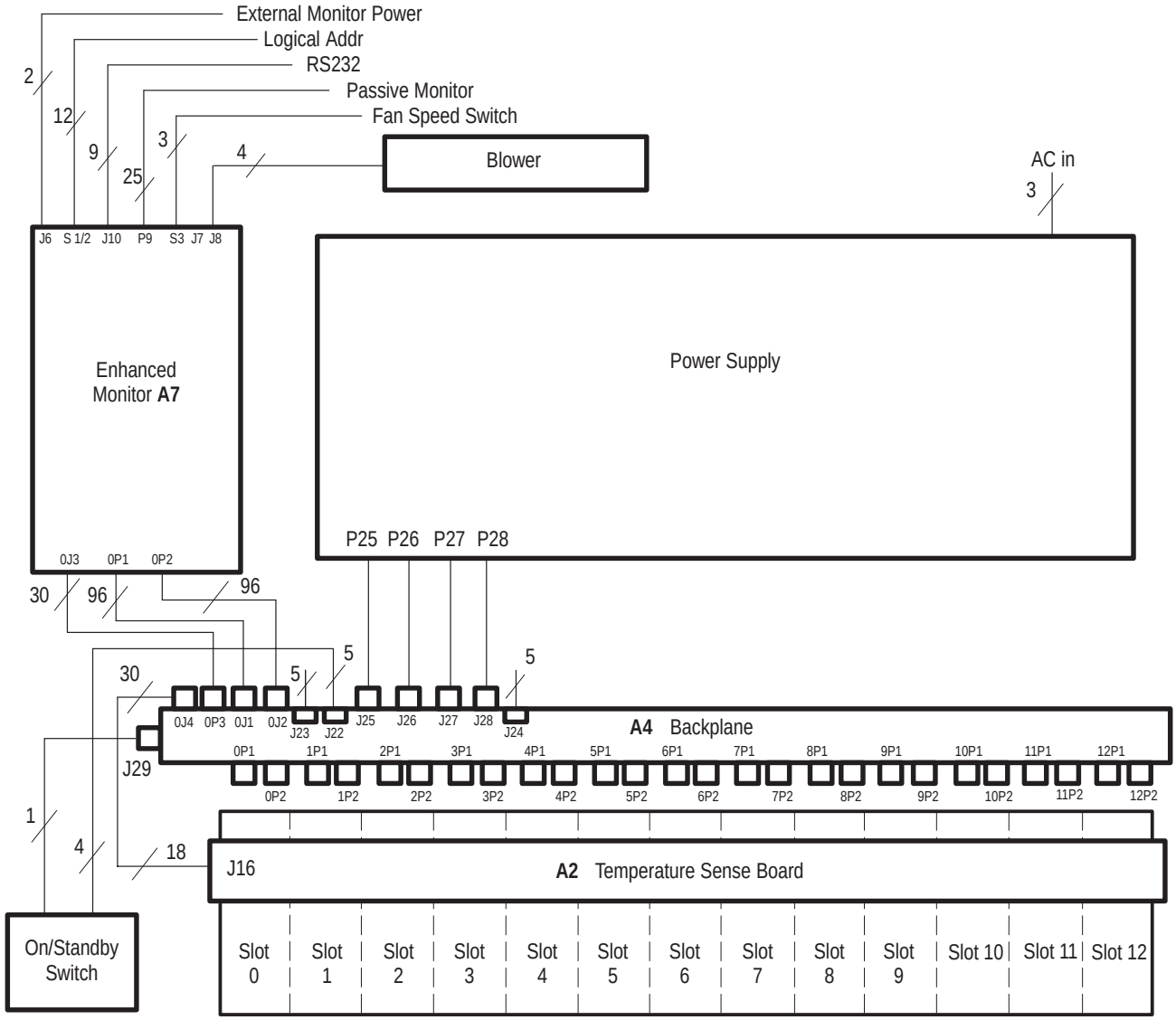


Figure 6–2: Benchtop chassis block diagram

Replaceable Mechanical Parts

Replaceable Mechanical Parts

This chapter contains a list of standard accessories, optional accessories, and replaceable parts.

After the benchtop controller is mated to the benchtop chassis, the resulting combination is the benchtop mainframe. The standard accessories and the optional accessories listed in this section are for the benchtop mainframe.

Standard Accessories

Table 7–1 lists the standard accessories shipped with the benchtop mainframe.

Table 7–1: Standard accessories

Accessory	Part number
Windows keyboard, PS2 mini-DIN	119–5662–00
Mouse, 3-button, PS2 mini-DIN	119–5662–02
Dual wide slot fillers	333–4206–00
SMB to BNC cable (2)	P6041
Female to female BNC (used to join 2 P6041 cables for diagnostics)	103–0028–00
Printer adapter cable	015–0687–00
Windows 98 package (software and manual)	063–3135–00
TLA 700 application software TLA TPI client software Diagnostics software	063–3022–XX
Windows 98 preinstall internal/external CDROM boot disk	063–3227–XX
Flash jumper with pull tab (for flashing module firmware)	131–4356–00
TLA 700 Series, Version 3.1, User Manual	071–0684–XX
Tek mouse pad	016–1524–XX
Cap, fuse holder	200–4326–00
Fuse, 15A	159–0256–00
Fuse, 6.3A	159–0381–00
Fuse, 20A	159–0379–00

Optional Accessories

Table 7–2 lists the optional accessories available for the benchtop mainframe.

Table 7–2: Standard accessories

Accessory	Part number
Power cord, North American	
right angle	161–0104–00
straight	161–0066–00
Power cord, Universal Euro	
right angle	161–0104–06
straight	161–0066–09
Power cord, UK	
right angle	161–0104–07
straight	161–0066–10
Power cord, Australian	
right angle	161–0104–05
straight	161–0066–11
Power cord, Switzerland	
right angle	161–0167–00
straight	161–0154–00
Transport hard case, wheeled	016–1522–00
TLA 720 Benchtop Controller Module Service Manual	071–0269–XX
TLA 7Nx and TLA 7Px Logic Analyzer Module Service Manual	071–0266–XX
TLA 7D1/7D2/7E1/7E2 Oscilloscope Module Service Manual	070–9780–XX
TLA 7XM Expansion Module Service Manual	071–0674–XX
Performance Verification and Adjustment Technical Reference	070–9776–XX

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 (see Part Number Revision Level below)
- Instrument type or model number

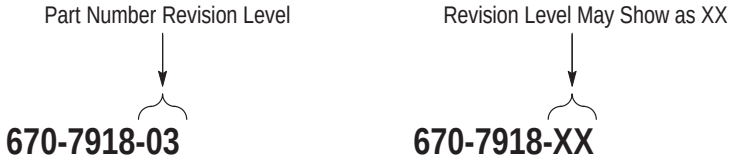
- Instrument serial number
- Instrument modification number, if applicable

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.

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

Part Number Revision Level

Tektronix part numbers contain two digits representing the revision level of the part. For most parts in this manual, you will find the letters XX in place of the revision level number.



When you order parts, Tektronix will provide you with the most current part for your product type, serial number, and modification (if applicable). At the time of your order, Tektronix will determine the part number revision level needed for your product, based on the information you provide.

Module Servicing

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

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

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

Using the Replaceable Parts List

The rest of this chapter contain lists of the replaceable mechanical and/or electrical components of the Portable Mainframe. Use these lists to identify and order replacement parts. The following table describes each column in the lists.

Table 7–3: Parts lists column descriptions

Column number	Column name	Description
1	Figure and 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 and 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.
7	Mfr. Code	Manufacturer code.
8	Mfr. Part Number	Manufacturer's or vendor's part number.

Abbreviations

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

Mfr. Code to Manufacturer Cross Index

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

Manufacturers Cross Index

Mfr. Code	Manufacturer	Address	City, State, Zip Code
06383	PANDUIT CORP	17303 RIDGELAND AVE	TINLEY PARK, IL 60477–3048
0B445	ELECTRI–CORD MFG CO INC	312 EAST MAIN STREET	WESTFIELD, PA 16950
0KB05	NORTH STAR NAMEPLATE INC	5750 NE MOORE COURT	HILLSBORO, OR 97124–6474
0L0L7	RADISYS CORPORATION	5445 NE DAWSON CREEK DRIVE	HILLSBORO, OR 97124
0VF15	TOTAL TECHNOLOGIES LTD	2110 S ANNE ST	SANTA ANNA, CA 92704
0ZQ35	3COM CORPORATION	5353 BETSY ROSS DRIVE	SANTA CLARA, CA 95052–8145
1GM54	ZYTEC CORP	7575 MARKET PLACE DR	EDEN PRAIRIE, MN 55344
24931	BERG ELECTRONICS INC	BERG ELECTRONICS RF/COAXIAL DIV 2100 EARLYWOOD DR	FRANKLIN, IN 46131
26742	METHODE ELECTRONICS INC	7444 WEST WILSON AVE	CHICAGO, IL 60656–4548
2W733	BELDEN WIRE & CABLE COMPANY	2200 US HWY 27 SOUTH	RICHMOND, IN 47374
2W944	PAPST MECHATRONIC CORP	AQUIDNECK INDUSTRIAL PARK	NEWPORT, RI 02840
50356	TEAC AMERICA INC	7733 TELEGRAPH RD	MONTEBELLO, CA 90640–6537
51506	ACCURATE SCREW MACHINE CO	19 BALTIMORE ST	NUTLEY, NJ 07110–1303
52152	3M COMPANY	INDUSTRIAL TAPE DIVISION	ST PAUL, MN 55144–1000
5F520	PANEL COMPONENTS CORP	PO BOX 115	OSKALOOSA, IA 52577–0115
60128	MICROSOFT CORPORATION	ONE MICROSOFT WAY	REDMOND, WA 98052–8300
61081	ELECTRONIC SOLUTIONS	6790 FLANDERS DR	SAN DIEGO, CA 92121
63426	NKK SWITCH	NIHON KAIHEIKA IND CO LTD 7850 E GELDING DRIVE	SCOTTSDALE, AZ 85260
71400	BUSSMANN	DIVISION COOPER INDUSTRIES INC	ST LOUIS, MO 63178
75915	LITTELFUSE INC	800 E NORTHWEST HWY	DES PLAINES, IL 60016–3049
7X318	KASO PLASTICS INC	11013 A NE 39TH	VANCOUVER, WA 98662
80009	TEKTRONIX INC	14150 SW KARL BRAUN DR	BEAVERTON, OR 97077–0001
80126	PACIFIC ELECTRICORD CO	747 WEST REDONDO BEACH	GARDENA, CA 90247–4203
8X345	NORTHWEST SPRING MFG CO	5858 WILLOW LANE	LAKE OSWEGO, OR 97035
S3109	FELLER U.S. CORPORATION	72 VERONICA AVE	SOMERSET, NJ 08873
TK2208	NORTHWEST RUBBER EXTRUDERS INC	16748 SW 72ND AVE	PORTLAND, OR 97224
TK2469	UNITREK CORPORATION	3000 LEWIS & CLARK HWY	VANCOUVER, WA 98661
TK2541	AMERICOR ELECTRONICS LTD	2682 W COYLE AVE	ELK GROVE VILLAGE, IL 60007

Replaceable Parts List The replaceable parts listing contains replaceable parts and accessories for the benchtop controller, as well as the benchtop mainframe.

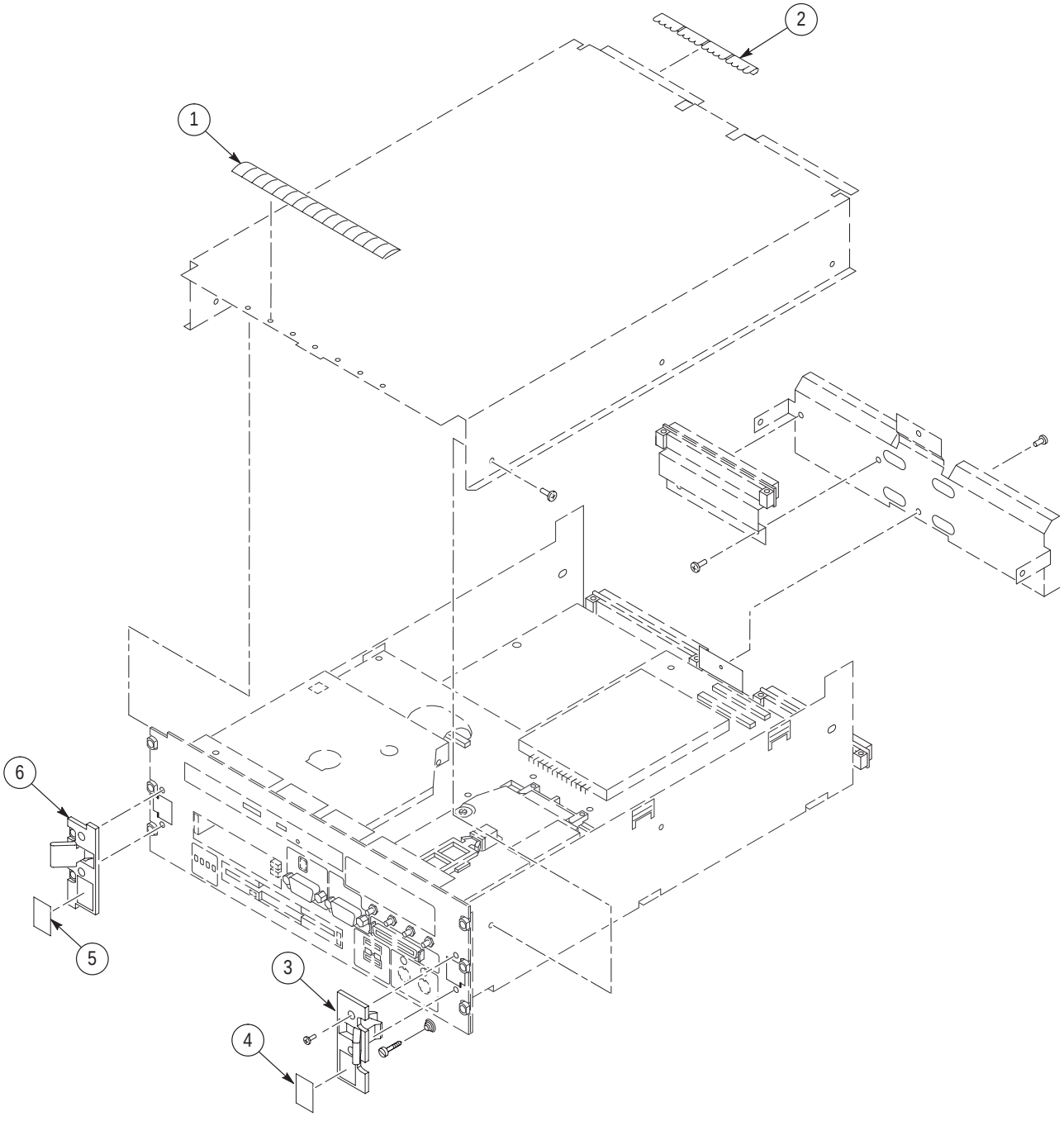


Figure 7–1: Benchtop controller exploded view

Replaceable parts list

Fig. & index number	Tektronix part number	Serial no. effective	Serial no. discont'd	Qty	Name & description	Mfr. code	Mfr. part number
1–1	348–1365–01			1	SHLD GSKT,ELEC:SYMETRICAL SLOTTED FINGER,0.350 W X 7.5 L,RIVIT MTG,SNAP–IN,RIVIT SPACING 1.5 IN	0KM03	0493–0070–00
–2	348–1537–00			4	GASKET,EMI:CLIP–ON,1.98 L,BE CU,TIN PLATED,W/T LANCES	0KM03	0493011500
–3	367–0484–00			1	HANDLE,EJECTOR:INJECTOR/EJECTOR ASSEMBLY,TWO WIDE VXI,W/OUT KEYING,SPRING LOADED,PLASTIC,20% GL	80009	367–0484–00
–4	334–9189–00			1	MARKER INDENT:EJECTOR LABEL,BOTTOM,0.745 X 0.520	0KB05	334918900
–5	334–9236–00			1	MARKER,IDENT:MKD TEKTRONIX,TOP INJECTOR/EJECTOR LABEL,BENCHTOP CONTROLLER	0KB05	334923600
–6	367–0489–00			1	HANDLE:INJECTOR/EJECTOR ASSEMBLY,TWO WIDE VXI,WITH TTL KEYING,SPRING LOADED,PLASTIC,10%	80009	367–0489–00
–	214–4762–00			2	SPRING,CONICAL:SPRING,CONICAL	8X345	ORDER BY DESCRIPTION

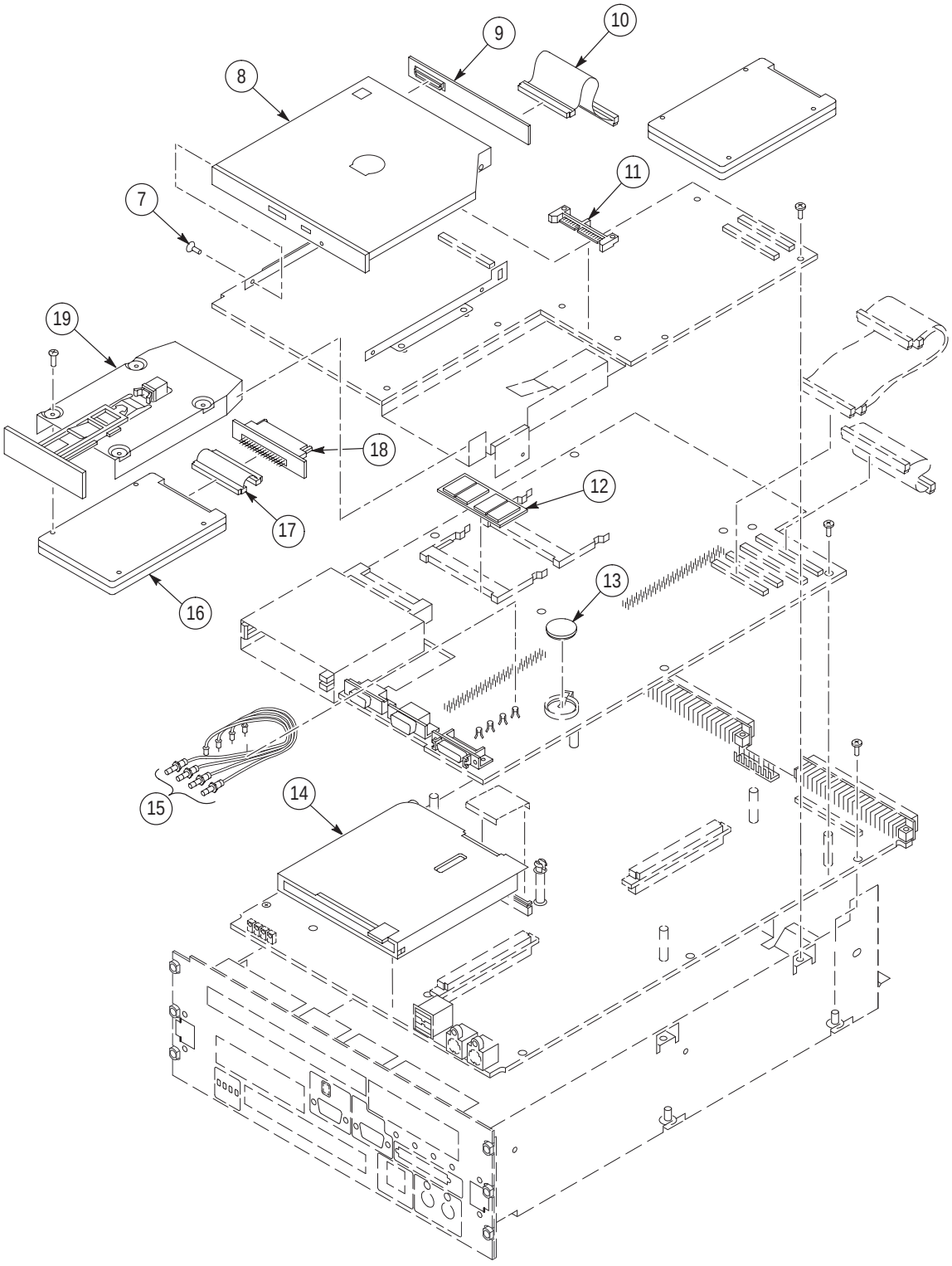


Figure 7–2: Benchtop controller exploded view (cont.)

Replaceable parts list

Fig. & Index Number	Tektronix Part Number	Serial No. Effective	Serial No. Discont'd	Qty	Name and Description	Mfr. Code	Mfr. Part Number
2–0	039–0048–00			1	CONTROLLER:THREE WIDE VXI CONTROLLER MODULE	0L0L7	039–0048–00
–7	211–1070–00			4	SCREW:M2 X 2MM,PNH,PHL, STL NI PLT	0KB01	211–1070–00
–8	119–5728–00			1	DISK DRIVE:OPTICAL,644MB,CD–ROM,16.7 MB/SEC,IDE/ATAPI,CD–224E–903,	50356	CD–224E–903
–9	671–4377–00			1	CIRCUIT BD ASSY:CD ROM INTERFACE,389–2561–00 WIRED	80009	671–4377–00
–10				1			
–11	131–6711–00			1	CONN,PLUG:DEVICE BAY,SMD,PLUG,RTANG,44 POS,0.05 CTR,0.197 H, 30 GOLD, PLZ, SHRD/4 SIDES	22526	62368–001
–12	156–8389–00			1	IC,MEMORY:CMOS,SDRAM,8MEG X 64,64M,SYNCHRONOUS,100MHZ,7NS,MODULE,MC–458CD64S–A10B,SODIMM14	S5769	MC–458CD64S–A10B
–13	146–0132–00			1	BATTERY, BUTTON		
–14	119–5677–00			1	FLOPPY DISK DRIVE, 3.5 INCH, 1.44 MBYTE	NA	NA
–15	174–4195–00			4	CABLE ASSY:COAXIAL CABLE,PELTOLA TO SMB (SET OF FOUR)	060D9	44–0162–01
–16	119–6071–00			1	DISK DRIVE:WINCHESTER,2.5 IN,6.4GB,9.5 MM,IDE,MHE2064AT	049S6	MHE2064AT
–17	174–3925–00			1	CA ASSY,SP:RIBBON,CD ROM AUDIO CABLE,IDC,44,28 AWG,1MM,1.0 L,2 X 22,0.079 CTR (2MM)	060D9	174–3925–00
–18	671–4378–00			1	CIRCUIT BD ASSY:HARD DISK DRIVE,679–4378–00 TESTED,389–2562–00 WIRED	80009	671–4378–00
–19	437–0479–00			1	CABINET ASSY:REMOVEABLE HARD DISK DRIVE HOLDER(DOES NOT INCLUDE HARD DISK DRIVE)	TK1943	437–0479–00
–	650–4016–00			1	RHDD ASSEMBLY:MAX REPLACEABLE HARD DISK DRIVE ASSEMBLY WITH S/W INSTALLED	80009	650–4016–00
–	–			6	SCREW,MACHINE:4-40 X 0.250 PHILLIPS,PNH	80009	ORDER BY DESCRIPTION
–	119–4330–02			1	TEK MOUSE, 3-BUTTON, PS2 MINI–DIN		
–	119–5193–00			1	KEYBOARD,ASSY:WINDOWS 95 SOLUTION KEYBOARD WITH 4–PIN MINI DIN CONNECTOR	80009	119–5193–00
–	159–0379–00			1	FUSE,CARTRIDGE:20A,250V,5 SEC MIN @ 200%,0.25 X 1.25,UL REC,326020,	75915	326 020
–	159–0381–00			1	FUSE,CARTRIDGE:5 X 20 MM,6.3A,250V,FAST BLOW,HIGH BREAKING CAPACITY,UL REC,SEMKO,	71400	GDA–6.3
–	071–0264–XX			1	MANUAL, TECH: TLA 700 SERIES LOGIC ANALYZER INSTALLATION MANUAL	80009	071–0264–XX
–	071–0265–XX			1	MANUAL, TECH: USER, TLA 700 SERIES LOGIC ANALYZER	80009	070–9775–XX

Replaceable parts list (cont.)

Fig. & Index Number	Tektronix Part Number	Serial No. Effective	Serial No. Discont'd	Qty	Name and Description	Mfr. Code	Mfr. Part Number
					OPTIONAL ACCESSORIES		
	161–0066–09			1	CA ASSY,PWR:3,0.75MM SQ,250V/10A,99 INCH,STR,IEC320,RCPT,EUROPEAN,SAFTEY CONTROLLED,	2W733	ORDER BY DESCRIPTION
	161–0066–10			1	CA ASSY,PWR:3,1.0 MM SQ,250V/10A,2.5 METER,STR,IEC320,RCPT X 13A,FUSED UK PLUG(13A FUSE),UNI	TK2541	ORDER BY DESCRIPTION
	161–0066–11			1	CA ASSY,PWR:3,1.0MM SQ,250V/10A,2.5 METER,STR,IEC320,RCPT,AUSTRALIA,SAFTEY CONTROLLED,	80126	ORDER BY DESCRIPTION
	161–0066–12			1	CA ASSY,PWR:3,18 AWG,250V/10A,98 INCH,STR,IEC320,RCPT X NEMA 6–15P,US,SAFTEY CONTROLLED,	S3109	ORDER BY DESCRIPTION
	161–0154–00			1	CA ASSY,PWR:3,1.0MM SQ,250V/10A,2.5 METER,STR,IEC320,RCPT,SWISS,SAFTEY CONTROLLED,	5F520	86515030
	119–6072–00			1	LAN PC CARD:ETHERNET PCMCIA ADAPTER W/CE MARK, 10 BASE–T	0ZQ35	3CCFES2
	119–5430–00			1	DISPLAY,MONITOR:17 INCH,COLOR,30–86KHZ MULTI SYNC, 0.27MM DOT PITCH,FLAT CRT,PWR SAVING,ON SCREE	80009	119–5430–00
	119–5798–00			1	DISPLAY,MONITOR:21 INCH COLOR MULTI–SYNC MONITOR, 30–95 KHZ,	80009	119–5422–00
	070–9776–XX			1	MANUAL, TECH: TECHNICAL REFERENCE, TLA700 SERIES PERFORMANCE VERIFICATION AND ADJUSTMENT	80009	070–9776–00
	071–0269–XX			1	MANUAL, TECH: SERVICE, TLA 720 BENCHTOP CONTROLLER	80009	071–0269–00
	071–0268–XX			1	MANUAL, TECH: SERVICE, TLA 720 BENCH TOP CHASSIS	80009	071–0268–XX
	071–0267–XX			1	MANUAL, TECH: SERVICE, TLA 714 PORTABLE MAINFRAME	80009	071–0267–XX
	071–0266–XX			1	MANUAL, TECH: SERVICE, TLA 7Nx and TLA 7Px SERIES LOGIC ANALYZER MODULE	80009	071–0268–XX
	070–9780–XX			1	MANUAL, TECH: SERVICE, TLA7D1, TLA7E1 DIGITIZING OSCILLOSCOPE MODULE	80009	070–9780–XX
	071–0572–XX			1	MANUAL, TECH: INSTRUCTION, TLA 7UP MAINFRAME FIELD UPGRADE KIT	80009	071–0572–XX

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