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Service Manual

Tektronix

TLA 704
Color Portable Mainframe

070-9777-02

This document applies to TLA 700 application software version 1.00 and above.

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

CE

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Tektronix warrants that the products that it manufactures and sells will be free from defects in materials and workmanship for a period of one (1) year from the date of shipment. If a product proves defective during this warranty period, Tektronix, at its option, either will repair the defective product without charge for parts and labor, or will provide a replacement in exchange for the defective product.

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

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

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TEKTRONIX SERVICE OPTIONS

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 S3), which helps keep downtime to a minimum.

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

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

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

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

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General Safety Summary

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

Only qualified personnel should perform service procedures.

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

To Avoid Fire or Personal Injury

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

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

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

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

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

Do not 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.

Preface

This is the service manual for the TLA 704 Color Portable Mainframe. Read this preface to learn how this manual is structured, what conventions it uses, and where you can find other information related to servicing this product. Read the *Introduction* following this preface for safety and other important background information needed before using this manual for servicing this product.

Manual Structure

The *TLA 704 Color Portable Mainframe Service Manual* is divided into chapters, which are made up of related subordinate topics. These topics can be cross referenced as sections.

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

A brief description of each chapter follows:

- *Specifications* contains a product description of the portable mainframe and tables of the characteristics and descriptions that apply to it.
- *Operating Information* includes basic installation and operating instructions at the level needed to safely operate and service the portable mainframe. For complete installation and configuration procedures, refer to the *TLA 700 Series Installation Manual*.
- *Theory of Operation* contains circuit descriptions that support general service to the circuit board or replacement part level.
- *Performance Verification* refers you to the *TLA 700 Series Performance Verification and Adjustment Manual* that contains the performance verification procedures for the portable mainframe and for other major components in TLA 700 Series Logic Analyzers.
- *Adjustment Procedures* notes that the portable mainframe requires no adjustment.
- *Maintenance* contains information and procedures for doing preventive and corrective maintenance on the portable mainframe. Included are instructions for cleaning, for removal and installation of replaceable parts, and for troubleshooting product failures. Instructions for shipping the module are also found in this chapter.
- *Options* contains information on the factory-installed options that may be available for the portable mainframe.

- *Diagrams* contains a block diagram and an interconnection diagram useful for isolating failed circuit boards or assemblies**.**
- *Mechanical Parts List* includes a table of all replaceable parts, their descriptions, and their Tektronix part numbers.

Manual Conventions

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

Modules

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

Replaceable Parts

This manual refers to any field-replaceable assembly or mechanical part specifically by its name or generically as a replaceable part. In general, a replaceable part is any circuit board or assembly, such as the hard disk drive, or a mechanical part, such as the I/O port connectors, that is listed in the replaceable parts list of Chapter 10. Also, see *Strategy for Servicing* on page xiii.

Safety

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

Related Manuals

The following manuals are available as part of the TLA 700 Series Logic Analyzer documentation set. (See *Standard Accessories* and *Optional Accessories* on pages 10–1 and 10–3 for manual part numbers.)

The procedures and information in this manual assumes that service personnel have access to all manuals listed in the following table.

Manual Name	Description	Service Use
The *TLA 700 Series Installation Manual*	Provides the basic installation instructions for the TLA 700 Series Logic Analyzer.	Installation and removal of DSO, Logic Analyzer, and Benchtop-Controller Modules Reinstallation of Windows 95 and TLA 700 software and firmware Replacing individual podlet cables in the logic analyzer probes Reformatting hard disk
The *TLA 700 Series Performance Verification and Adjustment Technical Reference Manual*	Provides performance verification, certification, and adjustment procedures for the TLA 700 Series Logic Analyzer	Performing periodic or after-repair functional or performance verifications, calibrations, or certifications Performing periodic or after-repair adjustment
The *TLA 700 Series Logic Analyzer User Manual* and *TLA 700 Online Help*	Provides operating information on the TLA 700 Series Logic Analyzer	Augments operating information found in chapter 2 of this manual
The *TLA 711 Color Benchtop Chassis Service Manual*	Provides service information for the benchtop chassis	Isolating and correcting failures in the benchtop chassis
The *TLA 711 Color Benchtop Controller Service Manual*	Provides service information for the slot 0 controller in the benchtop mainframe	Isolating and correcting failures in the benchtop controller
The *TLA 7Lx/TLA 7Mx Logic Analyzer Service Manual*	Provides service information for the logic analyzer modules	Isolating and correcting failures in the Logic Analyzer module
The *TLA 7Dx/TLA 7Ex Digitizing Oscilloscope Service Manual*	Provides service information for the digitizing oscilloscope modules	Isolating and correcting failures in the Digitizing Signal Oscilloscope module

Introduction

This manual contains information needed to properly service the TLA 704 Color Portable Mainframe. This introduction contains information critical to safe and effective servicing.

To prevent personal injury or damage to the portable mainframe, 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 ix.
- Read *Operating Information* beginning on page 2–1.

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

Adjustment and Certification Interval

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

Strategy for Servicing

This manual supports and contains information needed for periodic maintenance of the portable mainframe.

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

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

Service Offerings

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

Whether providing warranty repair service or any of the other services listed below, Tektronix service technicians are well equipped to service the TLA 704 Color Portable Mainframe. Tektronix technicians train on Tektronix products; they have access to the latest information on improvements to the TLA 704 Color Portable Mainframe as well as the latest new product upgrades. *Services are provided at Tektronix Services Centers and on-site at your facility, depending on your location.*

Warranty Repair Service

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

Calibration and Repair Service

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

The following services can be tailored to fit your requirements for calibration and/or repair of the TLA 704 Color Portable Mainframe.

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

Service Agreements. If service options are not added to the instrument purchase, then service agreements are available on an annual basis to provide calibration services or post-warranty repair coverage for the TLA 704 Color Portable Mainframe. Service agreements may be customized to meet special turn-around time and/or on-site requirements.

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

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

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

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

Contacting Tektronix

Product Support	For application-oriented questions about a Tektronix measurement product, call toll free in North America: 1-800-TEK-WIDE (1-800-835-9433 ext. 2400) 6:00 a.m. – 5:00 p.m. Pacific time Or contact us by e-mail: tm_app_supp@tek.com For product support outside of North America, contact your local Tektronix distributor or sales office.
Service Support	Contact your local Tektronix distributor or sales office. Or visit our web site for a listing of worldwide service locations. http://www.tek.com
For other information	In North America: 1-800-TEK-WIDE (1-800-835-9433) An operator will direct your call.
To write us	Tektronix, Inc. P.O. Box 1000 Wilsonville, OR 97070-1000

Specifications

This chapter provides a brief product description and lists the warranted characteristics, nominal traits, and typical characteristics of the TLA 704 Color Portable Mainframe.

Product Description

The TLA 704 Color Portable Mainframe is the base component of a customer-configurable portable instrument. It can function as a logic analyzer, a digital storage oscilloscope, or both, depending on the module cards installed in its slots. The mainframe has the following features:

- Microsoft Windows 95 operating system
- Standard PC I/O ports, two PC card slots, and a PC-based processor architecture provides automatic connectivity to numerous off-the-shelf I/O devices (Ethernet, modem, printers, etc.)
- Display system provides internal color flat-panel LCD display (10.4-inch active-matrix TFT) and an external SVGA port capable of driving large, high-resolution external monitors
- Four backplane slots provide compatibility with TLA 700 Series instrument modules
- Easy user configurability
- Precision clock, bus trigger line, and event signaling between the mainframe and instrument modules supports real-time triggering, sequencing, and time correlation of events
- Easy service access to field-replaceable parts
- Mainframe compatible with international power standards, certified to international safety and EMC requirements, and tested to rugged environmental standards

Characteristics Tables

This section contains the complete specifications for the portable mainframe. All specifications are warranted unless noted "typical." Typical characteristics describe typical or average performance and provide useful reference information. Specifications marked with the ✓ symbol are checked in the *TLA 700 Series Performance Verification and Adjustment Technical Reference Manual*.

Table 1–1: Internal controller

Characteristic	Description
Classification	Microsoft Windows 95 compliant
Processor	Intel 133 MHz Pentium PC-AT configuration, with an Intel 82430HX (Triton II) chip set
Main Memory	EDO DRAM
Style	Two 72-pin SIMMs, gold-plated
Loading	Symmetric, 2-SIMM minimum (64 bits)
Speed	60ns
Installed Configurations	16 MByte minimum, 32 MByte maximum
Cache Memory	256 KByte Level 2 (L2) write-back cache
Flash BIOS	512 KByte
Real-Time Clock and CMOS Setups NVRAM	Real-Time clock/calendar, with typical 10-year life. Standard and advanced PC CMOS setups; see BIOS specification.
Floppy Disk Drive	Standard 3.5 inch 1.44-MByte PC compatible high-density, double-sided floppy disk drive.
Hard Disk Drive	Standard PC compatible ATA/Enhanced Integration Device Electronics (EIDE) hard disk drive.
Size	MIN configuration: 840 MByte MAX configuration: 2.16 GByte Subject to change; these are the storage capacities valid at product introduction.

Table 1–2: Display system

Characteristic	Description
Classification	Standard PC graphics-accelerator technology (bitBLT-based); capable of supporting both internal color LCD display and external color SVGA/XGA monitor
Display Memory	DRAM-based frame-buffer memory
Size	1 MByte
Width	32-bit
Display Selection	Hardware sense of external SVGA monitor during BIOS boot sequence; defaults to internal color LCD display; automatically switches to external SVGA monitor, if attached. Dual (simultaneous) display of external SVGA monitor and internal color LCD is possible via special CMOS “simulscan” setup, as long as internal and external displays operate at same resolution (limited to 640x480 on current TFT LCD) and display rates. Dynamic Display Configuration 1 (DDC1) support for external SVGA monitor is provided.
External Display Drive	1 SVGA/XGA-compatible analog output port
Display Size	Resolution (Pixels) / Colors / DDC1? 640x480 / 256 / yes 640x480 / 64K / yes 640x480 / 16.8M / no 800x600 / 256 / yes 800x600 / 64K / yes 1024x768 / 256 / yes
Internal Display	
Classification	Thin Film Transistor (TFT) 10.4” active-matrix color LCD display, CCFL backlight, intensity controllable via software.
Resolution	640 pixels horizontal by 480 pixels
Color Scale	262,144 colors (6-bit RGB)

Table 1–3: Backplane interface

Characteristic	Description
Slots	4 C-size, compliant with VXIBus System Spec Rev. 1.4, except as follows: MODID driver not capable of sinking 48 mA as required for 3-state lines (meets standard design practices for VXI); and TTLTRG* may not be unasserted after SYSRESET*, as ADG332 does not use SYSRESET* (accommodated via local controller reset)

Table 1–3: Backplane interface (Cont.)

Characteristic	Description
✓ CLK10 Frequency	10 MHz ±100 PPM
System-Level Relative Time Correlation Error[1,2]	All measurements typical.
LA to LA "MagniVu" data	2 ns
LA to LA "normal" data utilizing an internal clock[3]	1 LA Sample – 0.5 ns
LA to LA "normal" data utilizing an external clock	2 ns
LA "MagniVu" to DSO data	3 ns
LA to DSO "normal" data utilizing an internal clock[3,4]	1 LA sample + 1 ns
LA to DSO "normal" data utilizing an external clock[4]	3 ns
DSO to DSO[4]	3 ns
System Trigger and External Signal Input Latencies[5,6]	All measurements typical.
External System Trigger Input to LA Probe Tip[7]	–271 ns
External Signal Input to LA Probe Tip via Signal 3, 4[8]	–212 ns + Clk
External Signal Input to LA Probe Tip via Signal 1, 2[8,9]	–208 ns + Clk
External System Trigger Input to DSO Probe Tip[7]	–27 ns
System Trigger and External Signal Output Latencies[6]	All measurements typical.
LA Probe Tip to External System Trigger Out[9]	380 ns + Smpl
LA Probe Tip to External Signal Out via Signal 3, 4[9]	
OR function	371 ns + Smpl
AND function	383 ns + Smpl
LA Probe Tip to External Signal Out via Signal 1, 2[6,9]	
normal function	381 ns + Smpl
inverted logic on backplane	384 ns + Smpl
DSO Probe Tip to External System Trigger Out	70 ns
DSO Probe Tip to External Signal Out via Signal 3, 4	
OR function	68 ns
AND function	78 ns
DSO Probe Tip to External Signal Out via Signal 1, 2[9]	
normal function	71 ns
inverted logic on backplane	71 ns

Table 1–3: Backplane interface (Cont.)

Characteristic	Description
Inter-Module Latencies[6]	All measurements typical.
LA to DSO Inter-Module System Trigger[3,7]	358 ns + Smpl
LA to LA Inter-Module System Trigger[3,7]	68 ns + Smpl
LA to DSO Inter-Module ARM[3]	360 ns + Smpl
LA to LA Inter-Module ARM[3,8]	108 ns + Smpl + Clk
LA to LA Inter-Module via Signal 1, 2[3,8,9]	120 ns + Smpl + Clk
LA to LA Inter-Module via Signal 3, 4[3,8]	116 ns + Smpl + Clk
DSO to DSO Inter-Module System Trigger[7]	50 ns
DSO to LA Inter-Module System Trigger[7]	–236 ns
DSO to LA Inter-Module ARM[8]	–192 ns + Clk
DSO to DSO Inter-Module ARM	59 ns
DSO to LA Inter-Module via Signal 1, 2[8, 9]	–179 ns + Clk
DSO to LA Inter-Module via Signal 3, 4[8]	–184 ns + Clk

1 **Includes typical jitter, slot-to-slot skew, and probe-to-probe variations to provide a "typical" number for the measurement. Assumes standard accessory probes are utilized.**

2 **For time intervals longer than 1 μs between modules, add 0.01% of the difference between the absolute time measurements to the relative time correlation error to account for the inaccuracy of the CLK10 source.**

3 **"Smpl" represents the time from the event at the probe tip inputs to the next valid data sample of the logic analyzer. In the normal internal clock mode, this represents the delta time to the next sample clock. In MagniVu internal clock mode, this represents 500 ps or less. In external clock mode, this represents the time to the next master clock generated by the setup of the clocking state machine and the supplied SUT clocks and qualification data.**

4 **DSO modules time correlation measured at maximum sample rate on channel one only.**

5 **All system trigger and external signal input latencies were measured from a falling-edge transition (active/true low) with signals measured in the "wired-or" configuration.**

6 **Latencies are based on typical portable mainframe configurations consisting of two LA modules or an LA module plus a DSO module. Latencies are system-configuration-dependent and may vary slightly with module loading.**

7 **In the Waveform window, triggers are always marked immediately except when delayed to the first sample. In the Listing window, triggers are always marked on the next sample period following their occurrence.**

8 **"+Clk" represents the time to the next "master" clock at the destination logic analyzer. In the "asynchronous" or "internal" clock mode, this represents the delta time to the next sample clock beyond the minimum async rate of 4 ns. In the "synchronous" or "external" clock mode, this represents the time to the next master clock generated by the setup of the clocking state machine and the supplied SUT clocks and qualification data.**

9 **Signals 1 and 2 (ECLTRG0, 1) are limited to a "broadcast" mode of operation, where only one source is allowed to drive the signal node at any one time. That single source may be utilized to drive any combination of destinations.**

Table 1–4: Front panel interface

Characteristic	Description
QWERTY Keypad	31-key ASCII keypad to support naming of files, traces, and keyboard equivalents of pointing device inputs for menus
HEX Keypad	25-key HEX keypad supporting standard DSO and LA entry functions
Special Function Knobs	
Multi-Function Knob	Various increment/decrement functions
Vertical Position	Scrolling and positioning dependent on display type
Vertical Scale	Scales waveform displays only
Horizontal Position	Scrolling and positioning dependent on display type
Horizontal Scale	Scales waveform displays only
Integrated Pointing Device	Vertically mounted glidepoint touchpad with three keypad control buttons (DRAG, SELECT, and MENU)
Mouse Port	PS/2 compatible mouse port utilizing a mini-DIN connector
Keyboard Port	PS/2 compatible keyboard port utilizing a mini-DIN connector

Table 1–5: Rear panel interface

Characteristic	Description
LPT (Parallel Interface) Port	36-pin high-density connector supports standard Centronics mode, Enhanced Parallel Port (EPP), or Microsoft high-speed mode (ECP) Complies with IEEE P1284-C/D2 for bi-directional Parallel Peripheral Interface for Personal Computers (draft) style 1284-C
COM (Serial Interface) Port	9-pin male sub-D connector to support RS-232 serial port.
SVGA Output Port	15-pin sub-D SVGA connector.
Type I and II PC Card Port	Standard Type I and II PC-compatible PC card slot. Complies with PCMCIA 2.1 and JEIDA 4.1
Type I, II, and III PC Card Port	Standard Type I, II, and III PC-compatible PC card slot
System Trigger Input	TTL-compatible inputs via rear-panel BNC connectors
Input Destination	System trigger (TTLTRG7)
Input Levels	$V_{IH} \geq 2.0V$; $V_{IL} \leq 0.8V$ (TTL-compatible input)
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 +5V peak
External Signal Input	TTL-compatible inputs via rear-panel BNC connectors
Input Destinations	Signal 1, 2 (ECLTRG0, 1) Signal 3, 4 (TTLTRG0, 1)
Input Levels	$V_{IH} \geq 2.0V$; $V_{IL} \leq 0.8V$ (TTL-compatible input)
Maximum Input Voltage	0 to +5V peak
Input Mode	Active (true) low, level sensitive
Input Bandwidth	Signal 1, 2: 50 MHz square wave minimum; Signal 3, 4: 10 MHz square wave minimum. Input bandwidth only applies to signals to the modules, not round-trip signals into the external signal input and back out the external signal output.
Active Period	Accepts signals during valid acquisition periods via real-time gating

Table 1–5: Rear panel interface (Cont.)

Characteristic	Description
System Trigger Output	TTL-compatible outputs via rear-panel BNC connectors
Source Selection	System trigger (TTLTRG7)
Output Levels	50-Ω back-terminated TTL output $V_{OH} \geq 4$ V into open circuit $V_{OH} \geq 2$ V into 50 Ω to ground $V_{OL} \leq 0.7$ V sinking 10 mA
Source Mode	Falling edge sensitive
Active Period	Outputs system trigger state during valid acquisition period; resets system trigger output to false state and resets output latch between valid acquisitions via software
Output Protection	Short-circuit protected (to ground)
External Signal Output	TTL-compatible outputs via rear-panel BNC connectors
Source Selection	Signal 1, 2 (ECLTRG0, 1) Signal 3, 4 (TTLTRG0, 1) 10 MHz clock (CLK10)
Output Levels	50-Ω back-terminated TTL output $V_{OH} \geq 4$ V into open circuit $V_{OH} \geq 2$ V into 50 Ω to ground $V_{OL} \leq 0.7$ V sinking 10 mA
Output Modes	User-definable: active (true) low or active (true) high
Output Bandwidth	Signal 1, 2: 50 MHz square wave minimum; Signal 3, 4: 10 MHz square wave minimum. The output bandwidth only applies to signals from the modules, not round-trip signals into the External Signal Input and back out the External Signal Output.
Active Period	Outputs signals during valid acquisition periods; resets signals to false state between valid acquisitions via software
Output Protection	Short-circuit protected (to ground)
Intermodule Signal Line Bandwidth	Minimum bandwidth over which the intermodule signals are specified to operate correctly: Signal 1,2 (ECLTRG0,1): 50 MHz square wave minimum Signals 3,4 (TTLTRG0,1): 10 MHz square wave minimum

Table 1–6: AC power source

Characteristic	Description
Source Voltage and Frequency	90 V_{RMS} to 250 V_{RMS}, 45 Hz to 66 Hz, continuous range CAT II; 100 V_{RMS} to 132 V_{RMS}, 360 Hz to 440 Hz, continuous range CAT II
Fuse Rating	
90 V - 250 V Operation (159–0046–00)	UL198/CSA C22.2 0.25 in × 1.25 in, Fast Blow, 8 A, 250 V
90 V - 250 V Operation (159–0381–00)	IEC 127/Sheet 1 5 mm × 20 mm, Fast Blow, 6.3 A, 250 V
Maximum Power Consumption	600 W line power maximum
Steady-State Input Current	6 A_{RMS} maximum
Inrush Surge Current	70 A maximum
Power Factor Correction	Yes
On/Standby Switch and Indicator	Front Panel On/Standby switch, with LED indicator located next to switch. The power cord provides main power disconnect.

Table 1–7: Secondary power

Characteristic	Description			
DC Voltage Regulation	Voltage	Vmin	Vnom	Vmax
	+24 V	23.28 V	24.24 V	25.20 V
	+12 V	11.64 V	12.12 V	12.60 V
	+5 V	4.875 V	5.063 V	5.250 V
	–2 V	–2.10 V	–2.00 V	–1.90 V
	–5.2 V	–5.460 V	–5.252 V	–5.044 V
	–12 V	–12.60 V	–12.12 V	–11.64 V
	–24 V	–25.20 V	–24.24 V	–23.28 V

Table 1–8: Certifications and compliances: TLA 704 Color Portable Mainframe

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 Tektronix, Inc. claims compliance to EMC Directive 89/336/EEC for the following products when used with the above named mainframes: TLA 700 Series Logic Analyzer Modules (TLA 7L1, TLA 7L2, TLA 7L3, TLA 7L4, TLA 7M1, TLA 7M2, TLA 7M3, TLA 7M4) TLA 700 Series Digitizing Oscilloscope Modules (TLA 7D1, TLA 7D2, TLA 7E1, TLA 7E2)
EC Declaration of Conformity – Low Voltage	Compliance was demonstrated to the following specification as listed in the Official Journal of the European Communities: Low Voltage Directive 73/23/EEC EN 61010-1:/A2 1995 Safety requirements for electrical equipment for measurement, control, and laboratory use
Approvals	UL3111-1 – Standard for electrical measuring and test equipment CAN/CSA C22.2 No. 1010.1 – Safety requirements for electrical equipment for measurement, control and laboratory use
Installation Category Descriptions	Terminals on this product may have different installation category designations. The installation categories are: CAT III Distribution-level mains (usually permanently connected). Equipment at this level is typically in a fixed industrial location CAT II Local-level mains (wall sockets). Equipment at this level includes appliances, portable tools, and similar products. Equipment is usually cord-connected CAT I Secondary (signal level) or battery operated circuits of electronic equipment
Conditions of Approval	Safety Certifications/Compliances are made for the following conditions: Temperature (operation): +5°C to +40°C Altitude (maximum operation): 2000 meters
IEC Characteristics	Equipment type: Test and Measuring Installation Category II Pollution Degree 2 Safety Class I

Table 1–9: Cooling

Characteristic	Description
Cooling System	Forced air circulation (negative pressurization) utilizing six fans operating in parallel
Cooling Clearance	2 inches (51 mm), sides and rear; unit should be operated on a flat, unobstructed surface

Table 1–10: Environmental

Characteristic	Description
Atmospherics	
Temperature (no media in floppy drive)	
Operating	+5° C to +50° C, 15° C/hr maximum gradient, non-condensing. Derated 1° C per 1000 feet (305 m) above 5000 feet (1524 m) altitude.
Nonoperating	–20° C to +60° C, 15° C/hr maximum gradient, non-condensing
Relative Humidity (no media in floppy drive)	
Operating	20% to 80% relative humidity, non-condensing. Maximum wet bulb temperature: +29° C (derates relative humidity to ~22% at +50° C)
Nonoperating	8% to 80% relative humidity, non-condensing. Maximum wet bulb temperature: 29° C (derates relative humidity to ~22% at +50° C)
Altitude	
Operating	To 10,000 ft. (3040 m). Derated 1° C/1000 ft. (305 m) above 5000 ft. (1524 m) altitude
Nonoperating	To 40,000 ft. (12,190 m)
Dynamics	
Random Vibration	Three axis, 30 minutes total, 10 minutes per axis; without VXI instrument modules installed, or with instrument modules installed but not exceeding 5 lbs/slot
Operating	0.27 g_{RMS} total from 5 Hz to 500 Hz
Nonoperating	2.28 g_{RMS} total from 5 Hz to 500 Hz
Mechanical Shock Operating	Half sine, 30 g, 11 ms duration, three drops each side, 18 shocks total, no media in floppy drive, without instrument modules installed or with instrument modules installed but not exceeding 5 lbs/slot. Meets functional shock requirements of MIL-T-28800E, Type-III, Class 5

Table 1–11: Mechanical

Characteristic	Description
Overall Dimensions	(See Figure 1–1 for overall chassis dimensions)
Height (with feet)	9.25 in (23.5 cm)
Width	17 in (43.18 cm)
Depth	17.5 in (44.45 cm)
Weight	30 lbs 12 oz (13.9 kg) with no modules installed, two dual-wide slot covers, and empty pouch
Shipping Configuration	60 lbs 13 oz (27.58 kg) minimum configuration (no modules), with all standard accessories 86 lbs 9 oz (39.26 kg) full configuration, with two TLA 7M4 modules and standard accessories (including probes)

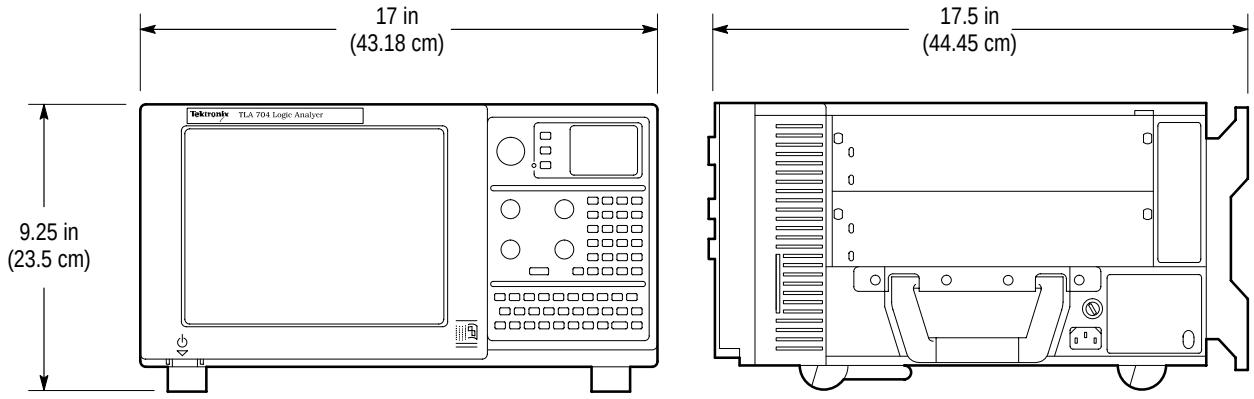


Figure 1–1: Front and side views of TLA 704 Color Portable Mainframe

Operating Information

This chapter contains information about operating the TLA 704 Color Portable Mainframe.

Installation

Refer to the *TLA 700 Series Logic Analyzer Installation Manual* for complete information on how to install and configure the portable mainframe.

I/O and Memory Hardware

This section describes the I/O and memory hardware on the portable mainframe, including:

- Color LCD display
- Front-panel keypad and knobs
- Glidepoint point device
- Mouse and keyboard connectors
- External I/O BNCs
- PCMCIA PC card ports
- Rear-panel I/O ports
- Floppy disk drive
- Hard disk drive
- Memory SIMMs

Figure 2–1 on page 2–2 shows the front panel of the portable mainframe and indicates the location of the external I/O hardware. Figure 2–2 on page 2–3 shows the rear panel of the portable mainframe.

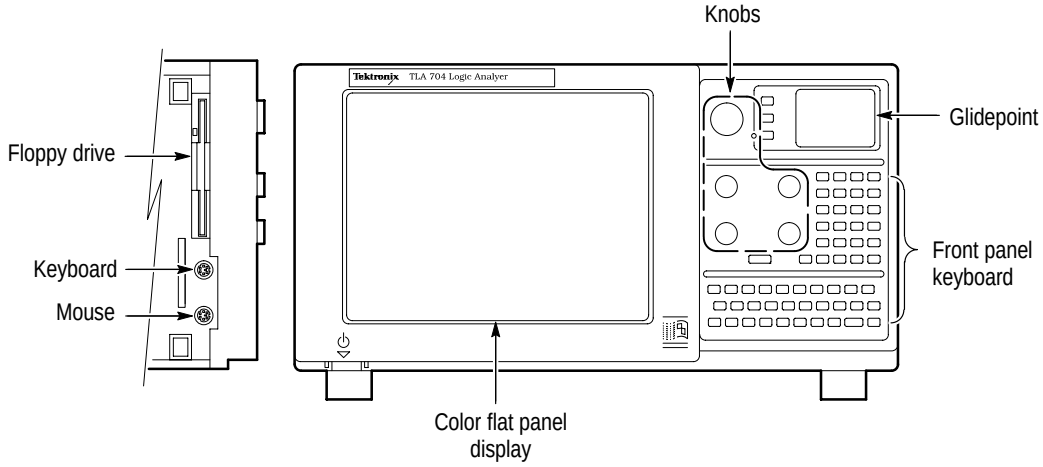


Figure 2–1: TLA 704 Color Portable Mainframe front panel

Color LCD Display

The portable mainframe features a 10.4-inch diagonal, flat-panel LCD active-matrix Thin-Film-Transistor (TFT) color display.

Front Panel Keypad, Knobs

The front panel of the portable mainframe includes a QWERTY keyboard, a hexadecimal numeric keypad, and five front panel knobs. The keypads are active simultaneously with the standard external keyboard.

QWERTY Keypad. The QWERTY keypad is useful for file naming and other operations where a complete alphabetic character set is needed.

Hexadecimal Numeric Keypad. The hexadecimal numeric keypad is useful for numeric entry of data.

Front Panel Knobs. The front panel knobs include a large multi-function knob and four smaller positioning/scale knobs. The multi-function knob is used primarily for incrementing and decrementing values in selected menu boxes. The positioning and scale knobs (Vertical Position, Horizontal Position, Vertical Scale, and Horizontal Scale) provide necessary control of DSO applications, as well as the scrolling of logic analyzer displays.

Glidepoint Point Device

The glidepoint device, vertically mounted on the front panel, can be used instead of the external mouse when limited bench space is available. The glidepoint device and the standard external mouse are active simultaneously.

Mouse and Keyboard Connectors

The portable mainframe has two six-pin PS/2 compliant DIN connectors. One connector supports an external mouse; the other connector supports an external keyboard. Descriptions of the two ports follow.

MOUSE Connector. 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 Connector. 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.

External I/O BNCs

The portable mainframe has four test I/O BNC connectors on the rear panel (see Figure 2–2): SYSTEM TRIG IN, SYSTEM TRIG OUT, EXTERNAL SIGNAL IN, and EXTERNAL SIGNAL OUT.

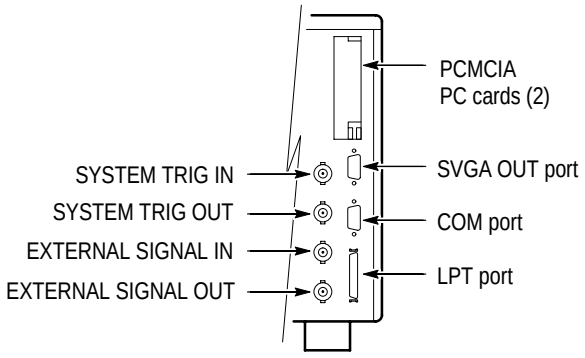


Figure 2–2: TLA 704 Color Portable Mainframe rear panel

SYSTEM TRIG IN Connector. The System Trigger Input is a TTL-compatible signal input that is user definable in software. The System Trigger Input utilizes a BNC connector. Refer to the *TLA 700 Series Logic Analyzer User Manual* for additional information.

SYSTEM TRIG OUT Connector. The System Trigger Output is a TTL-compatible output signal that is user definable in software. The System Trigger Output utilizes a BNC connector. Refer to the *TLA 700 Series Logic Analyzer User Manual* for additional information.

EXTERNAL SIGNAL IN Connector. The External Signal Input is a TTL-compatible input signal that is user definable in software. The External Signal Input utilizes a BNC connector. Refer to the *TLA 700 Series Logic Analyzer User Manual* for additional information.

EXTERNAL SIGNAL OUT Connector. The External Signal Output is a TTL-compatible output signal that is user definable in software. The System Trigger Output utilizes a BNC connector. Refer to the *TLA 700 Series Logic Analyzer User Manual* for additional information.

PCMCIA PC Card Port

The portable mainframe includes one slot that supports an industry standard Type I or Type II PC card, and another that supports a Type I, II, or III PC card.

I/O Ports

The portable mainframe has three (3) I/O Ports: an SVGA OUT port, a COM port, and an LPT port. Descriptions of the three ports follow.

SVGA OUT 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 2–1 for pin assignments.

Table 2–1: SVGA OUT pin assignments

Pin number	Pin function	Pin number	Pin function
1	RED	2	GRN
3	BLU	4	DDC DB2
5	GND	6	GND
7	GND	8	GND
9	(KEY)	10	GND
11	DDC DB0	12	DDC DB1
13	HSYNC	14	VSYNC
15	DDC DB3		

COM Port. The COM port is an RS232 serial port. The connector is a 9-pin male, sub-D plug. See Table 2–2 for pin assignments.

Table 2–2: COM (serial interface) pin assignments

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	GND
See IEEE specification P1284-C for pin connection definitions for other modes			

Floppy Disk Drive (FDD)

The TLA 704 Color Portable Mainframe has one standard 1/2 inch drive that supports 3.5 inch, 1.44 MByte, high-density/double-sided floppy disk media.

Hard Disk Drive (HDD)

The TLA 704 Color Portable Mainframe has one standard 2.5 inch IDE drive that interfaces directly to the controller via an Enhanced Integrated Device Electronics (IDE) interface. The Hard Disk Drive (HDD) is available in two configurations: the 840 MByte (minimum) configuration and the 2.16 GByte configuration. Configurations offered are subject to change; this manual lists configurations available at the time the product was introduced.

Memory SIMMs

The TLA 704 Color Portable Mainframe utilizes two (2) 72-pin EDO DRAM memory SIMMs (Single Inline Memory Module). The SIMMs must have gold pins and must be loaded symmetrically (in pairs). The SIMM speed requirement is 60 ns minimum.

Memory requirements are the 16 MByte minimum configuration or the 32 MByte maximum configuration.

Operating System and Application Interface

The portable mainframe comes with the Windows 95 operating system factory-installed. Operations and capabilities when running on the portable mainframe are the same as with Windows 95 running on a high-performance personal computer. Windows Help is available from the Start menu of the Windows 95 Task Bar. The Windows 95 software is included with the product. See the software and the *TLA 700 Series Installation Manual* if you need to reinstall the Windows 95 application.

The portable mainframe also comes with the TLA 700 application software configured at the factory to launch after the logic analyzer boots up and Windows 95 is running. The TLA 700 application software controls data acquisition and processing by the logic analyzer. The TLA 700 application software is included with the product. Refer to the *TLA 700 Series Installation Manual* if you need to reinstall the TLA 700 application software.

The topics that follow provide a brief overview of the TLA 700 application software.

System Window

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

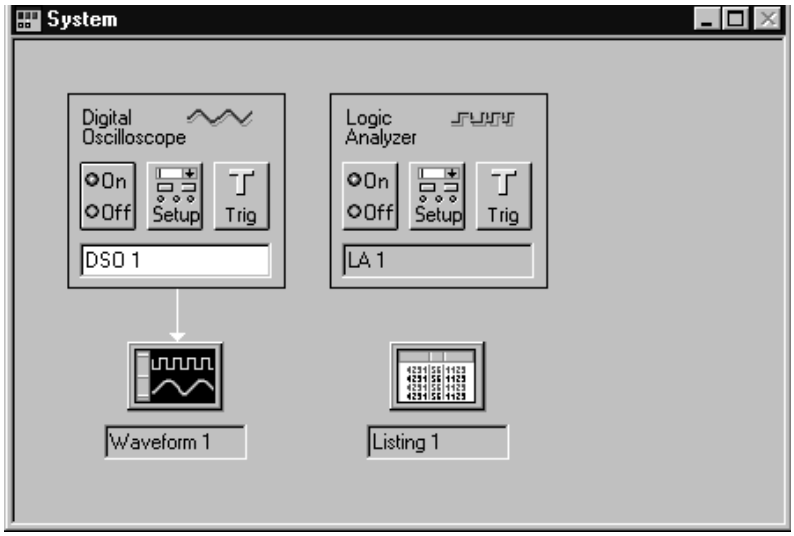


Figure 2–3: Typical System window

The center of the System window displays icons that represent hardware modules installed in the portable mainframe. The icons are links to the other windows in the instrument.

Trigger Window

The Trigger window provides access to the logic-analyzer trigger hardware. You can specify the data patterns you want to acquire and how much data to acquire by defining the trigger setups in menus and dialogs.

Listing Window

The Listing window displays acquired data as tabular text. Each column of data represents one group of data or other logical data information, such as time-stamps. Each row of data represents a different time that the data was acquired; newer samples of data display below older samples.

Waveform Window

The Waveform window displays acquired data as graphical waveforms. All defined channel groups display as busforms for the logic analyzer and as individual channels for the digitizing oscilloscope.

Setup Window

A setup window exists for each module in the instrument. It contains the setup information for each installed module, such as clocking, memory depth, threshold information, and channel information. Menus and dialogs contain information to set up the window as needed. Most of the changes that you make in menus or dialogs take effect at the end of the acquisition; however, probe threshold changes take effect immediately.

Online Help

Most of the user information for operating the portable mainframe is available through online help.

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

Refer to your Microsoft Windows documentation for additional information on using Windows help.

Diagnostics

The TLA 704 Portable Mainframe contains the following diagnostics:

- BIOS diagnostic tests (automatic)
- TLA 700 Series application software (automatic and manual)
- TLA 700 Series mainframe diagnostics (manual)
- QAPlus/Win (manual)

All diagnostics (both automatic and manually executed tests) are useful for troubleshooting purposes.

The portable mainframe performs BIOS and TLA 700 Series application diagnostics for the mainframe and all installed modules every time you power on. The diagnostics window displays when any of the diagnostic tests fail. To access the diagnostics tests in the TLA 700 Series application software, use the System pull-down menu.

In addition to Power-on Diagnostics, the TLA 704 Portable Mainframe also contains mainframe diagnostics and QAPlus/Win diagnostics for the PC hardware.

For more information about diagnostics, refer to the *Maintenance* chapter.

Theory of Operation

This section provides a brief overview of the theory of operation for the portable mainframe. Figure 3–1 shows a functional block diagram of the major components.

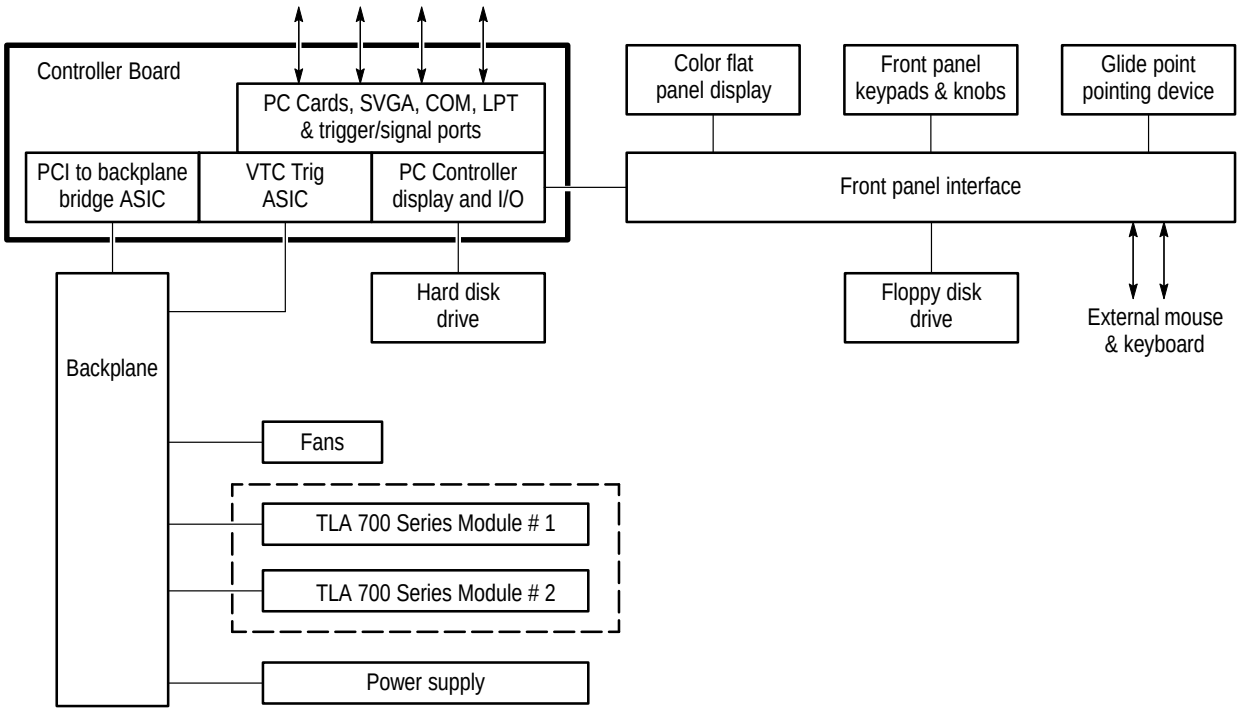


Figure 3–1: TLA 704 Color Portable Mainframe major components block diagram

Portable Mainframe

The portable mainframe contains the following major components:

- Power supply
- Backplane
- Controller Board
- Front Panel Interface Board
- Front Panel Controls Board
- Color Flat Panel Display

- Front Panel Keypads and Knobs
- Glidepoint Pointing Device
- Hard Disk Drive
- Floppy Disk Drive
- Mechanical Chassis

Power Supply

The power supply provides all voltages and currents to the portable mainframe. The power supply connects to the backplane at P400 and P401.

Backplane

The backplane supports up to four “C” sized TLA 700 slots for support of instrument modules. The backplane also connects the power supply secondary to the remainder of the system, including the fans, distributes the precision 10-MHz (CLK10) system clock, and supports all communication to, from, and between the instrument modules.

Controller Board

The Controller Board provides the portable mainframe with a high-performance PC-based controller architecture, including graphics and I/O, and interfaces to the backplane bus and front panel. The Controller Board mounts vertically on the left side of the instrument and connects to the back of the backplane via a P1/P2 interconnect. The Controller Board also provides I/O to the rear panel and is the source of the 10-MHz (CLK10) system clock.

The PC controller features a Pentium 133-MHz processor with either 16 or 32 MBytes of EDO DRAM, 256 KBytes of L2 cache, and 512 KBytes of flash-based BIOS.

A Cirrus Logic PCI-to-PCMCIA/PC CARD Host Adapter ASIC controls the two PC card slots.

A Cirrus Logic Viking display controller with 1 MByte of DRAM supports the flat-panel display and an external SVGA port.

One ECP/EPP Centronics-compatible parallel port and two 16550-based serial RS-232 COM ports (one external) support standard PC-based I/O peripherals.

A Tektronix-designed ADG343 CMOS ASIC manages the PCI-to-backplane interface, supporting DMA transfers with FIFO, IRQ management, programmable byte swapping, address space management/windowing, bus arbitration, and MODID control lines.

A Tektronix-designed ASIC manages the trigger lines, cross-connecting any of the 10 backplane trigger lines (ECL and TTL) to any of the four BNC ports on the rear I/O panel of the mainframe. The VTC ASIC supports several standard

trigger protocols and several custom features, including time interpolation to support individual module applications.

Front Panel Interface Board

The Interface Board interconnects the Controller Board, the flat-panel display, the floppy disk drive, the front-panel keypad and glidepoint, and the external mouse and keyboard ports. Dual 50-pin cables connect the Front Panel Interface Board to the Controller Board. The Interface Board also supplies the PC speaker.

Front Panel Controls Board

The Front Panel Controls Board combines signals from the front-panel hex keypad, the front-panel QWERTY keypad, and an external keyboard to generate or receive standard keyboard scan-codes from the Controller Board. Keys are controlled via a 6805C processor. A second 6805C processor controls the five front-panel knobs and the glidepoint.

Mechanical Chassis

The Mechanical Chassis provides the mechanical support structure for the instrument, and includes the cooling system, the modular-card cage, the EMI shielding system, and all the subsystems previously listed.

Performance Verification

Refer to the *TLA 700 Series Performance Verification and Adjustment Technical Reference Manual* for complete performance verification and calibration (certification) procedures for the TLA 704 Color Portable Mainframe.

Adjustment Procedures

There are no adjustment procedures specific to the TLA 704 Color Portable Mainframe.

Maintenance

This chapter provides procedures for inspecting and cleaning the portable mainframe, removing and replacing internal chassis components, and isolating problems to the board or replacement part level.

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

Preparation

The information in this chapter is designed for use by qualified service personnel. Read the *Safety Summary* at the front of this manual before attempting any procedures in this chapter. Refer to the *Operating Information* chapter for information on the location of controls, indicators, and connectors used with the chassis.

Preventing ESD

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



CAUTION. *Many components within the chassis are susceptible to static-discharge damage. Service the chassis only in a static-free environment. Observe standard handling precautions for static-sensitive devices while servicing the chassis. Always wear a grounded wrist strap, or equivalent, while servicing the chassis.*

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. Do 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.



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

Inspection and Cleaning

The TLA 704 Color Portable Mainframe is inspected mechanically and electrically before shipment. It should be free of marks or scratches and should meet or exceed all electrical specifications. To confirm this, inspect the chassis for physical damage incurred during transit. Retain the chassis packaging in case shipment for repair is necessary. If there is damage or deficiency, contact your local Tektronix representative.

Cleaning procedures consist of exterior and interior cleaning of the chassis. Clean the chassis as needed, based on the operating environment. Refer to the appropriate module service manuals for information on cleaning individual TLA 700 Series modules.

Interior Cleaning

Use a dry, low-velocity stream of air to clean the interior of the chassis. Use a soft-bristle, non-static-producing brush for cleaning around components. If you must use a liquid for minor interior cleaning, use a 75% isopropyl alcohol solution and rinse with deionized water.

Exterior Cleaning

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

Clean the On/Standby switch using a dampened cleaning towel. Do not spray or wet the switch directly.



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

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

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

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

Flat Panel Display Cleaning

The TLA 704 Portable Mainframe display is a soft plastic display and must be treated with care during cleaning.



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

Avoid using abrasive cleaners or commercial glass cleaners to clean the display surface.

Avoid spraying liquids directly on the display surface.

Avoid scrubbing the display with excessive force.

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

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

Removal and Installation Procedures

This subsection contains procedures for removal and installation of all mechanical and electrical field-replaceable parts.

Preparation — Please Read

WARNING. *Before performing this or any other procedure in this manual, read the Safety Summary found at the beginning of this manual. Also, to prevent possible injury to service personnel or damage to the portable mainframe, read* Installation *in Chapter 2, and* Preventing ESD *on page 6–1 in this section.*

This subsection contains the following items:

- Preparatory information needed to properly perform the procedures that follow
- List of tools required to remove and disassemble all replaceable parts
- Two parts locator diagrams for finding the External Parts (see Figure 6–1) and Internal Parts (see Figure 6–13 on page 6–29) in this mainframe
- Procedures for removing and reinstalling field replaceable parts

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

List of Replaceable Parts

Chapter 10 lists all replaceable parts.

General Instructions

***NOTE**. Read the following general instructions before removing a part. Following these instructions helps ensure that you remove the part to be serviced while removing the minimum number of additional parts.*

First read over the *Summary of Procedures* that follows to understand how the procedures are grouped. Then see Table 6–1 for a list of the tools needed to remove and install replaceable parts in this mainframe.

If you are removing a part for service, begin by looking up the procedure for that part. If any procedures are listed as required in advance in order to gain access to the part, perform those procedures first.

Summary of Procedures

Procedures are described in the order in which they appear in this section. In addition, you can look up any procedure for removal and reinstallation of any replaceable part in the *Table of Contents* of this manual.

- *Procedures for External Parts* on page 6–7 are procedures for removing parts that do not require internal access to the mainframe.
- *Procedures for Internal Parts* on page 6–28 are procedures for removing parts that require internal access to the mainframe.

Equipment Required. Most parts in this mainframe can be removed with a screwdriver handle mounted with a size T-15, Torx screwdriver tip. *Use this tool whenever a procedure step instructs you to remove or install a screw unless a different size screwdriver is specified in that step.* All equipment required to remove and reinstall each part is listed prior to the first step of its procedure.

Table 6–1: Tools required for part removal

Item Number	Name	Description
1	Screwdriver handle	Accepts Torx driver bits
2	T-15 Torx tip	Torx driver bit for T-15 size screw heads
3	T-10 Torx tip	Torx driver bit for T-10 size screw heads
4	Flat Blade Screwdriver	Small flat blade screwdriver
5	Phillips screwdriver	Phillips #1 screwdriver
6	Pliers	Standard tool
7	Side cutters	Diagonal cutters (for removing cable ties)
8	Scribe or jeweler's screwdriver	Standard tool
9	Cable tie	Standard item

Procedures for External Parts

Figure 6–1 shows the locations of the external parts of the TLA 704 Color Portable Mainframe. Procedures for removing and replacing these parts are presented in the following order:

- Front Cover and Trim Ring
- Front Panel Control Assembly
- Flat Panel Display Assembly
- Front-Panel Knobs
- Bottom Cover
- Top Cover
- Left Side Cover
- Right Side Cover
- Line Cord and Line Fuse
- Power Supply
- Rear Chassis Fan Tray
- Individual Fans
- Flip Stands and Rear Feet
- Cord-Wrap Feet
- Handle

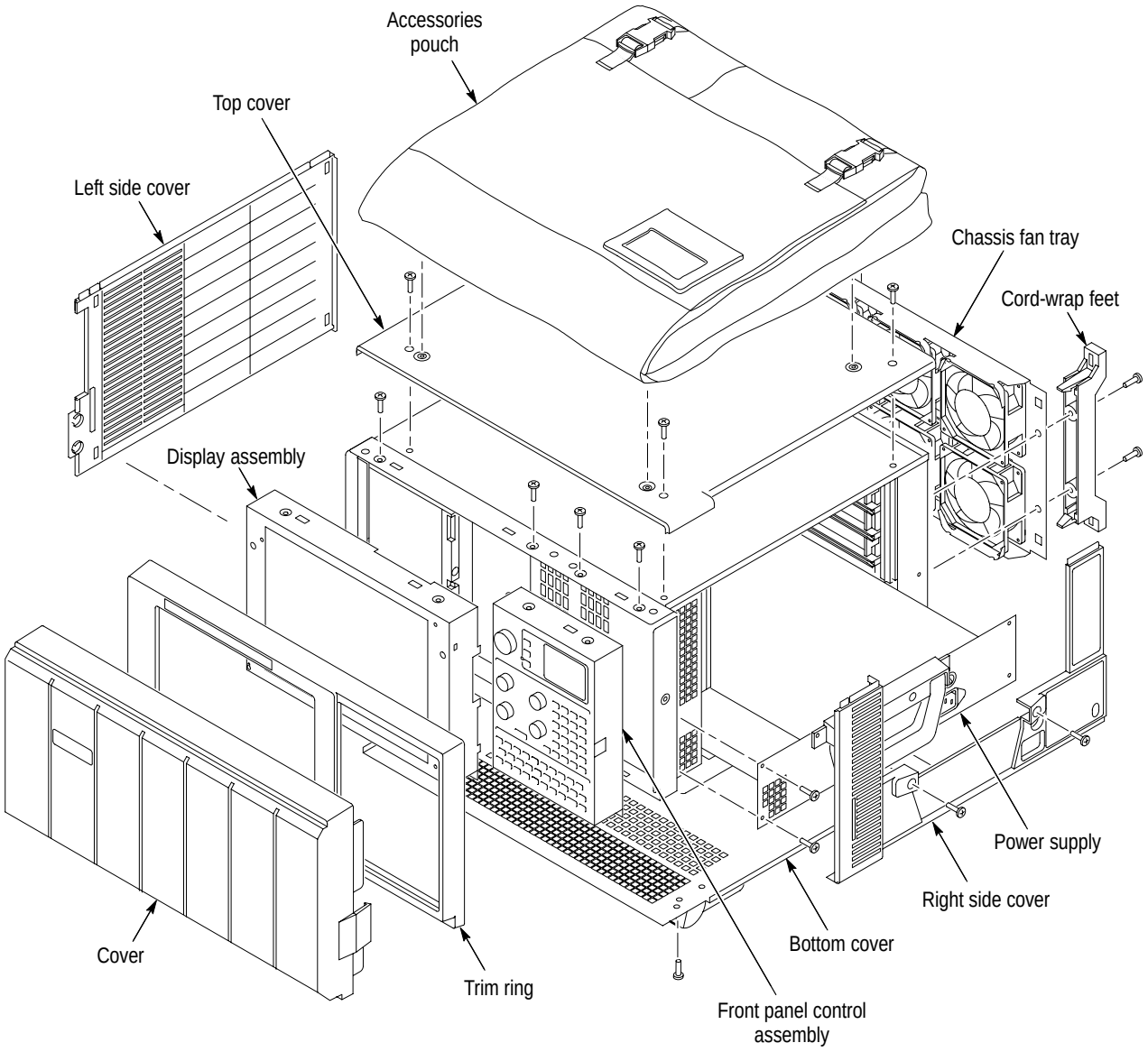


Figure 6–1: External parts

Front Cover and Trim Ring

You will need a flat-bladed screwdriver or other small prying tool (Table 6–1, item 4, page 6–6) to remove the trim ring.

Removal

Use the following procedure to remove the front cover and trim ring:

1. Locate the parts to be removed in the locator diagram *External parts*, Figure 6–1 on page 6–8.
2. Set the mainframe with the cord-wrap feet on the work surface and the bottom facing you.
3. Grasp the front cover by its left and right edges and snap it off the front panel. See Figure 6–2 on page 6–10.
4. Do the *Bottom Cover* removal procedure, on page 6–14, to remove the bottom cover.
5. Grasp the trim ring by its bottom edge and pull toward you to detach the three plastic snaps. (Alternatively, you can use a flat-bladed screwdriver or other small prying tool to help you detach the snaps.) Then, swing the bottom of the ring upward and work the rest of the ring off the front panel.

Installation

Use the following procedure to replace the front cover and trim ring:

1. Do the *Bottom Cover* installation procedure on page 6–14 to replace the bottom cover.
2. Replace the trim ring on the front panel. Start at the top edge and work around to the bottom until the three plastic snaps engage. Press the trim ring down all around the edges until it is completely seated.
3. Press the front cover back onto the front panel until the left and right edges snap into place.

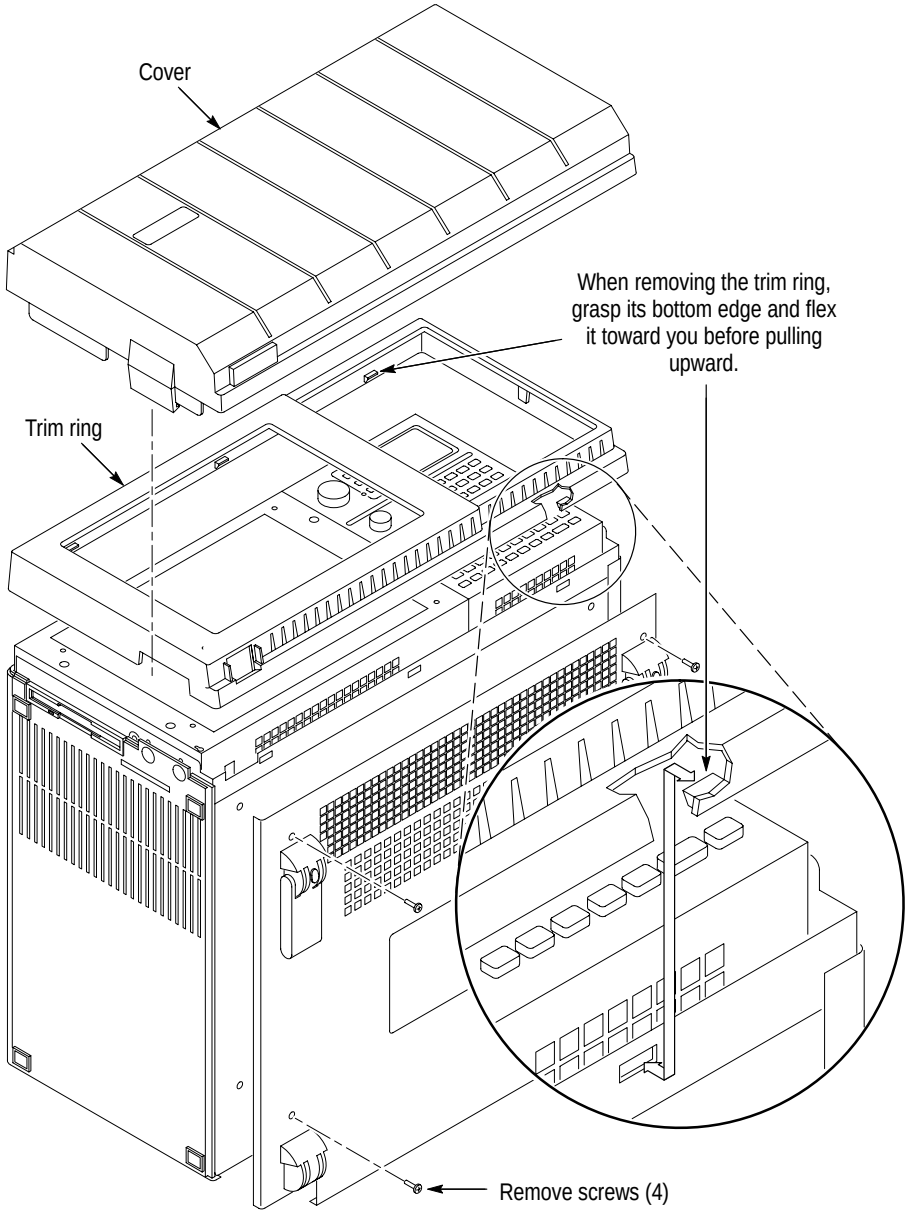


Figure 6–2: Front cover and trim ring removal

Front Panel Control Assembly

You will need a screwdriver with a size T-15 Torx tip (Table 6–1, items 1 and 2, page 6–6) to perform this procedure.

Removal

Use the following procedure to remove the front panel control assembly:

1. Locate the parts to be removed in the locator diagram *External parts*, Figure 6–1 on page 6–8.
2. Do the Front Cover and Trim Ring removal procedure, steps 1-5, on page 6–9.
3. Set the mainframe with the bottom on the work surface and the front facing you.

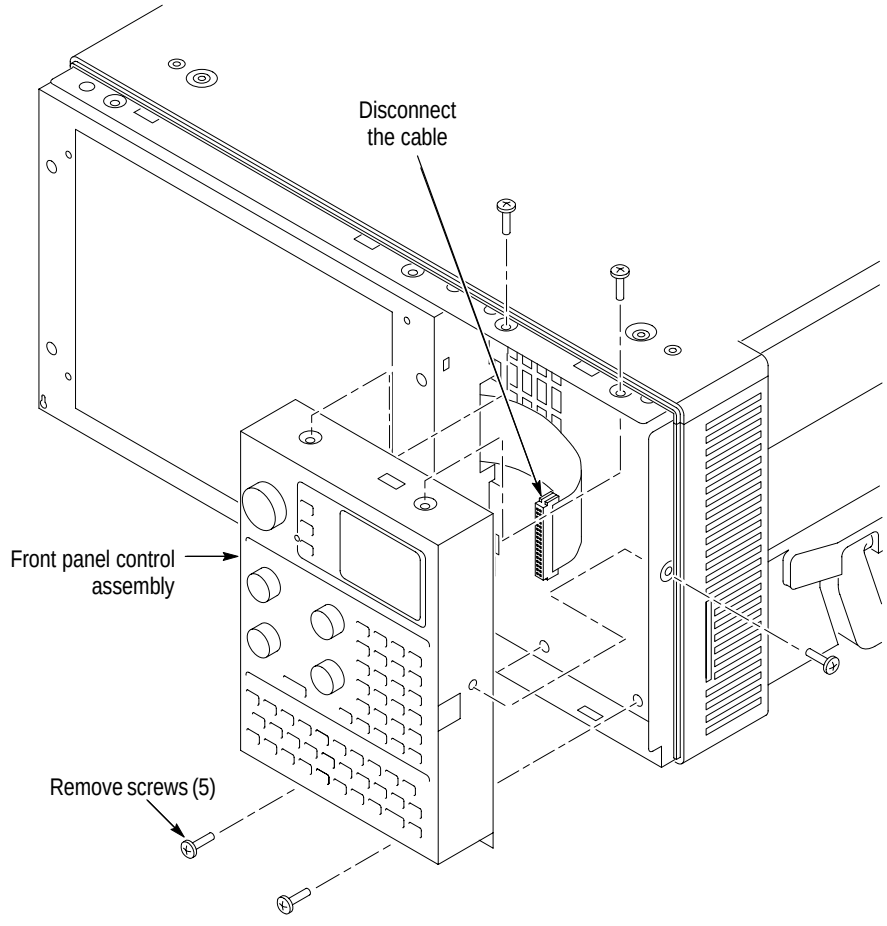


Figure 6–3: Front-panel control assembly removal

4. Remove the five screws that attach the front panel control assembly to the mainframe: two at the bottom of the assembly on the front of the instrument, two on the top, and one on the right side. (See Figure 6–3 on page 6–11).
5. Lift the bottom edge of the front control panel assembly and rotate it upward and off the front face of the mainframe.
6. Detach the cable connecting the front panel panel assembly to the interface board.

***NOTE**. Procedures for removing the knobs, elastomeric keypad, and Front Panel Control Board are found in "Procedures for Internal Parts," which begins on page 6–28.*

Installation

Use the following procedure to reinstall the front panel control assembly:

1. Reattach the cable connecting the front panel control assembly to the interface board.
2. Reinstall the front panel control assembly by first inserting the top edge and then rotating it downward into position. (Be sure the tabs are engaged at the top of the assembly. Insert the five screws that attach the front panel control assembly to the mainframe: two at the bottom of the assembly on the front of the instrument, two on the top, and one on the right side. (See Figure 6–3 on page 6–11).

Flat Panel Display Assembly

You will need a screwdriver with a size T-15 Torx tip (Table 6–1, items 1 and 2, page 6–6) to perform this procedure.

Removal

Use the following procedure to remove the flat panel display assembly:

1. Locate the parts to be removed in the locator diagram *External parts*, Figure 6–1 on page 6–8.
2. Do the Front Cover and Trim Ring removal procedure, steps 1-5, on page 6–9.
3. Set the mainframe with the bottom on the work surface and the front facing you.
4. Remove the screws that attach the flat panel display assembly to the mainframe: two screws at the bottom of the assembly on the front of the

instrument, two screws on the top, and one screw on the left side. (See Figure 6–4 on page 6–13).

5. Lift the bottom edge of the flat panel display assembly and rotate it upward and off the front face of the mainframe.

6. Detach the cable connecting the flat panel display assembly to the interface board.

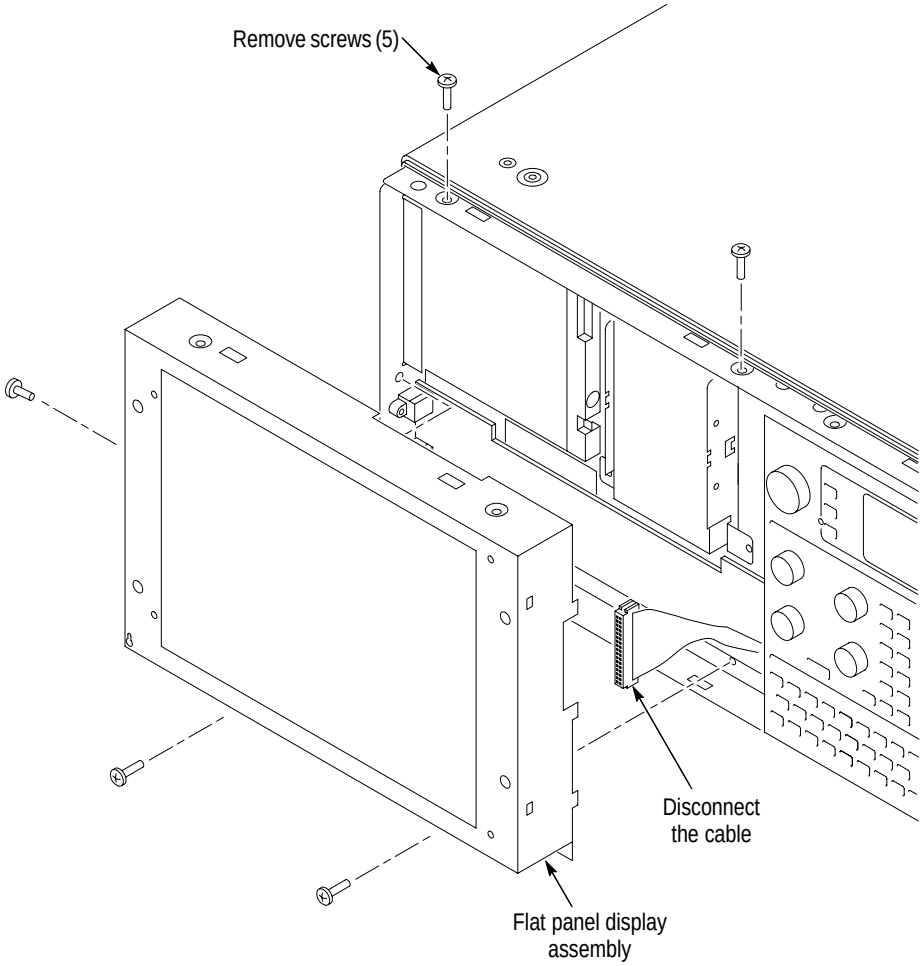


Figure 6–4: Flat panel display assembly removal

Installation

Use the following procedure to reinstall the flat panel display assembly:

1. Reattach the cable connecting the flat panel display assembly to the interface board.
2. Reinstall the flat panel display assembly by first inserting the top edge and then rotating it downward into position. (Be sure the tabs are engaged at the top of the assembly. Insert the five screws that attach the flat panel display assembly to the mainframe: two screws at the bottom of the assembly on the front of the instrument, two screws on the top, and one screw on the left side. (See Figure 6–4 on page 6–13).

Front Panel Knobs

No tools are needed to remove or replace a front panel knob on the portable mainframe.

Removal

To remove a front panel knob, grasp the knob and pull it straight out from the front panel.

Installation

To reinstall a knob, align the knob to a shaft and push in as far as it will go.

Bottom Cover

Removing the bottom cover should only be necessary to assist you in gaining access to the bottom of the front panel trim ring, or to replace a flip stand or rear foot. You may also need to loosen the mounting screws on one side of the bottom cover to remove or replace either side cover or to remove the power supply.

You will need a screwdriver with a size T-15 Torx tip (Table 6–1, items 1 and 2, page 6–6) to perform this procedure.

Removal

Use the following procedure to remove the bottom cover:

1. Locate the parts to be removed in the locator diagram *External parts*, Figure 6–1 on page 6–8.
2. Set the mainframe with the cord-wrap feet on the work surface and the bottom facing you.
3. Remove the four screws that attach the bottom cover to the mainframe. (See Figure 6–2 on page 6–10.)
4. Lift bottom cover off.

Installation

Use the following procedure to reinstall the bottom cover:

1. Reposition the bottom cover on the bottom surface of the portable mainframe.
2. Insert the four screws that attach the bottom cover to the mainframe. (See Figure 6–2 on page 6–10.)

Top Cover

You will need a screwdriver with a size T-15 Torx tip (Table 6–1, items 1 and 2, page 6–6) to perform this procedure.

Removal

Use the following procedure to remove the top cover:

1. Locate the parts to be removed in the locator diagram *External parts*, Figure 6–1 on page 6–8.
2. Set the mainframe with the bottom on the work surface and the front facing you.
3. Unsnap the accessories pouch from the top cover.
4. Do the Front Cover and Trim Ring removal procedure on page 6–9.
5. Remove the four screws that attach the top cover to the mainframe. (See Figure 6–5 on page 6–16.)
6. Lift the top cover off.

Installation

Use the following procedure to reinstall the top cover:

1. Reposition the top cover on the portable mainframe.
2. Insert the four screws that attach the top cover to the mainframe. (See Figure 6–5 on page 6–16.)
3. Do the Front Cover and Trim Ring installation procedure on page 6–9.
4. Reattach the accessories pouch to the top cover. (It snaps on.)

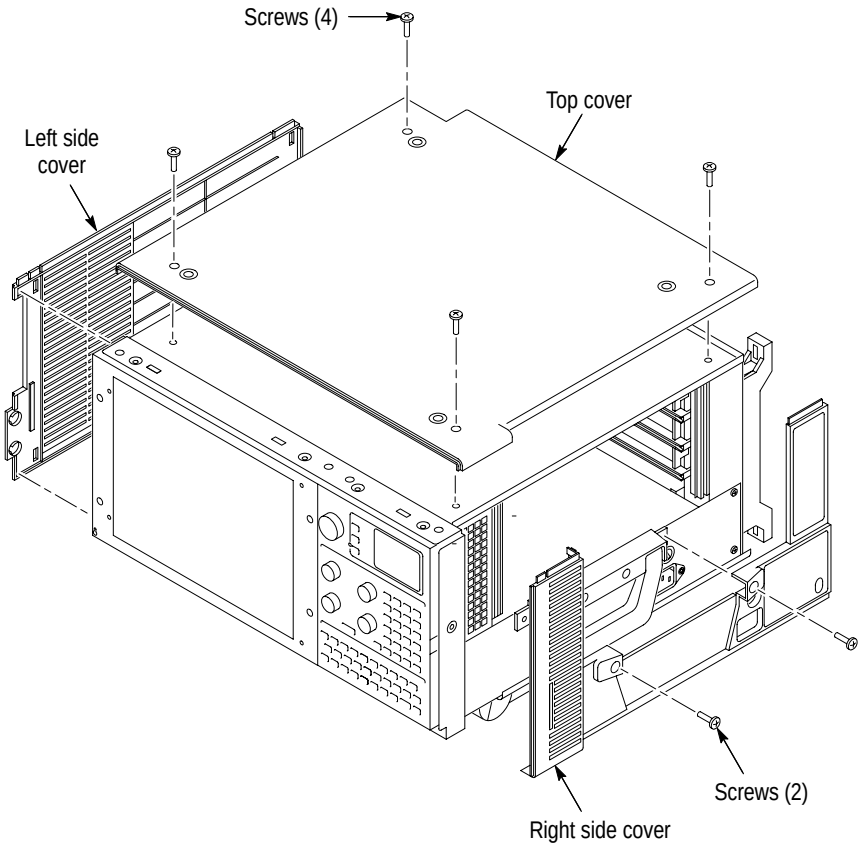


Figure 6–5: Top and side cover removal

Left Side Cover

No screws attach the left side cover to the mainframe. However, you must loosen the two screws closest to the left side of the bottom cover in order to remove the left side cover.

You will need a screwdriver with a size T-15 Torx tip (Table 6–1, items 1 and 2, page 6–6) to perform this procedure.

Removal

Use the following procedure to remove the left side cover:

1. Locate the parts to be removed in the locator diagram *External parts*, Figure 6–1 on page 6–8.
2. Do the *Top Cover* removal procedure on page 6–15.

3. Loosen the two screws on the bottom cover closest to the left side of the mainframe. (See Figure 6–2 on page 6–10.)
4. Remove the left side cover.

Installation

Use the following procedure to reinstall the left side cover:

1. Reposition the left side cover.
2. Tighten the two bottom cover screws nearest the left side of the mainframe.
3. Do the *Top Cover* installation procedure, page 6–15.

Right Side Cover

You will need a screwdriver with a size T-15 Torx tip (Table 6–1, items 1 and 2, page 6–6) to perform this procedure.

Removal

Use the following procedure to remove the left side cover:

1. Locate the parts to be removed in the locator diagram *External parts*, Figure 6–1 on page 6–8.
2. Remove any installed modules from the portable mainframe.
3. Do the *Line Cord and Line Fuse* removal procedure, page 6–18.
4. Do the *Top Cover* removal procedure, page 6–15.
5. Loosen the two screws on the bottom cover closest to the right side of the mainframe. (See Figure 6–2 on page 6–10.)
6. Remove the two screws that attach the right side cover to the power supply. (See Figure 6–5 on page 6–16.)
7. Remove the right side cover.

Installation

Use the following procedure to reinstall the right side cover:

1. The two screws near the right side of the bottom cover should be loosely fastened.
2. Reseat the right side cover in the groove of the bottom cover.
3. Insert the two screws that attach the right side cover to the power supply.
4. Tighten the two bottom cover screws nearest the right side of the mainframe.

5. Do the *Top Cover* installation procedure, page 6–15.
6. Do the *Front Cover and Trim Ring* installation procedure, page 6–9
7. Do the *Line Cord and Line Fuse* installation procedure, page 6–18.

Line Cord and Line Fuse

You will need a flat-bladed screwdriver (Table 6–1, item 4, page 6–6) to perform this procedure.

Removal

Use the following procedure to remove the line cord and line fuse:

1. Locate the parts to be removed in the locator diagram *External parts*, Figure 6–1 on page 6–8.
2. Set the mainframe with the bottom on the work surface and the right side facing you. If you are replacing the line fuse, do the next step; if you are replacing the line cord only, skip to step 4.
3. Find the fuse cap on the right side cover. (See Figure 6–6 on page 6–19.) Remove the fuse cap by turning it counterclockwise using a flat-bladed screwdriver, and then remove the line fuse.
4. Find the line cord on the right side cover. (See Figure 6–6 on page 6–19.) Unplug the line cord from its receptacle. Grasp the line cord on either side of the line cord retaining clamp. Rotate the line cord 90 degrees counterclockwise. Pull the line cord and clamp away from the side panel mounting hole to complete the removal.

Installation

Use the following procedure to reinstall the line fuse and line cord:

1. If you are replacing the line fuse, insert it into the line fuse receptacle. If you are not replacing the line fuse, skip to step 3.
2. Replace the fuse cap by turning it clockwise using a flat bladed screwdriver.
3. Insert the line cord and retaining clamp into the mainframe side panel mounting hole, with the line cord oriented up and down.
4. Rotate the line cord 90 degrees counterclockwise.
5. Plug the line cord into its receptacle.

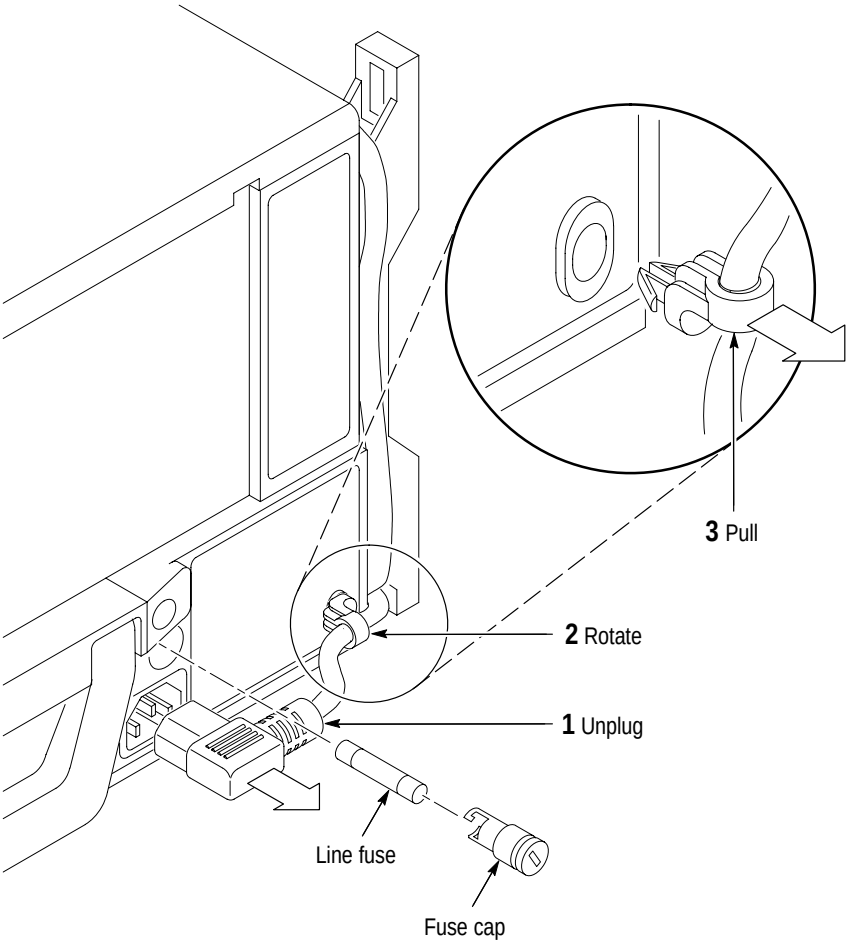


Figure 6–6: Line cord and line fuse removal

Power Supply

You will need a screwdriver with a size T-15 Torx tip (Table 6–1, items 1 and 2, page 6–6) to perform this procedure.

Removal

Use the following procedure to remove the power supply:

1. Locate the power supply in the diagram *Power supply removal*, Figure 6–7 on page 6–20.
2. Do the removal procedures for *Bottom Cover* (page 6–14), *Top Cover* (page 6–15), and *Right Side Cover* (page 6–17).

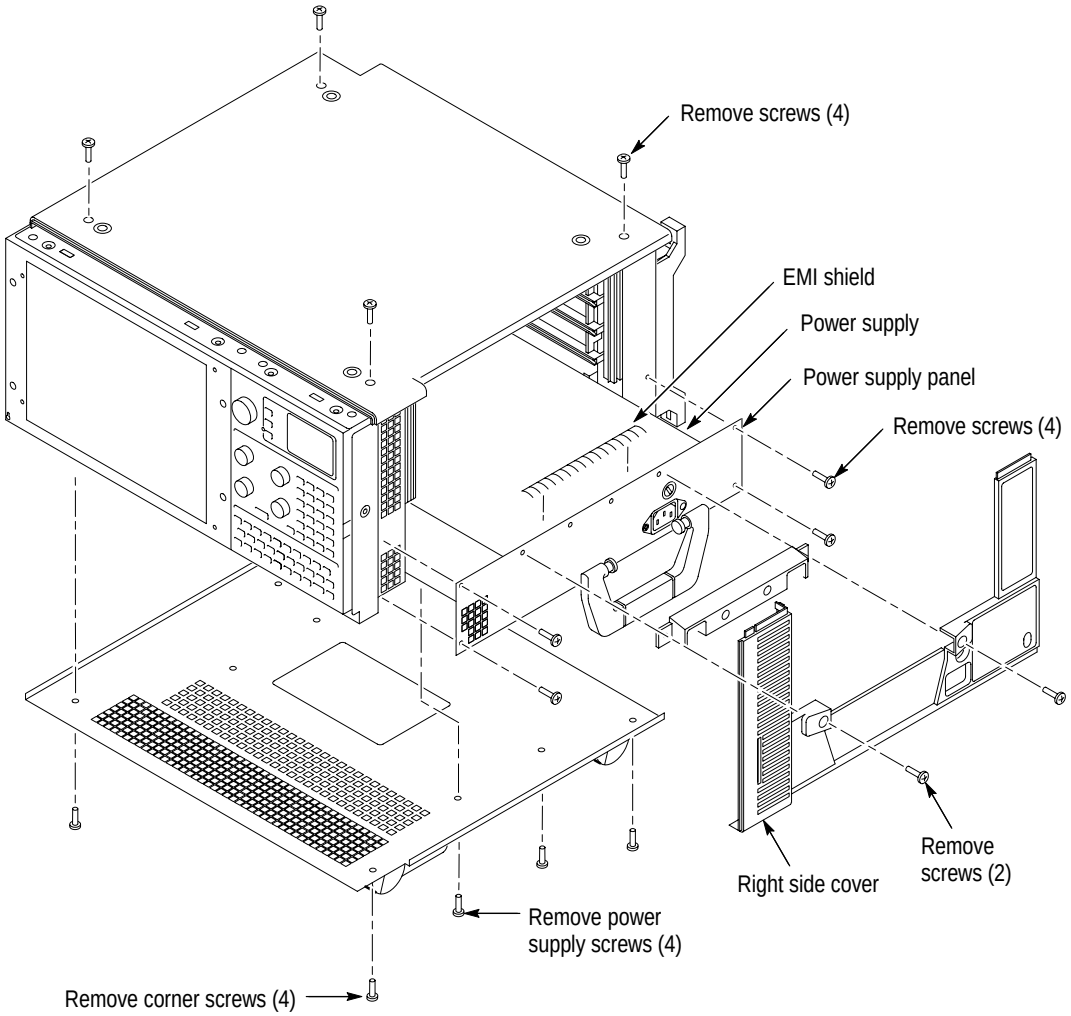


Figure 6–7: Power supply removal

3. Remove the four screws from the right side and the four screws from the bottom that secure the power supply to the chassis.
4. Pull on the handle to remove the power supply from the chassis.
5. Remove the handle and power supply panel before packaging the power supply for exchange.

***NOTE**. Replacement power supplies do not come equipped with a power supply panel or handle.*

Installation

Use the following procedure to reinstall the power supply:

1. Install the power supply panel and handle onto the replacement power supply.
2. Insert the power supply into the chassis. Press firmly to make sure the power supply is fully seated.
3. Insert the four screws on the right side and the four screws on the bottom that secure the power supply to the chassis.
4. Do the installation procedures for *Bottom Cover* (page 6–15), *Top Cover* (page 6–15), and *Right Side Cover* (page 6–17).

Rear Chassis Fan Tray

You will need a screwdriver with a size T-15 Torx tip (Table 6–1, items 1 and 2, page 6–6) to perform this procedure.

Removal

Use the following procedure to remove the rear chassis fan tray:

1. Locate the parts to be removed in the locator diagram *External parts*, Figure 6–1 on page 6–8.
2. Set the mainframe so that the bottom is on the work surface and the rear chassis fan tray faces you.
3. Remove the four screws located within the cord-wrap feet that secure the rear chassis fan tray to the mainframe. (See Figure 6–8 on page 6–22.)
4. Grasp the left cord-wrap foot (facing the fan tray) and swing the left side of the fan tray away from the mainframe.
5. Disconnect the cable connecting the rear chassis fan tray to the backplane board.
6. Remove the rear chassis fan tray.

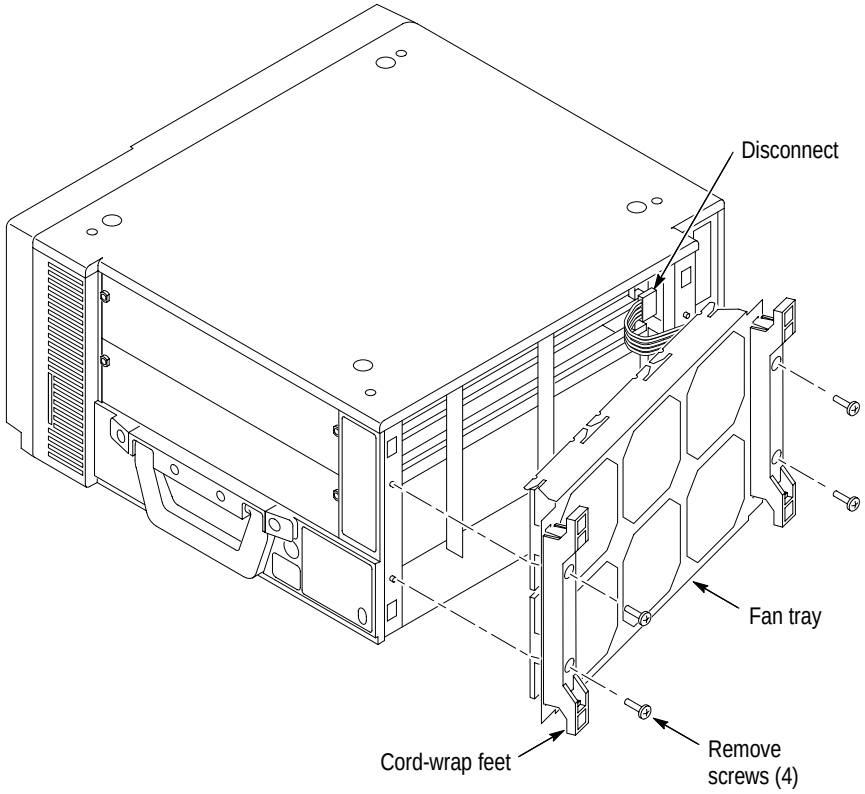


Figure 6–8: Rear chassis fan tray removal

Installation

Use the following procedure to reinstall the rear chassis fan tray:

1. Redress the cable connecting the rear chassis fan tray to the backplane board if necessary.
2. Reconnect the cable connecting the rear chassis fan tray to the backplane board.
3. Reposition the rear chassis fan tray.
4. Reposition the cord-wrap feet (they snap into holes on the rear chassis fan tray), and insert the four screws that secure the rear chassis fan tray to the mainframe.

Individual Fans

You will need a screwdriver with a size T-15 Torx tip (Table 6–1, items 1 and 2, page 6–6) a Philips screwdriver (Table 6–1, item 5), a pair of pliers (Table 6–1, item 6), a pair of side cutters (Table 6–1, item 7), and a scribe or jeweler's screwdriver (Table 6–1, item 8) or other small, pointed tool such as a bent paper clip, to perform this procedure.

Removal

Use the following procedure to remove an individual fan from the rear chassis fan tray:

1. Do the *Rear Chassis Fan Tray* removal procedure, page 6–21.
2. Use a Philips screwdriver to remove the screw that secures the hold down brackets to the rear chassis fan tray. (See Figure 6–9 on page 6–24.) If you are replacing one of the two fans nearest the cable connector, you need remove only one of the hold-down brackets. Otherwise, remove two.
3. Use a pair of pliers to gently straighten the metal tabs holding the fan to the rear chassis fan tray.
4. Lift the fan from the rear chassis fan tray.
5. Make note of the fan cable dress and remove the tie holding the cables together near the connector. Use a pair of side cutters to remove the cable tie.
6. Remove the fan wires from the cable connector. (Pay attention to the wire color locations for reinstallation.) Use a scribe, jeweler's screwdriver, or bent paper clip to gently push down the "finger" of metal that secures (latches) the wire end into the connector. (See insert, Figure 6–9 on page 6–24.) At the same time, pull gently on the wire until it comes out of the connector.

Installation

Use the following procedure to reinstall the rear chassis fan tray:

1. Reinsert the fan wires into the cable connector. Be sure to insert the (color–coded) wires into the same locations as they were removed from in step 6, above. The "finger" of metal that secures the wire end into the connector should be pointed up and outward for it to lock into place. (See insert, Figure 6–9 on page 6–24.)
2. Position the fan onto the rear chassis fan tray.
3. Gather the fan cables together, tie them together with a cable tie, and position them so that they do not interfere with any fan blades.
4. Use a pair of pliers to gently bend the metal tabs that hold the fan to the rear chassis fan tray until the fan is held firmly in position.

5. Attach the hold-down bracket(s) to the rear chassis fan tray.
6. Do the *Rear Chassis Fan Tray* installation procedure, page 6–22.

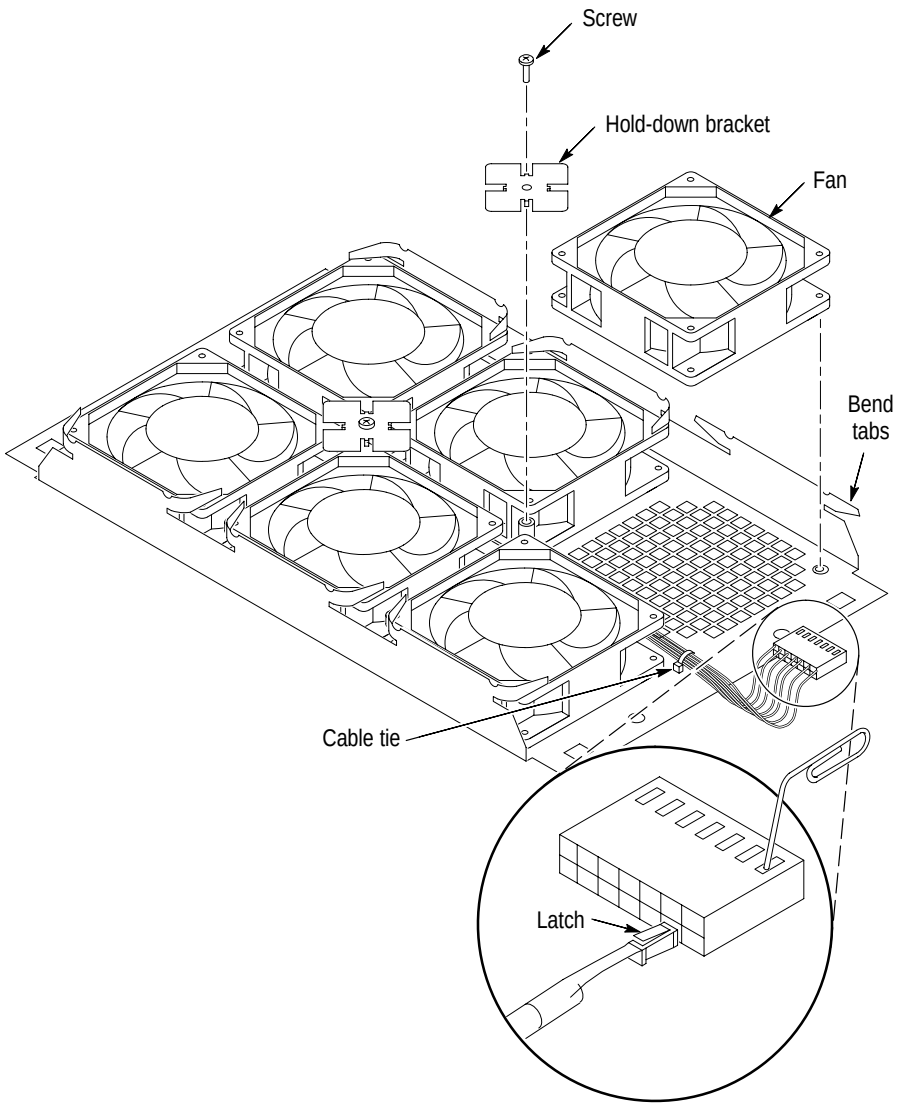


Figure 6–9: Individual fan removal

Flip Stands and Rear Feet

You will need a screwdriver with a size T-15 Torx tip (Table 6–1, items 1 and 2, page 6–6) and a small Philips screwdriver (Table 6–1, item 4, page 6–6) to perform this procedure.

Removal

Use the following procedure to remove the flip stands and rear feet:

1. Locate the parts to be removed in the locator diagram *External parts*, Figure 6–1 on page 6–8.
2. Set the mainframe so the rear panel is on the work surface and the bottom faces you.
3. Do the *Bottom Cover* removal procedure, page 6–14.
4. Remove the two screws attaching the flip stand or rear foot to the bottom cover. (See Figure 6–10 on page 6–25.)

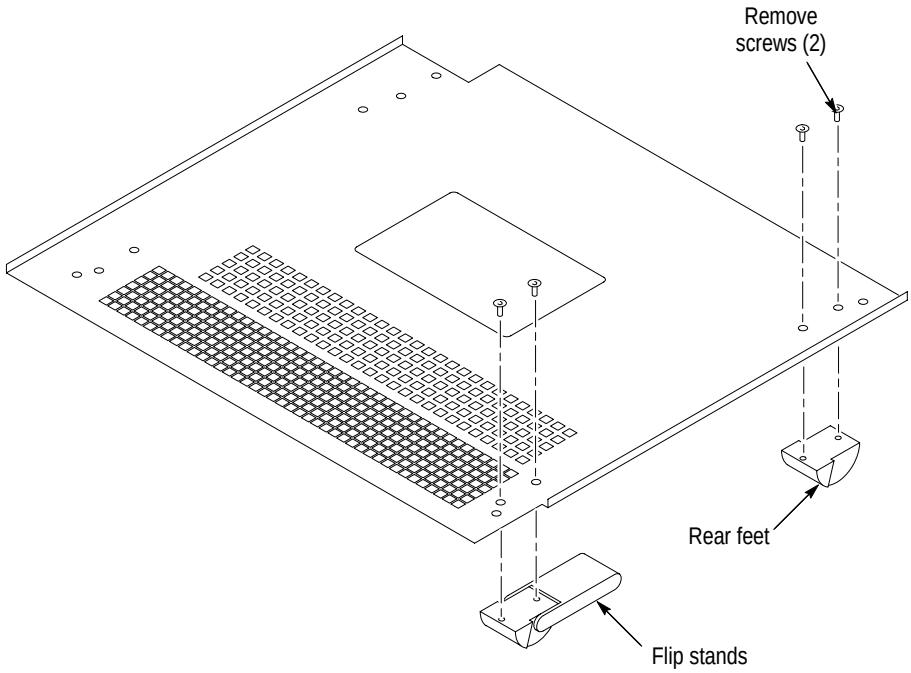


Figure 6–10: Flip stand and rear feet removal

Installation

Use the following procedure to reinstall the flip stands and rear feet:

1. Reattach the flip stand or rear foot to the bottom cover.
2. Do the *Bottom Cover* installation procedure, page 6–15.

Cord-Wrap Feet

You will need a screwdriver with a size T-15 Torx tip (Table 6–1, items 1 and 2, page 6–6) to perform this procedure.

Removal

Use the following procedure to remove the cord-wrap feet:

1. Set the mainframe so the bottom is on the work surface and the rear panel faces you.
2. Do the *Rear Chassis Fan Tray* removal procedure, page 6–21.
3. Orient the chassis fan tray so that the cord-wrap feet are on the bottom and the fans are on the top.
4. Press outward to unlatch the two tabs that connect each cord-wrap foot to the chassis fan tray. (See Figure 6–11 on page 6–26.)
5. Remove the cord-wrap feet.

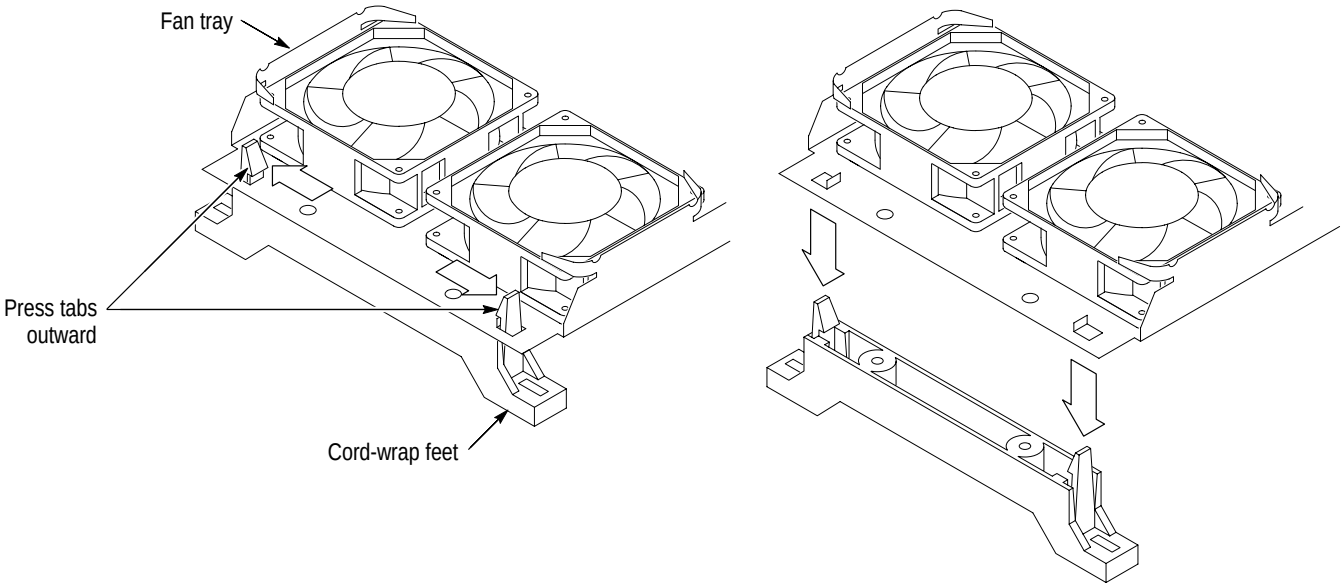


Figure 6–11: Cord-wrap feet removal

Installation

Use the following procedure to reinstall the cord-wrap feet:

1. Push the cord-wrap feet into the holes in the rear chassis fan tray to snap them into position.
2. Do the *Rear Chassis Fan Tray* installation procedure, page 6–22.

Handle

You will need a screwdriver with a size T-15 Torx tip (Table 6–1, items 1 and 2, page 6–6) to perform this procedure. You will also need a small flat-bladed screwdriver (Table 6–1, item 4, page 6–6) to allow you to remove the front panel trim ring prior to removing the handle.

Removal

Use the following procedure to remove the handle:

1. Set the mainframe so the bottom is on the work surface and the right side (the side with the handle) faces you.
2. Do the *Right Side Cover* removal procedure, page 6–17.
3. Remove the two inner screws connecting the handle to the power supply. (See Figure 6–12 on page 6–27.)
4. Lift off the plastic handle mount and handle.

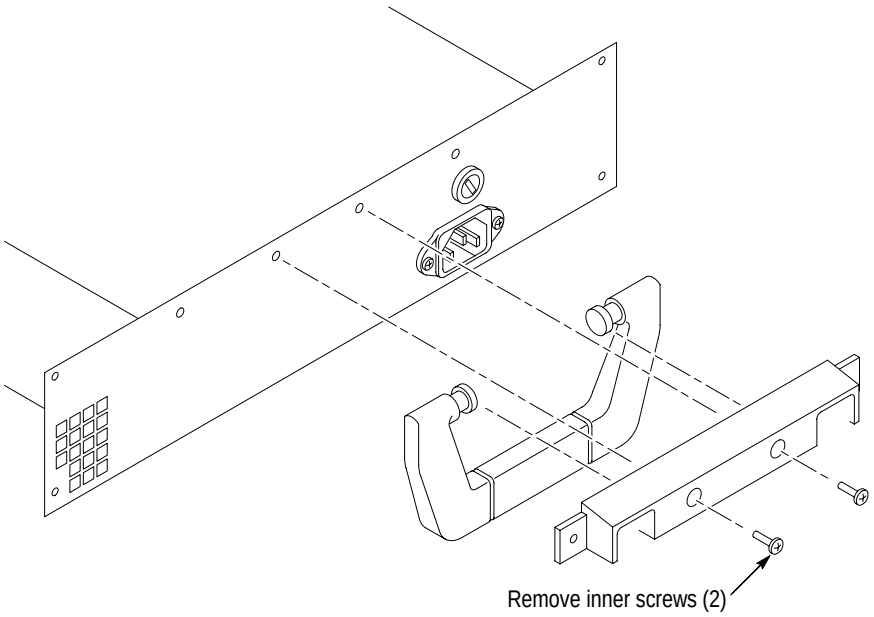


Figure 6–12: Handle removal

Installation

Use the following procedure to reinstall the handle:

1. Attach the handle and plastic handle mount to the power supply.
2. Do the *Right Side Cover* installation procedure, page 6–17.

Procedures for Internal Parts

Figure 6–13 on page 6–29 shows the locations of the internal parts of the TLA 704 Color Portable Mainframe. Procedures for removing and replacing these parts are presented in the following order:

- Controller Board
- DRAM SIMMs
- Backplane Board
- Floppy Disk Drive
- Hard Disk Drive
- Interface Board
- Front Panel Control Board
- Glidepoint Assembly
- Elastomeric Keypad

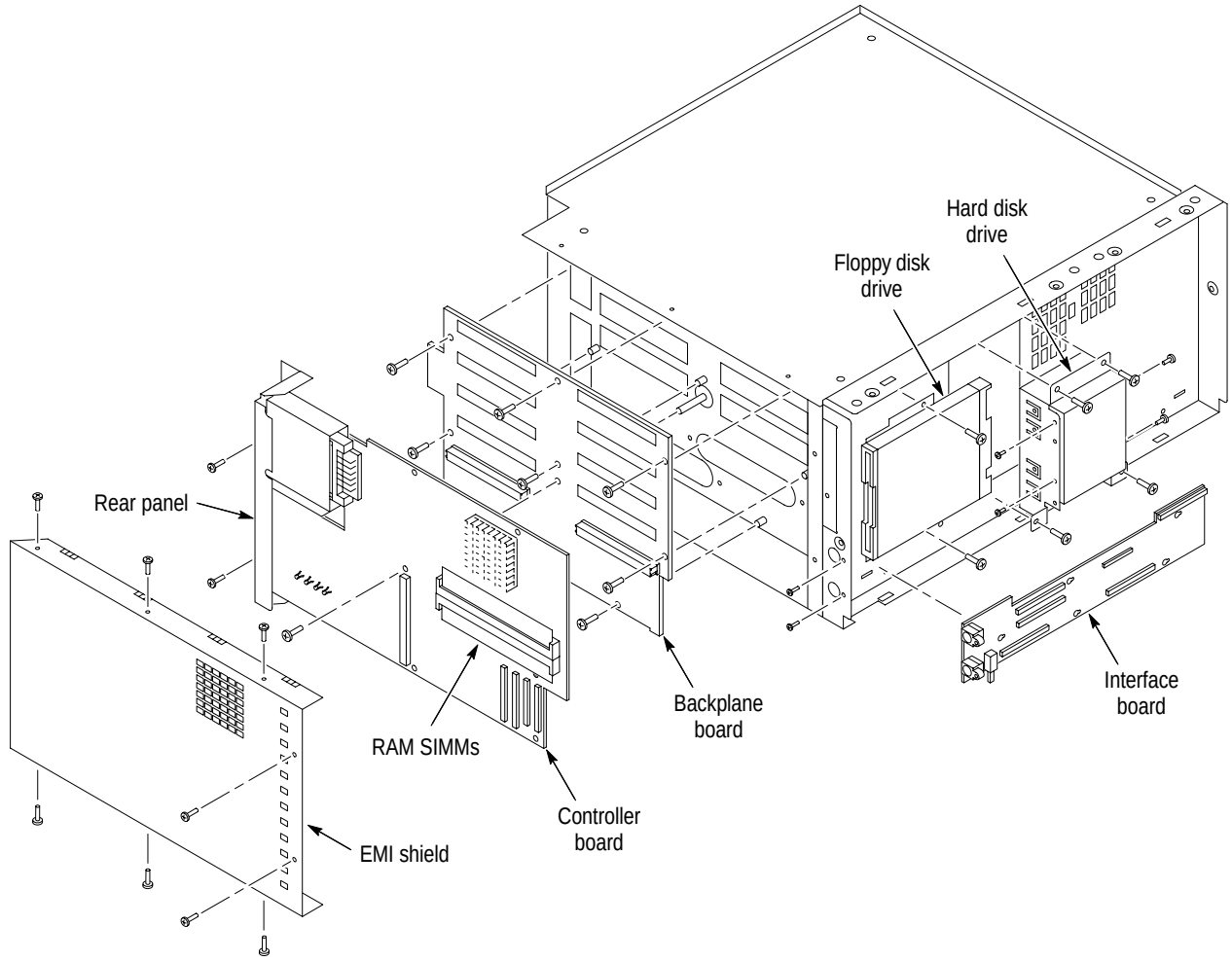


Figure 6–13: Internal parts

Controller Board

You will need a screwdriver with a size T-15 Torx tip (Table 6–1, items 1 and 2, page 6–6) to perform this procedure.

Removal

Use the following procedure to remove the controller board:

1. Locate the controller board in the locator diagram *Internal parts*, Figure 6–13 on page 6–29.
2. Set the mainframe so the bottom is on the work surface and the left side faces you.
3. Do the *Left Side Cover* removal procedure, page 6–16.

4. Remove the eight screws securing the EMI shield to the chassis (see Figure 6–13 on page 6–29), and then lift off the EMI shield.
5. Detach the three cables located near the bottom front corner of the controller board.
6. Remove the center screw from the controller board.
7. Remove the two screws securing the controller board to the chassis at the back panel.
8. Pull firmly on the rear panel until the controller board disconnects from the backplane board.

Installation

Use the following procedure to reinstall the controller board:

1. Reposition the controller board, and then push firmly on the AT bus connector until the board is fully seated in the connectors on the backplane board.
2. Insert the center screw into the controller board.
3. Insert the two screws securing the controller board to the chassis at the back panel.
4. Reattach the three cables located near the bottom front corner of the controller board.
5. Reposition the EMI shield, and then insert the eight screws that secure it to the chassis.
6. Do the *Left Side Cover* installation procedure, page 6–17.

Refer to the *TLA 700 Series Performance Verification and Adjustment* manual for post-repair calibration procedures.

RAM SIMMs

You will need a screwdriver with a size T-15 Torx tip (Table 6–1, items 1 and 2, page 6–6) to perform this procedure.

Removal

Use the following procedure to remove the RAM SIMMs:

1. Locate the SIMM boards in the locator diagram *Internal parts*, Figure 6–13 on page 6–29. Note that there are two SIMM boards, an upper and a lower.
2. Set the mainframe so the bottom is on the work surface and the left side faces you.
3. Do the *Left Side Cover* removal procedure, page 6–16.
4. Remove the two screws securing the EMI shield to the chassis, and then lift off the EMI shield.
5. Press outward on the clips holding each SIMM board to the controller board, and then lift off the SIMM board.

Installation

Use the following procedure to install new SIMM boards:

1. Insert the new SIMM boards. Press down gently until the clips that hold the SIMM boards to the controller board snap into place.

NOTE. *When upgrading RAM memory, make sure that both SIMM boards contain SIMMS of the same size.*

---

2. Reposition the EMI shield, and then insert the two screws that secure it to the chassis.
3. Do the *Left Side Cover* installation procedure, page 6–17.

Backplane Board

You will need a screwdriver with a size T-15 Torx tip (Table 6–1, items 1 and 2, page 6–6) to perform this procedure.

Removal

Use the following procedure to remove the backplane board:

1. Remove all modules installed in the portable mainframe.
2. Locate the backplane board in the locator diagram *Internal parts*, Figure 6–13 on page 6–29.

3. Do the *Controller Board* removal procedure, page 6–29.
4. Remove the seven remaining screws that secure the backplane board to the chassis.
5. Pull on the edges of the board nearest the front and rear surfaces of the mainframe to remove the backplane board from the chassis.
6. Detach cable J500.

Installation

Use the following procedure to reinstall the backplane board:

1. Reattach cable J500.
2. Reposition the backplane board, and insert the screws that secure the backplane board to the chassis.
3. Do the *Controller Board* installation procedure, page 6–30.
4. Reinstall any modules removed from the portable mainframe.

Floppy Disk Drive

You will need a screwdriver with a size T-15 Torx tip (Table 6–1, items 1 and 2, page 6–6) to perform this procedure.

Removal

Use the following procedure to remove the floppy disk drive:

1. Locate the floppy disk drive in the locator diagram *Internal parts*, Figure 6–13 on page 6–29.
2. Do the *Display Assembly* removal procedure, page 6–12.
3. Detach the data cable from J103 on the interface board.
4. Remove the two screws securing the floppy disk drive to the chassis.
5. Remove the floppy disk drive.
6. Remove the cable from the floppy disk drive.

Installation

Use the following procedure to reinstall the floppy disk drive:

1. Attach the data cable to the floppy disk drive.
2. Reposition the disk drive.
3. Insert the two screws securing the floppy disk drive to the chassis.

4. Attach the data cable to J103 on the interface board.
5. Do the *Display Assembly* installation procedure, page 6–14.

Hard Disk Drive

You will need a screwdriver with a size T-15 Torx tip and a size T-10 Torx tip (Table 6–1, items 1, 2, and 3, page 6–6) to perform this procedure.

Removal

Use the following procedure to remove the hard disk drive:

1. Locate the hard disk drive in the locator diagram *Internal parts*, Figure 6–13 on page 6–29.
2. Do the *Display Assembly* removal procedure, page 6–12.
3. Detach the cable at the bottom of the hard disk drive by pressing down (away from the hard disk drive) on the connector.
4. Remove the four screws that attach the hard disk drive bracket to the chassis.
5. Remove the four screws that attach the hard disk drive to the bracket.
6. Lift out the hard disk drive.

Installation

Use the following procedure to reinstall the hard disk drive:

1. Reposition the hard disk drive within the bracket.
2. Insert the four screws that attach the hard disk drive to the bracket.
3. Insert the four screws that attach the hard disk drive bracket to the chassis.
4. Reattach the cable at the bottom of the hard disk drive by gently pressing the connector at the end of the cable into the connector at the bottom of the hard disk drive.
5. Do the *Display Assembly* installation procedure, page 6–14.

***NOTE**. After replacing the hard disk drive, you must reinstall all of the TLA 700 Series software. Refer to the TLA 700 Series Installation Manual for software reinstallation instructions.*

Interface Board

You will need a small Philips screwdriver (Table 6–1, item 5, page 6–6) to perform this procedure.

Removal

Use the following procedure to remove the interface board:

1. Locate the interface board in the locator diagram *Internal parts*, Figure 6–13 on page 6–29.
2. Do the *Display Assembly* removal procedure, page 6–12.
3. Detach cables at J100, J101, J102, and J103.
4. Remove the two screws securing the interface board to the side panel by the mouse and keyboard ports.
5. Grasp the top and bottom of the board, slide the board to the right (i.e., toward the front panel control assembly), and lift the board off.

Installation

Use the following procedure to reinstall the interface board

1. Reposition the interface board on the mounting pegs, and slide it to the left (i.e., away from the front panel control assembly).
2. Insert the two screws securing the interface board to the side panel.
3. Reattach cables at J100, J101, and J102.
4. Do the *Display Assembly* installation procedure, page 6–14.

Front Panel Control Board

You will need a screwdriver with a size T-15 Torx tip (Table 6–1, items 1 and 2, page 6–6) and a flat-bladed screwdriver or other small prying tool (Table 6–1, item 4, page 6–6) to perform this procedure.

Removal

Use the following procedure to remove the front panel control board:

1. Locate the front panel control board in the locator diagram *Front panel control assembly parts locations*, Figure 6–14 on page 6–35.
2. Do the *Front Panel Control Assembly* removal procedure (page 6–11).
3. Remove the knobs from the front of the front panel control assembly.
4. Detach the glidepoint cable at J100.

5. Remove the six screws that attach the front panel control board to the front panel control assembly.

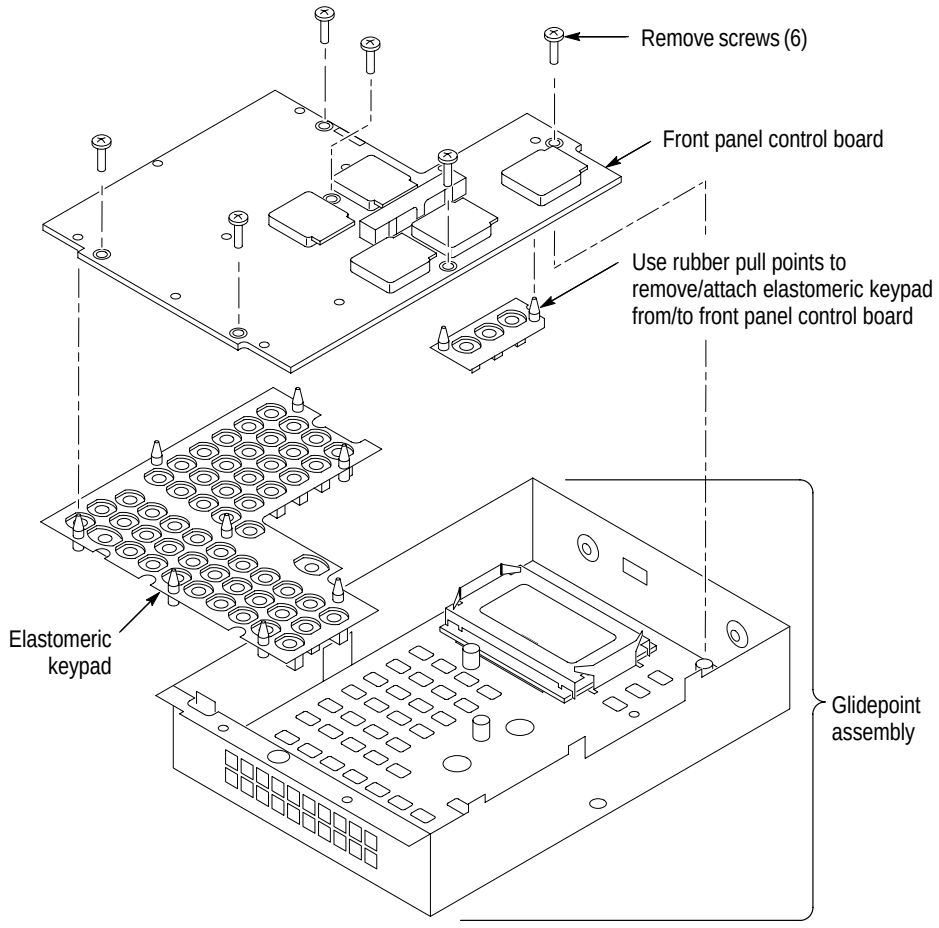


Figure 6–14: Front panel control assembly parts locations

6. Gently use the prying tool in the slots on the top and bottom of the control assembly to work the control board free.
7. Lift the front panel control board out of the assembly.

Installation

Use the following procedure to reinstall the front panel control board:

1. Carefully work the control board into position, making sure that all keys go through their holes in the front panel and that the board is firmly seated.
2. Insert the six screws that attach the front panel control board to the front panel control assembly.

3. Reattach the glidepoint cable at J100.
4. Replace the knobs on the front panel.
5. Do the *Front Panel Control Assembly* installation procedure (page 6–12).

Glidepoint Assembly

The glidepoint device is replaced as part of a larger assembly, consisting of the glidepoint device, glidepoint cable, front panel controls frame, and glidepoint bracket.

You will need a screwdriver with a size T-15 Torx tip (Table 6–1, items 1 and 2, page 6–6) to perform this procedure.

Removal

Use the following procedure to remove the glidepoint assembly:

1. Locate the glidepoint assembly in the locator diagram *Front panel control assembly parts locations*, Figure 6–14, page 6–35.
2. Do the *Front Panel Control Assembly* removal procedure (page 6–11).
3. Do the *Front Panel Control Board* removal procedure (page 6–34).

Installation

Use the following procedure to reinstall the glidepoint assembly:

1. Lay the glidepoint assembly face down on the work surface.
2. Do the *Front Panel Control Board* installation procedure (page 6–35).
3. Do the *Front Panel Control Assembly* installation procedure (page 6–12).

Elastomeric Keypad

You will need a screwdriver with a size T-15 Torx tip (Table 6–1, items 1 and 2, page 6–6) to perform this procedure.

Removal

Use the following procedure to remove the elastomeric keypad:

1. Locate the keypad in the locator diagram *Front panel control assembly parts locations*, Figure 6–14 on page 6–35.
2. Do the *Front Panel Control Assembly* removal procedure (page 6–11).

3. Do the *Front Panel Control Board* removal procedure (page 6–34).
4. Pull on the rubber pull-points from the front to remove the keypad from the Front Panel Control Board.

Installation

Use the following procedure to reinstall the keypad:

1. Pull the rubber pull-points through the Front Panel Control Board to install the keypad.

NOTE. *When replacing the top three keys next to the glidepoint assembly, the rubber of the keypad should line up with the edge of the board.*

2. Do the *Front Panel Control Board* installation procedure (page 6–35).
3. Do the *Front Panel Control Assembly* installation procedure (page 6–12).

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. Also, to prevent possible injury to service personnel or damage to electrical components, please read* Preventing ESD on page 6–1.

This section contains information and procedures designed to help you isolate faults to within the TLA 704 Color Portable Mainframe. The process is as follows:

- Do *Check for Common Problems* on page 6–40 to eliminate easy-to-find problems first.
- Do *Eliminate Other Problem Sources* on page 6–41 to eliminate the probes and DSO or Logic Analyzer modules as the fault source next.
- Do *Troubleshoot the Portable Mainframe*, beginning on page 6–42, to locate the failed replaceable part within the mainframe.

For assistance, contact your local Tektronix Service Center.

Service Level

This section supports isolation of faults within the portable mainframe to the replaceable-part level shown 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 xiii.

Required Documents

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

Manual or Section	Purpose
TLA 700 Series Performance Verification and Adjustment	To check, adjust, and perform re-calibration after circuit board or assembly replacement
TLA 700 Series Installation	To remove and reinstall modules in mainframe; to reinstall Windows 95, QAPlus/Win, or TLA 700 Software when required
Removal and Replacement Instructions (in this manual)	To remove and replace failed replaceable parts.
Replaceable Parts List (in this manual)	To order replaceable parts
Update the BIOS (See page 6–53 in this manual)	To update the portable mainframe BIOS

For a list of manuals available for the TLA 700 Logic Analyzer, see *Optional Accessories* on page 10–3.

Check for Common Problems

Use Table 6–2 to quickly isolate possible failures. The table lists problems related to the portable mainframe and possible causes. The list is not exhaustive, but it may help you eliminate a problem that is quick to fix, such as a blown fuse or loose cable.

Table 6–2: Failure symptoms and possible causes

Symptom	Possible cause(s)
Portable mainframe will not power on	■ Power cord not plugged in ■ Failed fuse ■ Faulty power supply ■ Faulty backplane board ■ Faulty module
Front panel light comes on (mainframe powers on), but one or more fans will not operate	■ Faulty fan cable ■ Defective fan ■ Faulty power supply
Controller appears “dead”; power light comes on, but monitor screen(s) is (are) blank, mainframe emits no beeps	■ SIMMs incorrectly installed or missing ■ Defective controller board
External monitor does not power on	■ Monitor power cord not plugged in ■ Failed fuse ■ Monitor failure
External monitor powers on, but is blank	■ External monitor controls turned down ■ Monitor cable faulty or not connected to mainframe ■ Display selection jumper set incorrectly on front panel interface board ■ Monitor defective

Table 6–2: Failure symptoms and possible causes (Cont.)

Symptom	Possible cause(s)
Flat panel display blank	■ Display selection jumper set incorrectly on front panel interface board (there are no jumpers on the board when the mainframe is shipped from the factory; this is the correct default setting) ■ External monitor plugged in (look on external monitor for display) ■ External monitor plugged in but not powered on ■ Defective cable from front panel interface board to display adapter board ■ Defective cable from controller board to front panel interface board ■ Defective cable from inverter board to display adapter board ■ Defective cable from inverter board to backlighting display lamp ■ Defective backlighting display lamp ■ Faulty display ■ Faulty controller board ■ Faulty inverter board ■ Faulty front panel interface board
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 6–48. ■ Faulty module. Refer to appropriate module service manual for further troubleshooting information.
BIOS error messages	■ Refer to the BIOS error message table on page 6–51

Eliminate Other Problem Sources

The portable mainframe is part of the TLA 700 Series Logic Analyzer, which comprises modules and one of two mainframes (in this case, the TLA 704 Color Portable Mainframe). If power-on diagnostics indicate that an LA or DSO module test failed, troubleshoot the module using the TLA service manual for the module.

Troubleshoot the TLA 704 Portable Mainframe

Follow the procedure in this section to identify the failed part within the portable mainframe.

Equipment Required

You will need a digital voltmeter to check power supply voltages, as described on page 6–46.

Testing might also 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

Follow the primary troubleshooting tree in Figure 6–15 for fault isolation. This tree calls for you to remove any installed modules, run the diagnostics programs, and check for BIOS errors.

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 6–48 for further troubleshooting information.

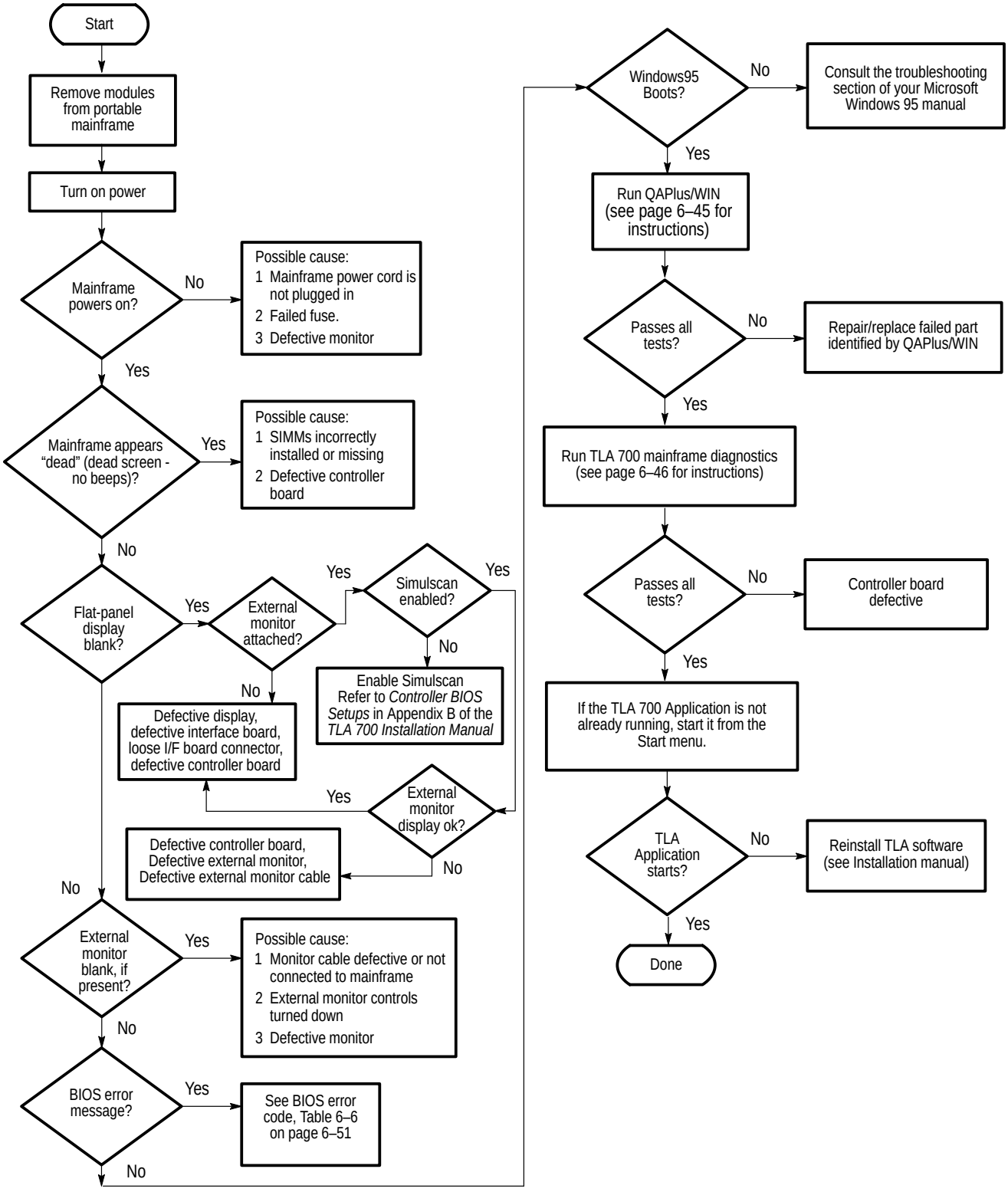


Figure 6–15: Primary troubleshooting tree

Controller/PC Diagnostics

The primary diagnostics for the portable mainframe are the power-on diagnostics, the QAPlus/Win diagnostics, and the TLA 700 mainframe diagnostics. Procedures for running these diagnostics are described below.

Power-on Diagnostics. The power-on diagnostics check the basic functionality of the mainframe at every power on. If any failures occur at power on, the screen displays the calibration and diagnostics property page. Table 6–3 lists a subset of the power on tests. Use the results of the tests to help you isolate problems to the mainframe or to the modules installed in the system.

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 6–3: 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	✓	✓

QAPlus/WIN. If the portable mainframe passes all the BIOS tests, the primary tree calls for you to run QAPlus/WIN. QAPlus/WIN is a comprehensive software application to check and verify the operation of the PC hardware in the portable mainframe. To run QAPlus/Win, you must have either a working keyboard or a working mouse or other pointing device and have Windows 95 running. Repair or replace any failed component identified by QAPlus/WIN.



CAUTION. Before running the QAPlus/WIN tests, be aware of the following problems and workarounds.

- The QAPlus/WIN discrete memory test fails if the computer being tested contains more than 16 megabytes of RAM.

  If your computer contains more than 16 megabytes of RAM, do not run the memory test from the Memory icon. Use the Run Quick Test item from the Tests menu instead, or use the Quick Test icon in the QAPlus/WIN title box.

- The QAPlus/WIN hard drive test may report an incorrect number of tracks and cylinders for your hard drive.

  This is an internal mapping problem, but has no effect on the results of the test. Bad sectors on your hard drive are still found and marked.

- The installation program for QAPlus/WIN stalls at the end of installation.

  To continue after the installation stalls, press CTRL-ALT-DEL, highlight the QAPlus/WIN installation program, and then click on End Task.

- The QAPlus/WIN keyboard test does not respond correctly to keys used by Windows 95.

  Keyboards made for use with Windows 95 contain two or three keys specific to that operating system. These are usually located on either side of the space bar. QAPlus/WIN does not “trap” these keys when performing the keyboard test. Do not press them.

NOTE*. To run* QAPlus/WIN *you must have either a working keyboard or a working mouse (or other pointing device) and Windows 95 running.*

To run the QAPlus/WIN 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 Qaplusw.exe.

5. Replace the assembly corresponding to the failing diagnostic test(s).

TLA 700 Mainframe Diagnostics. If the portable mainframe passes all the QAPlus/WIN 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 the functionality of the portable mainframe. If the TLA 700 Mainframe Diagnostics test fails, the portable mainframe is defective.

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

1. Turn off all other applications.
2. Click on Start in the Windows 95 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.

Bypassing Front Panel Controls

The Front Panel Control Assembly can be bypassed if necessary to assist in troubleshooting. Bypassing the Front Panel Control Assembly allows an external keyboard and mouse to function bypass the Front Panel Control Board as in a standard PC.

To bypass the Front Panel Control Assembly, unplug the cable from it to the Front Panel Interface Board (located behind the flat-panel display) at J102. Then, use jumpers to connect pins 33 and 34, pins 31 and 32, pins 27 and 28, and pins 25 and 26. See Figure 6–16.

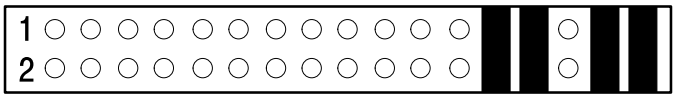


Figure 6–16: Jumper locations for bypassing front panel control assembly

Checking Power Supply Voltages

Power off the mainframe and remove any modules installed in it. Power on the mainframe and connect the reference lead of a digital voltmeter to chassis ground, such as the top of the power supply. Attach a 0.025” square pin to the probe tip of the other lead and insert it into a pin on one of the backplane connectors. The pins that should be carrying voltages are listed in Table 6–4. The arrangement of J1 and J2 connectors on the backplane is shown in Figure 6–17 on page 6–48. Measure the power supply voltages with the voltmeter and compare each reading to the values listed in the tables. If the voltages are within about 5% of the nominal voltages, your power supply is functional.

Table 6–4: Power supply voltages and backplane connector pins

J1 Pin	Voltage	J2 Pin	Voltage
Row A		Row A	
31	–12 V	2	–2 V
32	+5 V	7	–5.2 V
		13	–5.2 V
		19	–5.2 V
		25	+5 V
Row B		Row B	
31	+5 V STDBY	1	
32	+5 V	13	
		32	+5 V
Row C		Row C	
31	+12 V	4	–5.2 V
32	+5 V	13	–2 V
		19	–5.2 V
		31	+24 V
		32	–24 V

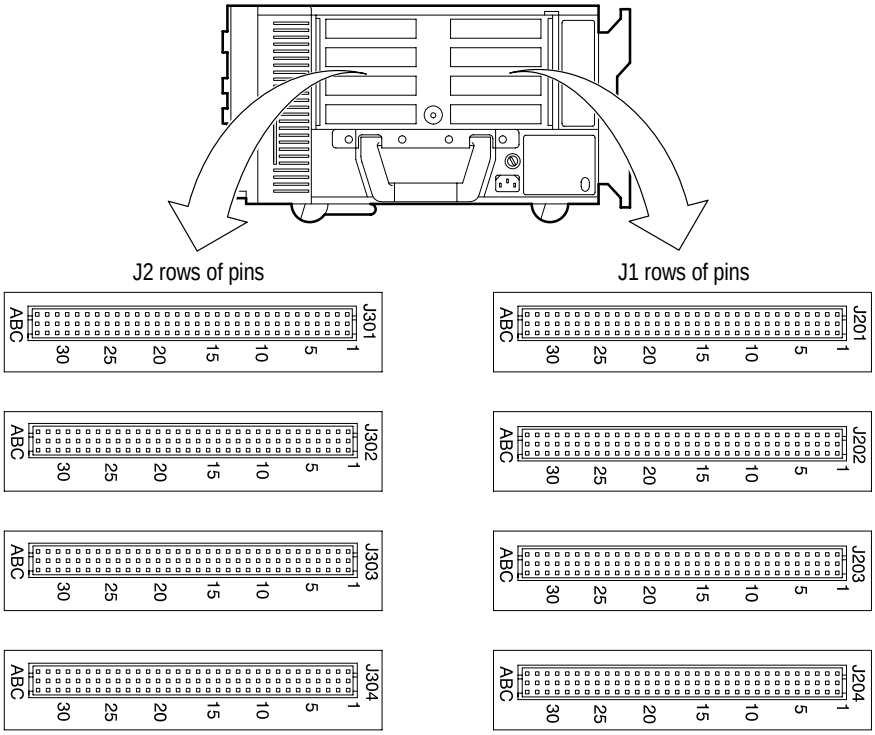


Figure 6–17: Location of J1 and J2 pins within the portable mainframe

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 in the portable mainframe.
- Verify that the module address switches are set correctly. Power off the portable 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 portable 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 0 and 1, power off the mainframe, move the module to slots 1 and 2, 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 portable 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 700 Series 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 700 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 6–5 lists some of the command line options for executing ResMan32.

Table 6–5: 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 95 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 will check all of the installed modules and their address locations. The program will print out data similar to that in Figure 6–18. In this example the portable mainframe has two logic analyzer modules installed. Both modules were properly configured and the resources were successfully configured.

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 6–18: ResMan32 program output

BIOS Setup Error Messages

The portable mainframe runs a BIOS test when it boots up. If the BIOS test encounters a problem, the program displays the error on the display. Table 6–6 lists the error codes, an explanation of each error code, and actions that can be taken. Refer to the *TLA 700 Series Installation Manual* for information on BIOS setup parameters and feature settings.

Table 6–6: BIOS error codes and explanations

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 power-on self-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 SIMMs; if one of the SIMMs is 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 SIMMs; if one of the SIMMs is 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.	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 and on the adapter board. Replace the hard disk drive and reinstall the TLA 700 Series software.
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.
Invalid NVRAM media type	The BIOS cannot access the NVRAM.	Replace the controller board.
Keyboard controller error	The keyboard controller may be defective.	Swap keyboard with a known good keyboard.
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 cannot be found.	Insert a bootable disk into the floppy disk drive and try to reboot. Reload the Windows 95 operating system.

Table 6–6: BIOS error codes and explanations (Cont.)

Error code	Explanation	Action to be taken
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.	Replace the controller board.
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.	Replace the controller board.
Press <F1> to resume, <F2> to Setup	This message is displayed after a recoverable error 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.	This is an informational 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.
Press and hold CTRL-ALT-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 power-on self-test.	This is an informational message.
Previous boot incomplete - Default configuration used	The previous power-on self- test was not successful. If the power-on self-test fails, it loads default values and displays a message to run the CMOS setup. If incorrect values are loaded, future boot attempts may fail.	This is an informational message. Verify that the CMOS setup is configured correctly.
Real time clock error	The real time clock may be defective.	Replace the controller board.
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 slowly. Exchange the SIMMs; if one of the SIMMs is 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/Calendar component. To replace the system battery, replace the RAM/Calendar component. **Note:** After replacing the RAM/Calendar component, you must reflash the BIOS. Refer to *Update the BIOS* on page 6–53 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 slowly. Try rebooting 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 re-defined.	This is an informational message. Reboot the system, and then verify that the CMOS setup is configured correctly.
System RAM Failed at offset: nnnn	The system RAM at HEX address nnnn may be defective.	Exchange the SIMMs; if one of the SIMMs is 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, replace the controller board.

Update the BIOS Version

On rare occasions it may be necessary to update the controller BIOS version. In most cases this is only necessary to activate enhancements to the product. To update the BIOS, you will need the latest version of BIOS available on floppy disk (Tektronix part number 063-2895-xx). Before updating the BIOS verify that the BIOS version on the instrument is an older version than that printed on the floppy disk label.

Verify the BIOS Version

The BIOS version is briefly displayed on boot up of the instrument. To verify the BIOS version number, power the instrument on and watch the upper left hand section of the screen. A message will be displayed as below:

> Copyright 1996 By RadiSys Corporation. Version 1.xx.xx.
> RadiSys boot block version 1.xx.xx

Before continuing, verify that the BIOS version that is displayed is an older version than the version you are installing. The version number is listed on the software floppy diskette.

Verify the BIOS Jumper is in Place

Some controllers were shipped with the BIOS jumper already in place. To verify that you need to install a BIOS jumper, go to step 1, on page 6–54, and follow the instructions and attempt to update the BIOS.

If the BIOS jumper is not in place, you will get an error message stating that the BIOS could not be updated. If this happens, disregard the message and turn the instrument off with the power switch.

To install the BIOS jumper, proceed with the instructions under *Install the BIOS Jumper*, and follow the disassembly instructions.

Install the BIOS Jumper

To install the BIOS jumper, perform the following procedures to disassemble the instrument to access the jumper location:

1. Remove the front cover and trim ring; follow the procedure beginning on page 6–9.
2. Remove the bottom cover; follow the procedure beginning on page 6–14.
3. Remove the left side cover; follow the procedure beginning on page 6–16.
4. Remove the top cover; follow the procedures beginning on page 6–15.
5. Remove the eight screws securing the EMI shield to the chassis (see Figure 6–13 on page 6–29), and then lift off the EMI shield.
6. Place a shorting jumper at jumper position H2, pins one and three. Refer to Figure 6–19 for the jumper placement.

The BIOS jumper does not need to be removed after the BIOS is updated.

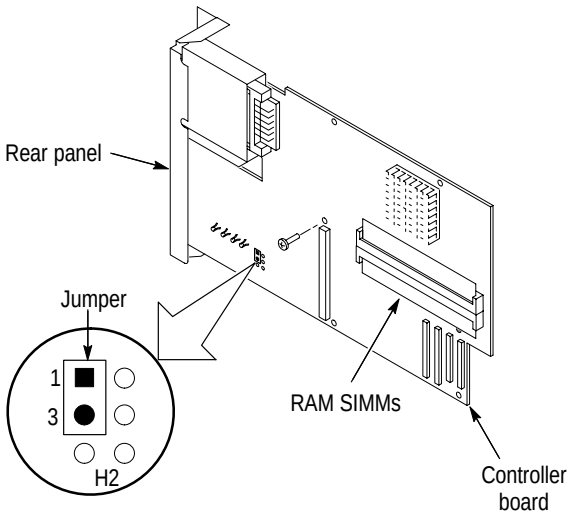


Figure 6–19: BIOS jumper location

7. After installing the BIOS jumper, reassemble the instrument.

Set Up and Update the BIOS

The new BIOS requires you to change the CMOS BIOS settings. This only has to be done once. To change the CMOS BIOS settings, follow these steps:

1. Insert the BIOS software floppy disk into the disk drive.
2. Power the instrument on. The floppy disk is a bootable floppy.
3. At the A:\> prompt, type **phlash** and press <Return>.
4. When the install program completes, press any key at the prompt.
5. Remove the floppy disk from the floppy disk drive.

Configure the CMOS Setup and Complete the Setup

Perform the following steps to configure the BIOS CMOS setup. You may want to refer to the *TLA 700 Series Installation Manual* for a complete list of the parameters for the CMOS setup.

1. Power the instrument off, and then on.
2. During the boot up process, press the <F2> key to enter the CMOS Setup.

   You may see a Checksum Error message. This is because you have not yet configured the CMOS setup.
3. Select **Continue** from the menu to load the default values.

4. In the CMOS setup main menu select **IDE Adapter 0 Master** and then select **Autotype** for the hard disk drive type.
5. Enter the **Advanced** menu and scroll to the **Advanced Chipset Control** submenu and select it by pressing the <Return> key.
   a. Set the DRAM memory speed to 60 ns.
   b. Press the <Esc> key to exit the Advanced Chipset Control submenu.
6. Select **Exit** and then select **Save**.
7. Continue with the regular boot up of the instrument.
8. Double-click on the **My Computer** icon to launch it.
9. Double-click on the **Control Panel** icon to launch it.
10. Double-click on the **Add New Hardware** icon to launch it.
11. Click **Next>** to continue.
    a. When the popup prompts you: **Do you want Windows to search for your new hardware**, click **Yes [Recommended]**.
    b. Click on **Next>** to proceed, and click **Next>** again to confirm that you want to continue.
    c. The Add New Hardware Wizard will take a few minutes to complete the task.
12. When the Add New Hardware Wizard completes its task, click on the **Details** button and verify that **Advanced power management support** is listed.
13. Click **Finish**, and close out of the Add New Hardware Wizard.
14. In the Control Panel, double click on the **Power** icon to launch it.
15. Verify that there is a Power tab present in Power Properties.
16. Verify that the **Allow Windows to manage power use on this computer** is checked. If it is not checked, click on the little box to place a check mark there.
17. Click on **Advanced...**

    Verify that the **Show suspend command on Start menu** is NOT checked. If it IS checked, click on it to remove the check mark.
18. Close the Power Properties text box, and close the Control Panel.
19. Close out your Windows session by selecting **Shut Down...** from the Windows menu.

20. The instrument will close your Windows session and automatically power off.

Verify Operation

Run the QAPlus/WIN diagnostic software to verify that all of the functions of the controller are functioning correctly.

After running the QA/Plus/WIN diagnostics, quit the application by selecting **Restart MS Windows**, and clicking the **OK** button. This guarantees that the TLA 700 returns to a stable state for normal operation.

Adjustment After Repair

There are no adjustment procedures required after replacement of any part of the TLA 704 Color Portable Mainframe. Power on the mainframe to ensure that it, and any installed modules, pass their power-on diagnostics.

Repackaging Instructions

If you need to send the portable mainframe to a Tektronix field center for repair, attach a tag to the chassis with the owner name and address, the serial number, and a brief description of the problem(s) encountered or the service required. Always return all accessories so that the entire system can be tested.

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

Options

This section provides a list of options that might be installed in the portable mainframe.

Options and Upgrade Kits

Table 7–1 lists the options and upgrade kits for the TLA 704 Color Portable Mainframe. These items are separately purchased and installed. Contact your local Tektronix representative for more information.

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

Table 7–1: TLA 704 Color Portable Mainframe options and upgrade kits

Description	Option	Part number
32MB DRAM/2.1GB Hard Disk Upgrade (Order TLAF1 for Field-Installable upgrade)	1S	--
10BaseT and 10Base2 LAN PC Card	1A	119-5510-XX
17-inch Color Monitor	1M	119-5430-XX
21-inch Color Monitor	2M	119-5422-XX
Logic Analyzer Cart	1K	LACART
Power Cord, Universal Euro (230VAC) right-angle straight	A1	 161-0104-06 161-0066-09
Power Cord, UK (230VAC) right-angle straight	A2	 161-0104-07 161-0066-10
Power Cord, Australian (230VAC) right-angle straight	A3	 161-0104-05 161-0066-11
Power Cord, North American (230VAC) right-angle straight	A4	 161-0104-08 161-0066-12
Power Cord, Switzerland (230VAC) right-angle straight	A5	 161-0167-00 161-0154-00
Test Data Report	95	--

DRAM/Hard Disk Upgrade

Option 1S upgrades the amount of memory and the hard drive provided with the system from 16 MB DRAM and 840 MB on the hard disk to 32 MB DRAM and 2.1 GB on the hard disk.

LAN PC Cards

Option 1A adds a LAN PC card to the standard configuration to provide 10BaseT and 10Base2 LAN communication capabilities.

External Color Monitors

Options 1M and 2M add a 17-inch and a 21-inch external color monitor, respectively, to the standard configuration.

Logic Analyzer Cart

Option 1K adds a cart on which to mount and move the TLA 704 Portable and TLA 711 Benchtop mainframes.

Power Cord Options

Options A1 through A5 provide different power cords, as listed in Table 7–1.

Tektronix Service Options

Service options are listed in the front of the manual, after the warranty page.

Electrical Parts List

Refer to the *Mechanical Parts List* chapter for a complete listing and description of replaceable parts for the TLA 704 Color Portable Mainframe.

Diagrams

This chapter contains the interconnection diagram and the block diagram for the portable mainframe.

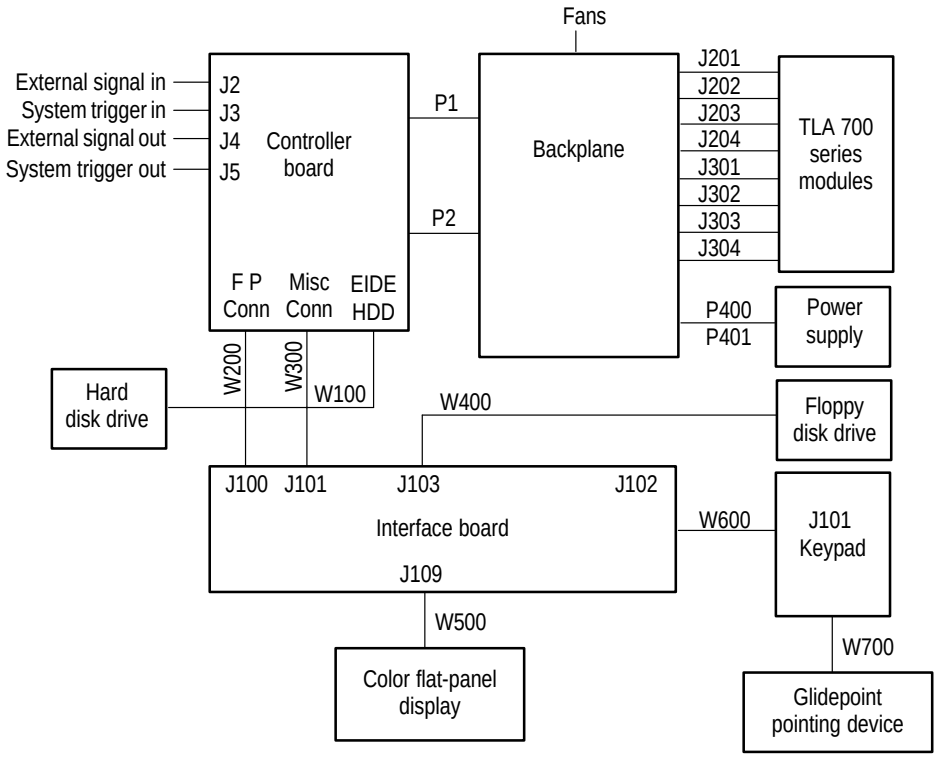


Figure 9–1: Interconnection diagram

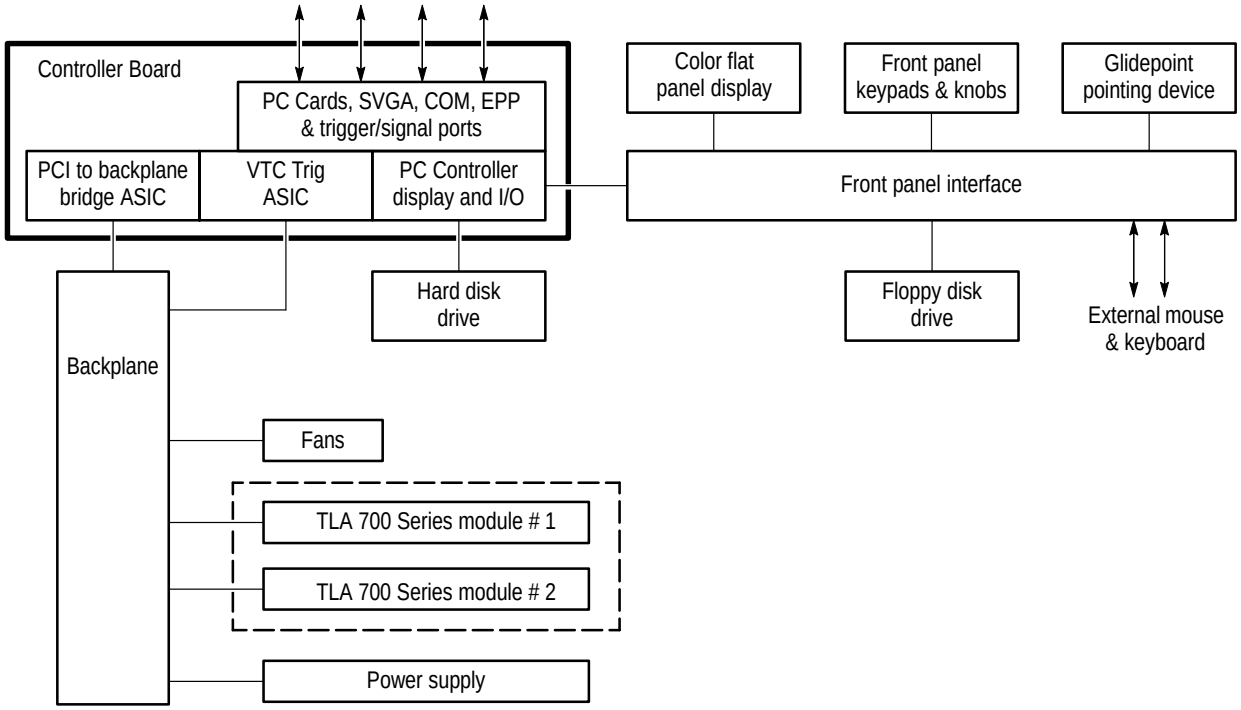


Figure 9–2: Block diagram

Replaceable Parts List

This chapter contains a list of standard accessories, optional accessories, and replaceable parts for the portable mainframe. Use this information to identify and order accessories and replacement parts.

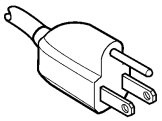
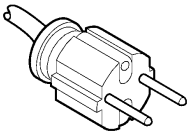
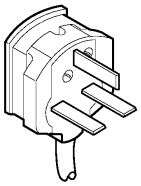
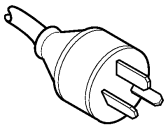
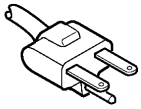
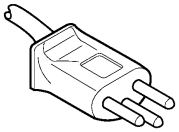
Standard Accessories

The portable mainframe comes standard with the accessories listed in Table 10–1.

Table 10–1: Standard accessories

Accessory	Part number
Windows 95 keyboard (US), PS/2 mini DIN	119-5193-00
Mouse, 3-button, PS/2 mini-DIN	119-4330-02
Accessory pouch	016-1441-00
Front-panel cover	200-4279-00
Dual-wide slot panel fillers (2)	333-4206-00
Printer adapter cable, 3 feet	012-1512-00
Windows 95 package (software and manual)	
QA Plus software	063-2506-00
TLA 700 application software	063-1967-00
Jumper with pull-tab (5)	131-4356-00
TLA 700 Series Logic Analyzer User manual	070-9775-XX
TLA 700 Series Logic Analyzer Installation manual	070-9774-XX
Mouse pad	016-1524-00
Power cord, North American, right-angle	161-0104-00
Power cord, North American, straight	161-0066-00
Certificate of Traceable Calibration	

Table 10–2: Power cord identification

Plug configuration	Normal usage	Option number
	North America 125 V/15A Plug NEMA 5-15P	Standard
	Europe 230 V	A1
	United Kingdom 230 V	A2
	Australia 230 V	A3
	North America 230 V	A4
	Switzerland 230 V	A5

Optional Accessories

The portable mainframe has the following optional accessories:

Table 10–3: Optional accessories

Description	Tektronix part number
US Power cord	
right-angle	161-0104-00
straight	161-0066-00
Option A1 Power cord	
right-angle	161-0104-06
straight	161-0066-09
Option A2 Power cord	
right-angle	161-0104-07
straight	161-0066-10
Option A3 Power cord	
right-angle	161-0104-05
straight	161-0066-11
Option A4 Power cord	
right-angle	161-0104-08
straight	161-0066-12
Option A5 Power cord	
right-angle	161-0167-00
straight	161-0154-00
TLA 704 software field upgrade kit	020-3001-XX
Wheeled transport hard case	016-1522-00
TLA 700 Series Performance Verification and Adjustment Technical Reference Manual	070-9776-XX
TLA 704 Color Portable Mainframe Service Manual	070-9777-XX
TLA 711 Color Benchtop Chassis Service Manual	070-9773-XX
TLA 711 Color Benchtop Controller Service Manual	070-9778-XX
TLA 7LX/TLA 7MX Logic Analyzer Service Manual	070-9779-XX
TLA 7Dx/TLA 7Ex Digitizing Oscilloscope Service Manual	070-9780-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.

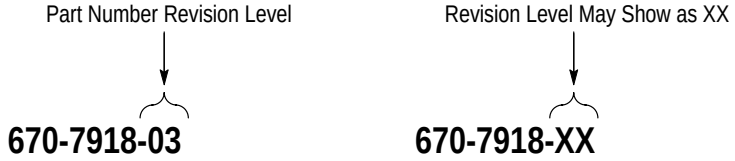
- Part number (see Part Number Revision Level below)
- Instrument type or model number
- Instrument serial number
- Instrument modification number, if applicable

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 Tektronix for repair, after which Tektronix will return it to you.

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

Common Replaceable Parts

Table 10–4 provides a quick reference list of parts that you are most likely to replace. For more detailed information refer to the individual parts lists in this chapter.

Table 10–4: Common replaceable parts

Name	Description	Tektronix part number
Line Fuse	Fuse, cartridge: 90 V to 132 V operation, 8 A, fast blow, 250 V	159-0046-00
Line Fuse	Fuse, cartridge: 207 V to 250 V operation, 6.3 A, fast blow, 250 V	159-0381-00

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 10–5: Parts lists column descriptions

Column number	Column name	Description
1	Figure & Index Number	Figure and index numbers in the exploded view illustrations.
2	Tektronix Part Number	Use this part number when ordering replacement parts from Tektronix.
3 and 4	Serial Number	Column 3 indicates the serial number at which the part was first effective. Column 4 indicates the serial number at which the part was discontinued. No entries in either column indicates the part is good for all serial numbers.
5	Qty	Quantity of parts used.
6	Name & Description	An item name is separated from the description by a colon (:). Because of space limitations, an item name may sometimes appear incomplete. Use the U. S. Federal Catalog Handbook H6-1 for further item name identification.
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
0D1M6	NMB TECHNOLOGIES INC	9730 INDEPENDENCE AVE	CHATSWORTH, CA 91311
0KB01	STAUFFER SUPPLY CO	810 SE SHERMAN	PORTLAND, OR 97214-4657
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
12136	PHC INDUSTRIES INC	1643 HADDON AVE; PO BOX 1448	CAMDEN, NJ 08103
1DM20	PARLEX CORP	7 INDUSTRIAL WAY	SALEM, NH 03079
1GM54	ZYTEC CORP	7575 MARKET PLACE DR	EDEN PRAIRIE, MN 55344
26742	METHODE ELECTRONICS INC	BACKPLAIN DIVISION 7444 WEST WILSON AVE	CHICAGO, IL 60656-4548
2W733	BELDEN WIRE & CABLE COMPANY	2200 US HWY 27 SOUTH; PO BOX 1980	RICHMOND, IN 47374
4T165	NEC ELECTRONICS, INC.	2880 SCOTT BLVD; PO BOX 58062	SANTA CLARA, CA 95052-8062
50356	TEAC AMERICA INC	7733 TELEGRAPH RD; PO BOX 750	MONTEBELLO, CA 90640–6537
5F520	PANEL COMPONENTS CORP	PO BOX 115	OSKALOOSA, IA 52577-0115
60128	MICROSOFT CORPORATION	ONE MICROSOFT WAY; DEPARTMENT 101	REDMOND, WA 98052-8300
61935	SCHURTER INC	1016 CLEGG CT PO BOX 750158	PETALUMA, CA 94975–0158
6V439	ERNI COMPONENTS INC	12701 NORTH KINGSTON AVENUE	CHESTER, VA 23831
6Y440	MICRON SEMICONDUCTOR PRODUCTS INC	8000 S FEDERAL WAY; PO BOX 6	BOISE, ID 83707-0006
71400	BUSSMANN DIV OF COOPER INDUSTRIES INC	114 OLD STATE RD PO BOX 1460	ST LOIUS MO 63178
80009	TEKTRONIX INC	14150 SW KARL BRAUN DR PO BOX 500	BEAVERTON, OR 97077-0001
80126	PACIFIC ELECTRICORD CO	747 WEST REDONDO BEACH; PO BOX 10	GARDENA, CA 90247-4203
S3109	FELLER U.S. CORPORATION	72 VERONICA AVE; UNIT #4	SOMERSET, NJ 08873
S5341	ALPS ELECTRIC CO LTD	1-7 YUKIGAYA-OHTSUKA-CHO OHTA-KU	TOKYO JAPAN
TK1163	POLYCAST INC	9898 SW TIGARD ST	TIGARD, OR 97223
TK1373	PATELEC-CEM	10156 TORINO	VAICENTALLO, ITALY 62/456
TK2157	CONNECTOR TECHNOLOGY INC	5065 E HUNTER AVE	ANAHEIM, CA 92807-6001
TK2383	PANASONIC INDUSTRIAL CO	1600 MCCANDLESS DR	MILPITAS, CA 95035
TK2469	UNITREK CORPORATION	3000 LEWIS & CLARK HWY; SUITE 2	VANCOUVER, WA 98661
TK2541	AMERICOR ELECTRONICS LTD	UNIT-H; 2682 W COYLE AVE	ELK GROVE VILLAGE, IL 60007
TK2647	INSTRUMENT SPECIALTIES CO INC.	C/O TEMCO NW; 1336 SE 51ST STREET	HILLSBORO, OR 97123

Replaceable Parts List

Fig. & Index Number	Tektronix Part Number	Serial No. Effective	Serial No. Discont'd	Qty	Name & Description	Mfr. Code	Mfr. Part Number
1-1	016-1441-00			1	POUCH, PLASTIC:PLASTIC POUCH,ZEUS	80009	016-1441-00
-2	200-4275-00			1	COVER,TOP:PLASTIC TOP COVER,ZEUS	80009	200-4275-00
-3	211-0721-00			10	SCREW,MACHINE:6-32 X 0.375,PNH,STL,CDPL,T-15 TORX DR	0KB01	ORDER BY DESCRIPTION
-4	348-1479-00			2	FOOT, REAR:PLASTIC REAR FOOT:ZEUS	80009	348-1479-00
-5	348-1254-01			8	PAD,FOOT:TEK BLACK,SANTOPRENE	80009	348-1254-01
-6	200-4233-00			1	COVER,RIGHT:COVER,COSMETIC,RIGHT	80009	200-4233-00
-7	200-4280-00			1	COVER:BOTTOM COVER,0.050 SHEET METAL,ALUM	80009	200-4280-00
-8	348-1515-00			0	FOOT,CABINET:BLACK PLASTIC,63-526,SET OF 4	80009	348-1515-00
-9	200-4279-00			1	COVER,FRONT:FRONT, PROTECTIVE, ABS, TEK BLUE	80009	200-4279-00
-10	214-4718-00			1	ACTUATOR,SWITCH:ACTUATOR,ON/STANDBY	80009	214-4718-00
-11	101-0145-00			1	TRIM,RING:FRONT TRIM RING,PLASTIC	80009	101-0145-00
-12	200-4232-00			1	COVER,LEFT:COVER,COSMETIC,LEFT	80009	200-4232-00

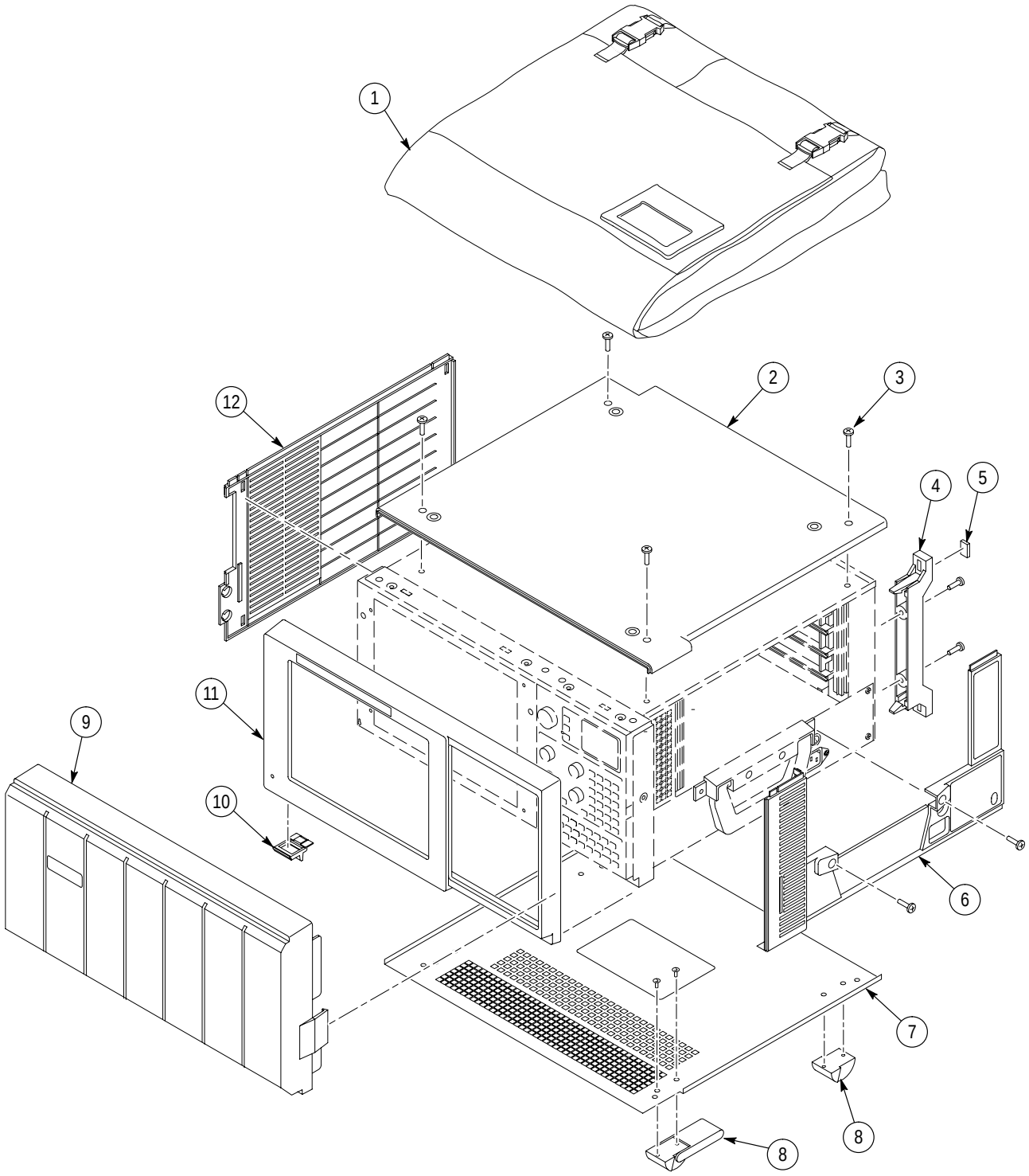


Figure 10–1: External parts

Replaceable Parts List

Fig. & Index Number	Tektronix Part Number	Serial No. Effective	Serial No. Discont'd	Qty	Name & Description	Mfr. Code	Mfr. Part Number
2-1	650-3587-00			1	FLAT-PANEL DISPLAY ASSEMBLY		
-2	211-0721-00			9	SCREW,MACHINE:6-32 X 0.375,PNH,STL,CDPL,T-15 TORX DR	0KB01	ORDER BY DESCRIPTION
-3	614-0932-00			1	FRONT PNL ASSY:FRONT PANEL MODULE ASSY	80009	614-0932-00
-4	366-0771-00			4	KNOB,CAP:0.650 DIA,MACROBLEND DP4-1368	TK1163	366-0771-00
-5	366-0770-00			1	KNOB,CAP:0.925 DIA,MACROBLEND DP4-1368	TK1163	366077000
-6	650-3574-00			1	GLIDEPOINT/FRAME ASSY	80009	650-3574-00
-7	214-4703-00			1	ACTUATOR:ELASTOMERIC, SWITCHMAT	80009	214-4703-00
-8	671-3487-00			1	CIRCUIT BD ASSY:FRONT PANEL,389-2042-00,TESTED	80009	671-3487-00
-9	352-1063-00			1	OPTO, PASSIVE:LIGHT PIPE, 0.14 DIA X 1.445 INCHES LONG, CLEAR ACRYLIC	80009	352-1063-00

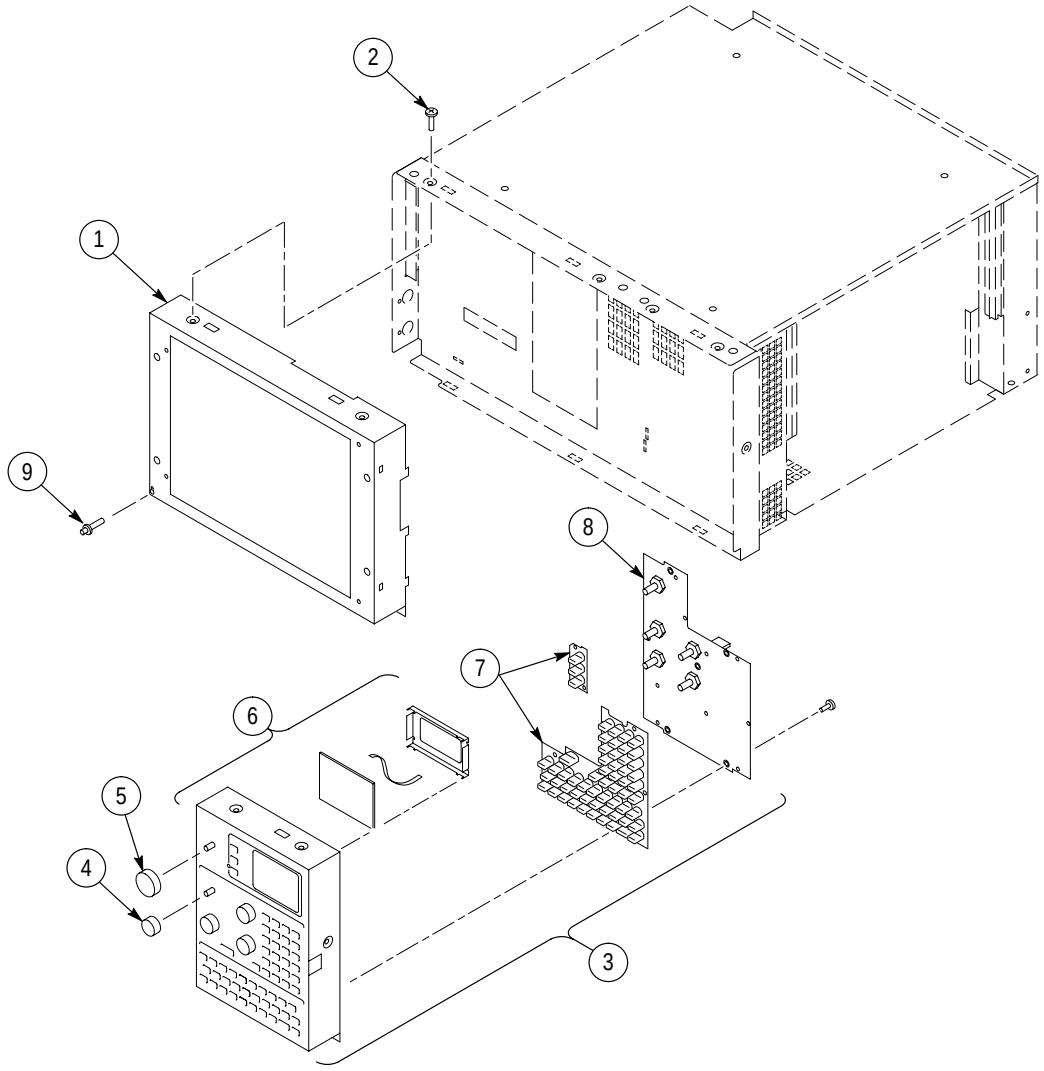


Figure 10–2: Front panel display and control assemblies

Replaceable Parts List

Fig. & Index Number	Tektronix Part Number	Serial No. Effective	Serial No. Discont'd	Qty	Name & Description	Mfr. Code	Mfr. Part Number
3-1	407-4380-00			1	BRACKET:HARD DRIVE BRACKET,SHEET METAL	80009	407-4380-00
-2	211-0721-00			4	SCREW,MACHINE:6-32 X 0.375,PNH,STL,CDPL,T-15 TORX DR	0KB01	ORDER BY DESCRIPTION
-3	119-5588-00	B010100	B010761	1	DISK DRIVE:WINCHESTER,3.5,840MEG,14MS,IDE, ST9840AG	80009	119-5588-00
-3	119-5683-00	B010762	B011207	1	DISK DRIVE:WINCHESTER,2.5 IN:1.4GB,12MS,IDE, ST91420AG	80009	119-5683-00
-3	119-5607-00	B011208	B011290	1	DISK DRIVE:TOSHIBA 2.5 INCH, 2.16GB HDD	80009	119-5607-00
-3	119-5683-00	B011291		1	DISK DRIVE:WINCHESTER,2.5 IN:1.4GB,12MS,IDE, ST91420AG	80009	119-5683-00
-3	119-5607-00			1	DISK DRIVE:TOSHIBA 2.5 INCH, 2.16GB HDD (OPTION 1S ONLY)	80009	119-5607-00
-4	671-3489-00			1	CIRCUIT BD ASSY:INTERFACE,COLOR,389-2044-00,TESTED	80009	671-3489-00
-5	174-3521-00			1	CA ASSY SP:RIBBON,FRONT PNL,IDC,34,28 AWG,6.0 L,2X17,0.1CTR,RCPT,NON PLZ,BOTH ENDS,	TK2469	174-3521-00
-6	174-3732-00			1	FLOPPY DRIVE CABLE		
-7	174-3406-00			1	CA ASSY,SP:RIBBON,IDC,44,28 AWG,1MM,2X22,0.079 CTR,2MM,RCPT W/O STRAIN RELIEF BOTH ENDS,11	80009	174-3406-00
-8	407-4381-00			1	BRACKET:FLOPPY DRIVE BRACKET,SHEET METAL	80009	407-4381-00
-9	119-5528-01	B010100	B010900	1	DISK DRIVE:FLOPPY,3.5 INCH,1.44MB,BLACK,0.5 INCH,DSDD, JU-226AXX1F	TK2383	JU226AXX1F
-9	119-5677-00	B010901		1	DISK DRIVE:FLOPPY,3.5 INCH,1.44MB,BLACK,0.5 INCH,DSDD, FD-04-HF2300	50356	FD-04-HF2300
-10	211–0895–00			2	SCREW,MACH:M2.6 X 0.45 X 8MM,PHILLIPS,PNH,ZINC YELLOW	0KB01	211–0895–00

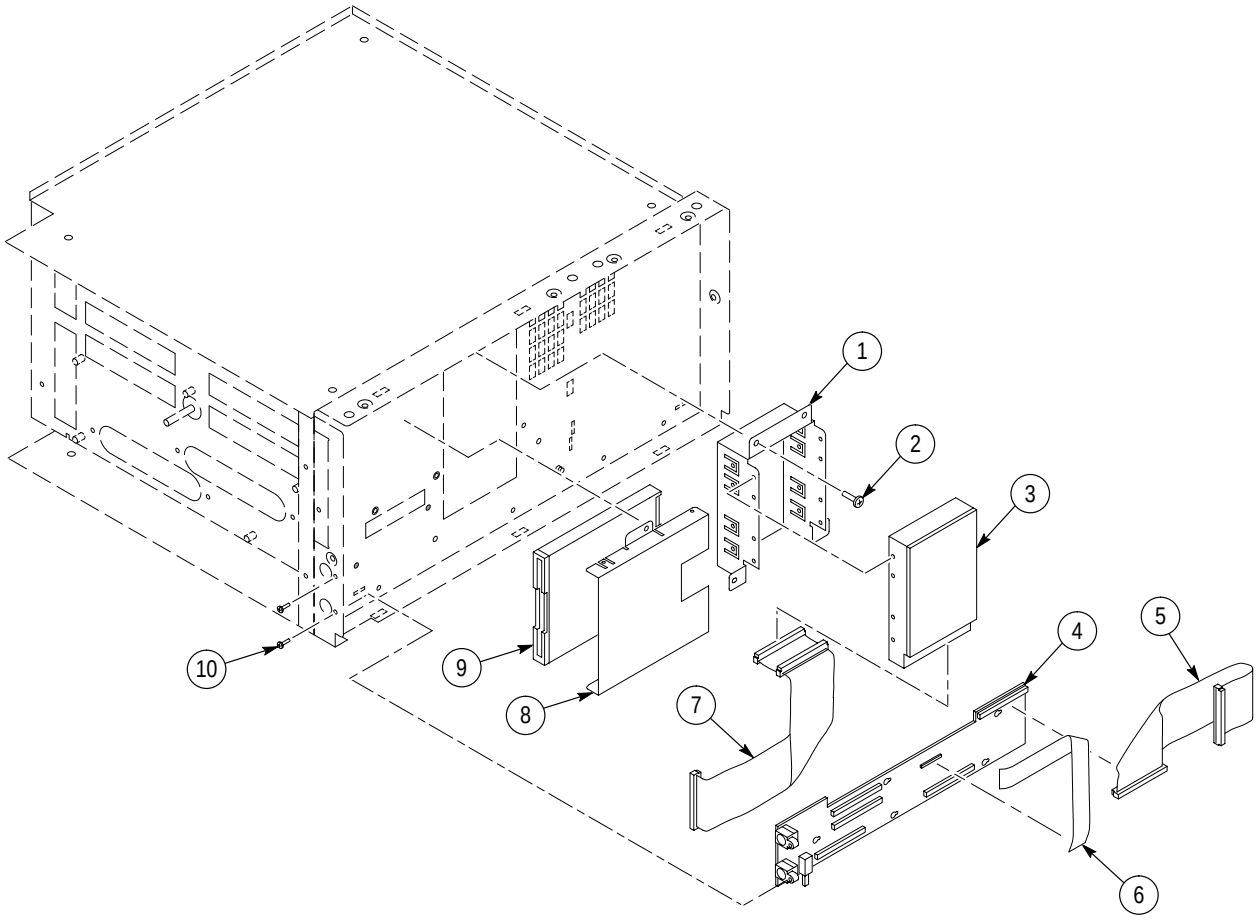


Figure 10–3: Floppy disk drive, hard disk drive, front panel interface board, and related cables

Replaceable Parts List

Fig. & Index Number	Tektronix Part Number	Serial No. Effective	Serial No. Discont'd	Qty	Name & Description	Mfr. Code	Mfr. Part Number
4-1	118-9160-00			1	BACK PLANE:4 SLOT BACKPLANE ASSY,VXI	TK2157	118-9160-00
-2	211-0721-00			1	SCREW,MACHINE:6-32 X 0.375,PNH,STL,CDPL,T-15 TORX DR	0KB01	ORDER BY DESCRIPTION
-3	039-0031-00	B010100	B010900	1	CONTROLLER:SINGLE BOARD, PENTIUM CONTROLLER W/VXI INTERFACE,SAFETY CONTROLLER	0L0L7	OBD
-3	039-0031-01	B010901	B011979	1	CONTROLLER:SINGLE BOARD, PENTIUM CONTROLLER W/VXI INTERFACE,SAFETY CONTROLLER	0L0L7	OBD
-3	039-0031-02	B011980		1	CONTROLLER:SINGLE BOARD, PENTIUM CONTROLLER W/VXI INTERFACE,SAFETY CONTROLLER	0L0L7	OBD
-3	039-0038-00	B010100	B010900	1	CONTROLLER BD:SINGLE BOARD,32MB PENTIUM CONTROLLER W/VXI INTERFACE,(MAX) (OPTION 1S ONLY)	0L0L7	OBD
-3	039-0038-01	B010901	B011979	1	CONTROLLER BD:SINGLE BOARD,32MB PENTIUM CONTROLLER W/VXI INTERFACE,(MAX) (OPTION 1S ONLY)	0L0L7	OBD
-3	039-0038-02	B011980		1	CONTROLLER BD:SINGLE BOARD,32MB PENTIUM CONTROLLER W/VXI INTERFACE,(MAX) (OPTION 1S ONLY)	0L0L7	OBD
-4	346-0128-00			1	STRAP,TIEDOWN,E:8.0 L X 0.1 W,NYLON	06383	PLT2M
-5	174-3530-00			1	CA ASSY,SP:RIBBON,IDC,28 AWG,1MM,8.0 L,2X25,0.079CTR(2MM) BOTH ENDS,SAME SIDE,	80009	174-3530-00
-6	156-7501-00			2	IC,MEMORY:CMOS,DRAM,2MEG X 32,60NS,EDO,5 V,ST1322004A-60G,72SIMM,GOLD PLATED	6Y440	MT16D232G-6X
-6	156-7503-00			2	IC,MEMORY:CMOS,DRAM,4MEG X 32,60NS,EDO,5VOLTS,MT8D432G-6X,72SIMM,GOLD (OPTION 1S ONLY)	6Y440	MT8D432G-6X
-7	337-4032-00			1	SHIELD,ELECT:SHIELD,ELECT,PROCESSOR,ALUM,ZEUS	80009	337-4032-00
–8	Order by Mfr Part Number			1	CONNECTOR, SUB-MINIATURE, LPT SERIAL PORT	0L0L7	40–0272–01
–9	Order by Mfr Part Number			4	CONNECTOR, PELTOLA TO BNC (SET OF FOUR)	0L0L7	44–0153–01
–10	Order by Mfr Part Number			1	CONNECTOR, 15-PIN, SVGA, OUTPUT A	0L0L7	40–0030–00
–11	Order by Mfr Part Number			1	CONNECTOR, 9-PIN, RS-232, MALE	0L0L7	40–0019–00
–12	PART OF ITEM 3			1	REAR PANEL		

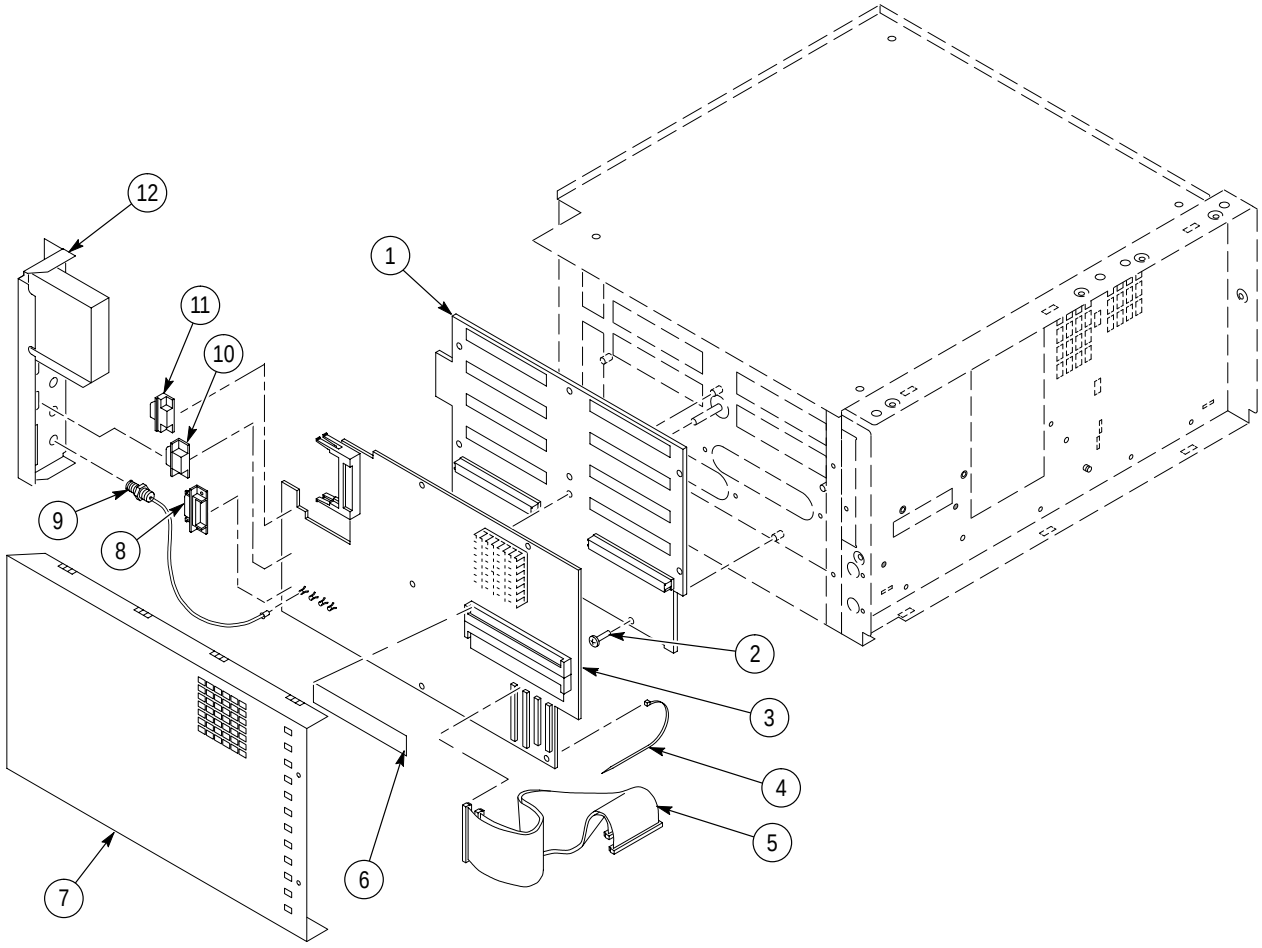


Figure 10–4: Controller board, interface board, and EMI shield

Replaceable Parts List

Fig. & Index Number	Tektronix Part Number	Serial No. Effective	Serial No. Discont'd	Qty	Name & Description	Mfr. Code	Mfr. Part Number
5-1	441-2075-00			1	CHASSIS,MAIN:MAIN CHASSIS,ZEUS/JUPITER,	80009	441-2075-00
-2	436-0296-00			1	TRAY,FAN:CHASSIS ASSY,W/FANS MOUNTED,ZEUS,	80009	436-0296-00
-3	119-5522-00			6	FAN,DC:TUBEAXIAL,24V,4.3W,3200RPM,54.7CFM,92MM X 25.4MM,41DBA,RIBBED MOUNTING FLANGE,W/	0D1M6	3610KL-05W-B50 -L00
-4	386-0076-00			2	PLATE,CMPNT NTG:PLATE, FAN MOUNT	80009	386-0076-00
-5	211–0895–00			2	SCREW,MACH:M2.6 X 0.45 X 8MM,PHILLIPS,PNH,ZINC YELLOW	0KB01	211–0895–00
-6	351-0979-00			2	GUIDE,CARD:GUIDE,DIN 41612,ACCOM C MALE,FRONT PANEL,3 X 32	6V439	043 520
-7	348-1365-01			1	SHLD GSKT,ELEC:SYMMETRICAL SLOTTED FINGER,0.350 W X 7.5 L,RIVIT MTG,SNAP-IN,RIVIT SPACING 1.5 IN	TK2647	0493-0069-01
-8	441–2093–00			1	CHASSIS:CHASSIS,BRACE WITH EMI GASKET	80009	441–2093–00
-9	159-0046-00			1	FUSE,CARTRIDGE:3AG,8A,250V,15SEC,CER	71400	ABC 8
-9	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
10	200-2264-00			1	CAP,FUSEHOLDER:3AG FUSES	61935	FEK 031 1666
10	200-2265-00			1	CAP,FUSEHOLDER:5 X 20MM FUSES	61935	031.1663
-11	367-0477-00			1	HANDLE,CARRYING:DUAL DUROMETER MOLDED HANDLE, POLYPROPYLENE HANDLE VINYL GRIP SECTION	12136	PT 3170
-12	407-4459-00			1	BRACKET:HANDLE BRACKET,PLASTIC,	80009	407-4459-00
-13	211-0721-00			6	SCREW,MACHINE:6-32 X 0.375,PNH,STL,CDPL,T-15 TORX DR	0KB01	ORDER BY DESCRIPTION
-14	119-4933-00	B010100	B010762	1	POWER SUPPLY:POWER SUPPLY ASSY,ZEUS,	1GM54	119-4933-00
-14	119-4933-01	B010763		1	POWER SUPPLY:POWER SUPPLY ASSY,ZEUS,	1GM54	119-4933-01
-15	020-2205-00			2	NUTBAR/SET SCREWS		

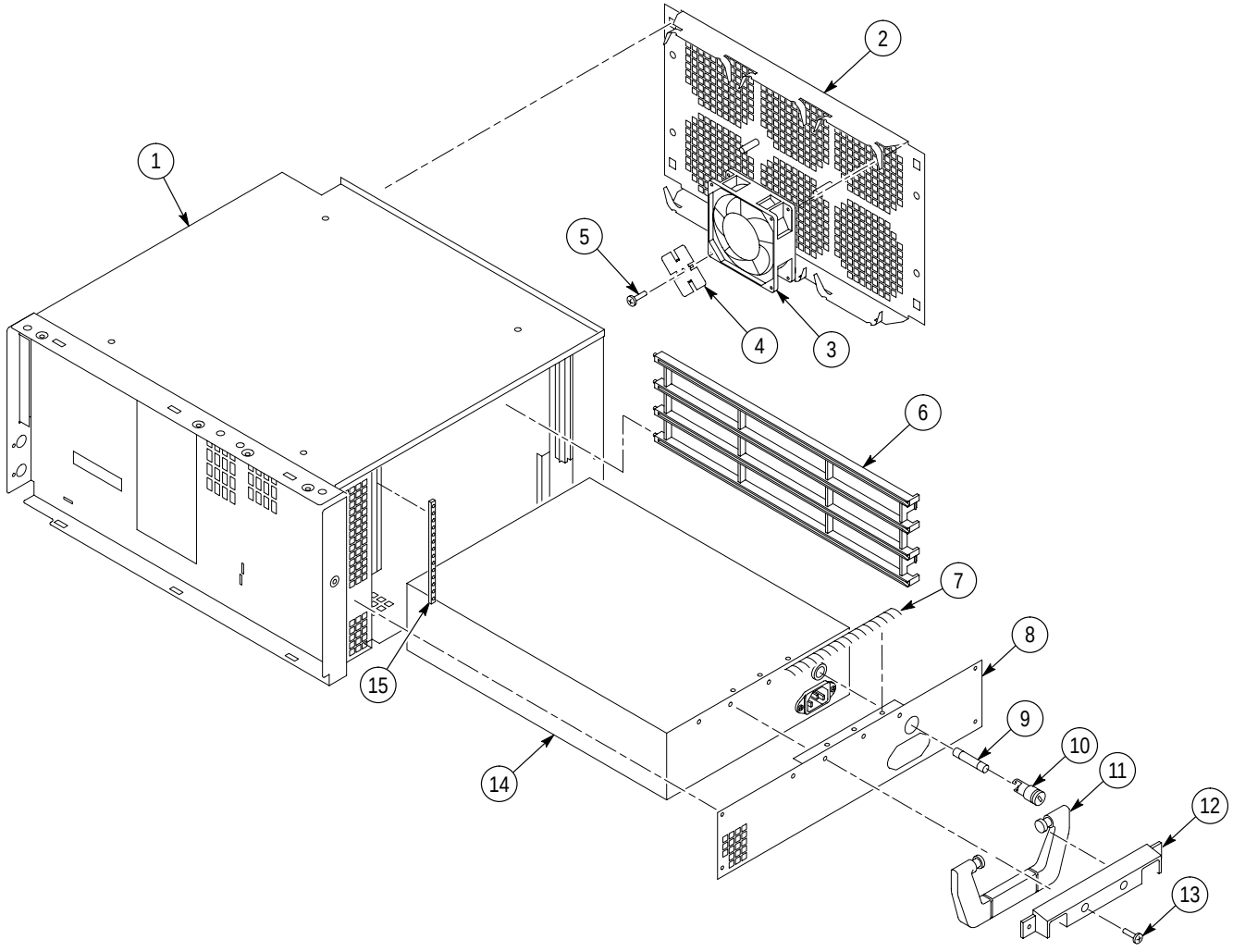


Figure 10–5: Power supply, handle, and fan

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