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Service Manual

Tektronix

TLA715
Dual Monitor Portable Mainframe

071-0913-00

This document applies to System Software version 4.1 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.

www.tektronix.com

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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.

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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 markings on the product. Consult the product manual for further ratings information before making connections to the product.

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

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

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

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

Wear Eye Protection. Wear eye protection if exposure to high-intensity rays or laser radiation exists.

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

Do Not Operate in Wet/Damp Conditions.

Do Not Operate in an Explosive Atmosphere.

Keep Product Surfaces Clean and Dry.

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

Symbols and Terms

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



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



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

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

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

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

CAUTION indicates a hazard to property including the product.

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



Service Safety Summary

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

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

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

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

To avoid electric shock, do not touch exposed connections.

Preface

This is the service manual for the TLA715 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

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

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

A brief description of each chapter follows:

- *Specifications* contains a product description of the instrument and tables of the characteristics and descriptions that apply to it.
- *Operating information* includes basic controls and connectors on the instrument. It also provides a high-level overview of the operating system and application interface. Refer to the *Tektronix Logic Analyzer Family User Manual* for detailed information on the operating system and for installation information not found in this document.
- *Theory of Operation* contains a high-level overview of the basic operation of the instrument to help you service the instrument to a module level.
- *Performance Verification* contains the performance verification and certification procedures for the instrument.
- *Adjustment Procedures* notes that there are no adjustments for the instrument. For adjustment information on the product modules, refer to the appropriate service module manual.
- *Maintenance* contains information and procedures for doing preventative and corrective maintenance on the instrument. Included are instructions for cleaning, for removal and installation of replaceable parts, and for troubleshooting product failures. Instructions for shipping the instrument are included in this chapter.
- *Options* contains information on factory installed options and accessories that may be purchased for your instrument.

- *Electrical Parts List* refers you to the Mechanical Parts List for a list of all replaceable parts in the instrument.
- *Diagrams* contains block diagrams of the instrument and interconnection diagrams useful for isolating failures in the instrument.
- *Mechanical Parts List* includes tables of all replaceable parts for the instrument along with the Tektronix part number.

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 TLA700 Series Logic Analyzer, DSO (digitizing oscilloscope) unit, or pattern generator unit that mounts inside the portable mainframe. A module is composed of circuit cards, interconnecting cables, and a user-accessible front panel enclosed in a mechanical supporting frame.

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.

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 Tektronix Logic Analyzer Family documentation set. The procedures in this manual assume that the service personnel have access to all manuals listed in the following table. Other manuals may exist outside of the table as the product line offerings change. Contact your local Tektronix Service Representative for the latest part numbers of the service documentation. You can also obtain part numbers from the online help for the instrument.

Table i: Tektronix Logic Analyzer Family Documentation

Manual name	Description	Service use
The *Tektronix Logic Analyzer Family User Manual*	Provides basic operation and installation information for the Tektronix Logic Analyzer Family.	Installation and removal of LA, DSO, and pattern generator modules as well as the mainframes. Reinstallation of the system and application software.
The *TLA721 Benchtop Mainframe & TLA7XM Expansion Mainframe Service Manual.*	Provides service information for the benchtop controller, benchtop mainframe, expansion module, and expansion mainframes.	Isolating and correcting failures in the benchtop controller, benchtop mainframe, and expansion mainframes.
The *TLA7Nx/TLA7Px/TLA7Qx Logic Analyzer Module Service Manual.*	Provides service information for the logic analyzer modules.	Isolating and correcting failures in the logic analyzer module. Performing periodic or after-repair functional or performance verifications, calibrations, and certifications for the logic analyzer modules. Performing periodic or after-repair adjustments for the logic analyzer modules.
The *TLA7Dx/TLA7EX Digitizing Oscilloscope Module Service Manual.*	Provides service information for the DSO modules.	Isolating and correcting failures in the DSO module. Performing periodic or after-repair functional or performance verifications, calibrations, and certifications for the DSO modules. Performing periodic or after-repair adjustments for the DSO modules.
The *TLA7PG2 Pattern Generator Module Service Manual.*	Provides service information for the pattern generator modules.	Isolating and correcting failures in the pattern generator module. Performing periodic or after-repair functional or performance verifications, calibrations, and certifications for the pattern generator modules.

Introduction

This manual contains information needed to properly service the portable mainframe. This introduction contains information critical to safe and effective servicing.

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

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

Be sure to follow all warnings, cautions and notes.

Adjustment and Certification Interval

Generally, you should perform the adjustments and certification (calibration) once per year, or following repairs that may affect adjustment or calibration.

Service Strategy

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

This manual 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 *Mechanical Parts List*
- supports removal and replacement of those boards or assemblies
- supports removal and replacement of the 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 equipped to service the portable mainframe. 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 is located behind the title page in this manual. Tektronix technicians provide warranty service at most Tektronix service locations worldwide. The Tektronix product catalog lists all service locations worldwide.

Calibration and Repair Service

In addition to warranty repair, Tektronix Service offers calibration and other services which provide solutions to your service needs and quality standards compliance requirements.

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

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

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

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

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

Use this service to reduce down-time for repair by exchanging 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

Phone	1-800-833-9200*
Address	Tektronix, Inc. Department or name (if known) 14200 SW Karl Braun Drive P.O. Box 500 Beaverton, OR 97077 USA
Web site	www.tektronix.com
Sales support	1-800-833-9200, select option 1*
Service support	1-800-833-9200, select option 2*
Technical support	Email: techsupport@tektronix.com 1-800-833-9200, select option 3* 1-503-627-2400 6:00 a.m. – 5:00 p.m. Pacific time

*** This phone number is toll free in North America. After office hours, please leave a voice mail message.**
Outside North America, contact a Tektronix sales office or distributor; see the Tektronix web site for a list of offices.

Specifications

This chapter provides a brief product description and lists the warranted characteristics, nominal traits, and typical characteristics of the portable mainframe.

Product Description

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

- Microsoft Windows operating system
- High-performance, system controller with automatic PC connectivity to a multitude of off-the-shelf I/O devices (such as Ethernet, modem, printers) via standard PC I/O ports and two PC Card (CardBus) slots
- Display system provides internal color flat-panel LCD display and two external SVGA ports capable of driving large, high-resolution external monitors
- Four backplane slots provide compatibility with TLA700 Series instrument modules
- Precision clock, bus trigger line, and event signaling between the mainframe and instrument modules supports real-time triggering, sequencing, and time correlation of events
- Mainframe compatible with international power standards, certified to international safety and EMC requirements, and tested to rugged environmental standards
- CD-ROM drive
- Removable hard disk drive for easy removal of the hard disk drive for extra security

Characteristics Tables

This section contains the 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 Performance Verification chapter in this manual.

The specifications listed in this section are valid under the following conditions:

- The instrument must reside in an environment with temperature, altitude, and humidity, within the operating limits described in Table 1–11 beginning on page 1–14.
- The instrument has has a warm-up period of at least 20 minutes.

Table 1-1: Internal controller

Characteristic	Description
Operating system	Microsoft Windows 2000
Microprocessor	Intel Pentium PC-AT configuration with an Intel chip-set and a 733 MHz Pentium III processor
Main memory	SDRAM
Style	144 pin SO DIMM, 2 sockets, gold plated, 1.25-inch (3.175 cm) maximum height
Speed	133 MHz
Available configurations	32, 64, 128, 256 MByte per SO DIMM
Installed configurations	Minimum 256 MB loaded in one socket Maximum 512 MB with both sockets loaded
Cache memory	256 KByte Level 2 (L2) write-back cache
Flash BIOS	256 KByte
Real-Time clock and CMOS setups NVRAM	Real-Time clock/calendar, standard and advanced PC CMOS setups; see BIOS specification
RTC, CMOS setup, & PNP NVRAM retention time (typical)	> 10 years battery life, lithium battery

Table 1-1: Internal controller (Cont.)

Characteristic	Description
Floppy disk drive	Standard 3.5 inch 1.44-MB PC compatible high-density, double-sided floppy disk drive, 500 Kbits/sec transfer rate
Bootable replaceable hard disk drive	Standard PC compatible IDE (Integrated Device Electronics) hard disk drive residing on an EIDE interface.
Size	Minimum 10 GB Maximum 30 GB Continually subject to change due to the fast-moving PC component environment. These storage capacities valid at product introduction.
Interface	ATA -5/enhanced IDE (EIDE)
Average seek time	Read, 12 ms
Average latency	7/14 ms
I/O data transfer rate	33.3 MBytes/sec maximum (U-DMA mode 2)
Cache buffer	2 MBytes (30 GB) /512 KBytes (10GB)
CD ROM drive	Standard PC compatible IDE (Integrated device Electronics) 24X (minimum) CD ROM drive residing on an IDE interface. Continually subject to change due to the fast-moving PC component environment.

Table 1-2: Display system

Characteristic	Description
Classification	Standard PC graphics-accelerator technology capable of supporting both internal color LCD display and two external color VGA, SVGA, or XGA monitors
Display memory	4 MB SDRAM clocked up to 100 MHz, no external video memory
Display selection	Hardware sense of external SVGA monitor during BIOS boot sequence; defaults to internal color LCD display (indicated by two beeps); automatically switches to external SVGA monitor, if attached (indicated by one beep). 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 800x600 on current LCD) and display rates (simulscan mode indicated by three beeps). Four beeps during the BIOS boot indicates a monochrome LCD was found (not supported). Five beeps indicates no recognizable LCD or external monitor was found. Dynamic Display Configuration 1 (DDC1) support for external SVGA monitor is provided.
External display drive	1 VGA, SVGA, or XGA-compatible analog output port. Display size is selected via Win2000 display applet.
Display Size (Primary with Silicon motion chip)	Resolution (Pixels) / Colors / Refresh Rates 640 x 480 / 256, 64 K, 16.8 M / 60, 75, 85 800 x 600 / 256, 64 K, 16.8 M / 60, 75, 85 1024 x 768 / 256, 64 K, 16.8 M / 60, 75, 85 1280 x 1024 / 256, 64 K, 16.8 M / 60 1600 x 600 / 256, 64 K / 60 1600 x 1200 / 256, 64 K / 60
(Secondary with 815E chip set)	Resolution (Pixels) / Colors / Refresh Rates 640 x 480 / 256, 64 K, 16.8 M / 60, 75, 85 800 x 600 / 256, 64 K, 16.8 M / 60, 75, 85 1024 x 768 / 256, 64 K, 16.8 M / 60, 75, 85 1280 x 1024 / 256, 64 K, 16.8 M / 60, 75, 80 1600 x 1200 / 256 / 60, 75
Internal display	
Classification	TFT (Thin Film Transistor) 26 cm active-matrix color LCD display, CCFL backlight, intensity controllable via software.
Resolution	800 X 600, 262, 144 colors with 211.2 mm (8.3 in) by 158.4 mm (6.2 in) of viewing area
Color scale	262, 144 colors (6-bit RGB) with a color gamut of 42% at center to NTSC

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 by local controller reset)
✓ CLK10 Frequency	10 MHz ±100 PPM
Relative time correlation error (typical)	Typical measured relative time correlation error between modules in the same instrument Includes typical jitter, slot-to-slot skew, and probe-to-probe variations to provide a simple, overall, typical value. Assumes standard accessory probes are used. For long-term (> 1 μs) time interval measurements between modules add 0.01% of the delta time between the absolute time measurements to the relative time correlation error to account for the inaccuracy of the CLK10 source.
LA to LA MagniVu data	2 ns
LA to LA normal data using an internal clock[1]	1 LA Smpl - 0.5 ns
LA to LA normal data using an external clock	2 ns
LA to LA MagniVu to DSO data[2]	3 ns
LA normal data using an internal clock to DSO[1, 2]	1 LA Smpl ± 2 ns
LA normal data using an external clock to DSO[2, 3]	3 ns
DSO to DSO[2]	3 ns
Intermodule signal line bandwidth	Minimum bandwidth up to which the intermodule signals operate correctly
Signal 1, 2 (ECLTRG0, 1)	50 MHz squarewave
Signal 3, 4 (TTLTRG0, 1)	10 MHz squarewave
System trigger input	TTL-compatible via rear panel BNC connector
Input destination	System Trigger (TTLTRG7)
Input levels	V_{IH} ≥ 2.0 V V_{IL} ≤ 0.8 V
Input mode	Falling edge sensitive, latched (active low)
Minimum pulse width	12 ns
Active period	Accepts system triggers during valid acquisition periods via real-time gating; resets system trigger input latch between valid acquisition periods
Maximum input voltage	0 to 5 V peak

Table 1-3: Backplane interface (Cont.)

Characteristic	Description
External signal input	TTL-compatible via rear panel BNC connector
Input destinations	Signal 1, 2 (ECLTRG0, 1) Signal 3, 4 (TTLTRG0, 1)
Input levels	V_{IH} ≥ 2.0 V V_{IL} ≤ 0.8 V
Input mode	Level sensitive, active (true) low
Input bandwidth[4] Signal 1, 2 (ECLTRG0, 1)	50 MHz squarewave minimum
Signal 3, 4 (TTLTRG0, 1)	10 MHz squarewave minimum
Active period	Accepts signals during valid acquisition periods via real-time gating
Maximum input voltage	0 to 5 V peak
System trigger output	TTL-compatible via rear panel BNC connector
Source selection	System Trigger (TTLTRG7)
Output levels	50 Ω back terminated TTL output V_{OH} ≥ 4.0 V into open circuit ≥ 2.0 V into 50 Ω to ground V_{OL} ≤ 0.7 V sinking 10 mA
Source mode	Falling edge latched, active (true) low
Active period	Outputs system trigger state during valid acquisition period; resets system trigger output to false state between valid acquisitions via software
Output protection	Short-circuit protected to ground
External signal output	TTL-compatible via rear panel BNC connector
Source selection	Signal 1, 2 (ECLTRG0, 1) Signal 3, 4 (TTLTRG0, 1)
Output levels	50 Ω back terminated TTL output V_{OH} ≥ 4.0 V into open circuit ≥ 2.0 V into 50 Ω to ground V_{OL} ≤ 0.7 V sinking 10 mA
Output mode	User definable; level sensitive active (true) low or active (true) high
Output bandwidth[5] Signal 1, 2 (ECLTRG0, 1)	50 MHz squarewave minimum
Signal 3, 4 (TTLTRG0, 1)	10 MHz squarewave minimum

Table 1-3: Backplane interface (Cont.)

Characteristic	Description
Active period	Outputs signals during valid acquisition periods; resets signals to false state between valid acquisitions
Output protection	Short-circuit protected to ground

1 Smpl represents the time from the event to the next valid data sample at the LA probe tip. In the normal internal clock mode, this represents the delta time to the next sample clock.

2 DSO modules time correlation measured at the maximum sample rate on one channel only

3 During this measurement the DSO is measuring the CLK channel of the LA module. If the DSO measures a data channel from the time the data edge occurs until the clock edge occurs, the time must be included

4 The input bandwidth specifications apply only to signals to the modules from the External Signal Input connector, not to round-trip signals into the External Signal Input connector and back out of the External Signal Output connector.

5 The output bandwidth specifications apply only to signals from the modules to the External Signal Output connector, not to round-trip signals into the External Signal Input connector and back out of the External Signal Output connector.

Table 1-4: Latencies

Characteristic	Description
System Trigger and External Signal Input latencies (typical)	
LA source characteristics	
External System Trigger Input to LA probe tip[1]	-266 ns
External Signal In to LA probe tip via Signal 3, 4 (TTLTRG0, 1)[2]	-212 ns + Clk
External Signal In to LA probe tip via Signal 1, 2 (ECLTRG0,1)[2, 3]	-208 ns + Clk
DSO source characteristics[4]	
External System Trigger Input to DSO probe tip[1]	-25 ns
System Trigger and External Signal Output latencies (typical)	
LA source characteristics[5]	
LA probe tip to External System Trigger Out	376 ns + Smpl
LA probe tip to External Signal Out via Signal 3, 4 (TTLTRG0, 1)[6]	
OR function	366 ns + Smpl
AND function	379 ns + Smpl

Table 1-4: Latencies (Cont.)

Characteristic	Description
LA probe tip to External Signal Out to via Signal 1,2 (ECLTRG0,1)[3, 6] Normal function Inverted logic on backplane	 364 ns + Smpl 364 ns + Smpl
DSO source characteristics	
DSO probe tip to External System Trigger Out	68 ns
DSO probe tip to External Signal Out via Signal 3, 4 (TTLTRG0, 1)[6] OR function AND function	 65 ns 75 ns
DSO probe tip to External Signal Out to via Signal 1, 2 (ECLTRG0,1)[3, 6] Normal function Inverted logic on backplane	 68 ns 71 ns
Intermodule latencies for LA source (typical)	
LA source characteristics	
LA to DSO intermodule System Trigger (TTLTRG7)[1, 5] LA: Trigger All Modules DSO: Wait for System Trigger	358 ns + Smpl
LA to LA intermodule System Trigger (TTLTRG7)[1, 5] LA2: Trigger All Modules LA1: Do Nothing	66 ns + Smpl
LA to DSO intermodule ARM (TTLTRG2 ,4, 5, 6)[5]	360 ns + Smpl
LA to LA intermodule ARM (TTLTRG2 ,4, 5, 6)[2, 5]	108 ns + Smpl + Clk
LA to LA intermodule Signal 1, 2 (ECLTRG0, 1)[2, 3, 5] LA2: Trigger, then set Sig2 LA1: If Sig2 is true, trigger	116 ns + Smpl + Clk
LA to LA intermodule Signal 3, 4 (TTLTRG0, 1)[2, 5] LA2: Trigger, then set Sig3 LA1: If Sig3 is true, trigger	116 ns + Smpl + Clk

Table 1-4: Latencies (Cont.)

Characteristic	Description
Intermodule latencies for DSO source (typical)	
DSO source characteristics	
DSO to LA intermodule System Trigger (TTLTRG7)[1] DSO: Trigger All Modules LA: If anything, Do nothing	-240 ns
DSO to DSO intermodule System Trigger (TTLTRG7)[1] DSO1: Trigger All Modules DSO: Wait for System Trigger	50 ns
DSO to LA intermodule ARM (TTLTRG2 ,4, 5, 6)[2]	-192 ns + Clk
DSO to DSO intermodule ARM (TTLTRG2 ,4, 5, 6)	59 ns
DSO to LA intermodule Signal 1, 2 (ECLTRG0, 1)[2, 3] DSO: Trigger and set Sig1 LA: Wait for Sig1, then trigger	-179 ns + Clk
DSO to LA intermodule Signal 3, 4 (TTLTRG0, 1)[2] DSO: Trigger and set Sig3 LA: Wait for Sig3, then trigger	-184 ns + Clk

1 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.

2 Clk represents the time to the next master clock at the destination logic analyzer module. In the normal internal clock mode, this represents the delta time to the next sample clock. In the external clock mode, this represents the time to the next master clock generated by the setup of the clocking state machine and the supplied target system clocks and qualification data.

3 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. The signal source can be used to drive any combination of destinations.

4 All system trigger and signal input latencies are measured from the falling edge transition (active/true low) with signals in the wired-OR configuration.

5 Smpl represents the time from the event to the next valid data sample at the LA probe tip. In the normal internal clock mode, this represents the delta time to the next sample clock. In the MagniVu internal clock mode, this represents 500 ps or less. In the external clock mode, this represents the time to the next master clock generated by the setup of the clocking state machine and the supplied target system clocks and qualification data.

6 All Signal output latencies are validated to the rising edge of an active (true) high output.

Table 1-5: 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 dependent on screen or window type
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 Trackball with two keypad control buttons (SELECT and MENU)
USB port	Front panel (lower left-hand side) dual USB connector
Mouse Port	PS/2 compatible pointing device port
Keyboard Port	PS/2 compatible keyboard port

Table 1-6: Rear panel interface

Characteristic	Description
Parallel interface port	36-pin high-density connector supports Output only, 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
Serial interface port	9-pin male sub-D connector to support RS-232 serial port.
SVGA output Port 1 and Port 2	Two 15-pin sub-D SVGA connectors
PC CardBus32 port	Standard Type I, II, III PC-compatible, PC card slot. Complies with PCMCIA 2.1 and JEIDA 4.1

Table 1-7: 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 to 250 V operation (159-0046-00)	UL198/CSA C22.2 0.25 in × 1.25 in, Fast Blow, 8 A, 250 V
90 V to 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
Steady-state input current	6 A_{RMS} maximum at 90 VAC_{RMS}, 60 Hz or 100 VAC_{RMS}, 400 Hz
Inrush surge current	70 A maximum
Power factor correction	Yes
On/Sleep indicator	Green/yellow front panel LED located next to On/Standby switch provides visual feedback when the On/Off switch is actuated. When the LED is green, the instrument is powered and the processor is not sleeping. When the LED is yellow, the instrument is powered, but the processor is sleeping.
On/Standby switch and indicator	Front panel On/Standby switch. Users can push the switch to power down the instrument without going through the Windows shutdown process; the instrument normally powers down. The power cord provides main power disconnect.

Table 1-8: 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 1-9: Cooling

Characteristic	Description
Cooling system	Forced air circulation system with no removable filters using six fans operating in parallel
Pressurization	Negative pressurization system in all chambers including modules
Slot activation	Installing a module activates the cooling for the corresponding occupied slots by opening the airflow shutter mechanism. Optimizes cooling efficiency by only applying airflow to installed modules.
Air intake	Front sides and bottom
Air exhaust	Back rear
Cooling clearance	2 inches (51 mm) front, sides, top, and rear. Prevent blockage of airflow to bottom of instrument by placing on a solid, noncompressable surface; can be operated on rear feet.
Fan speed and operation	All fans operational at half their rated potential and speed (12 VDC)

Table 1-10: Certifications and compliances

Category	Standards or description	
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 61326	EMC requirements for Class A electrical equipment for measurement, control and laboratory use.[1]
	IEC 61000-4-2	Electrostatic discharge immunity (Performance criterion B)
	IEC 61000-4-3	RF electromagnetic field immunity (Performance criterion A)
	IEC 61000-4-4	Electrical fast transient / burst immunity (Performance criterion B)
	IEC 61000-4-5	Power line surge immunity (Performance criterion B)
	IEC 61000-4-6	Conducted RF immunity (Performance criterion A)
	IEC 61000-4-11	Voltage dips and interruptions immunity (Performance criterion B)
	EN 61000-3-2	AC power line harmonic emissions
Australia / New Zealand Declaration of Conformity - EMC	Complies with EMC provision of Radiocommunications Act per the following standard(s):	
	AS/NZS 2064.1/2	Industrial, Scientific, and Medical Equipment: 1992
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, amended by 93/68/EEC	
	EN 61010-1/A2:1995	Safety requirements for electrical equipment for measurement control and laboratory use.
Canadian Certification	CAN/CSA C22.2 No. 1010.1	Safety requirements for electrical equipment for measurement, control, and laboratory use.
Installation (Overvoltage) Category	Terminals on this product may have different installation (overvoltage) 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.
Pollution Degree	A measure of the contaminates that could occur in the environment around and within a product. Typically the internal environment inside a product is considered to be the same as the external. Products should be used only in the environment for which they are rated.	
	Pollution Degree 2	Normally only dry, nonconductive pollution occurs. Occasionally a temporary conductivity that is caused by condensation must be expected. This location is a typical office/home environment. Temporary condensation occurs only when the product is out of service.

[1] Emissions which exceed the levels required by this standard may occur when this equipment is connected to a test object.

Table 1-10: Certifications and compliances (Cont.)

Category	Standards or description
Safety Certification Compliance	
Equipment Type	Test and measuring
Safety Class	Class 1 (as defined in IEC61010-1, Annex H) - grounded product
Overvoltage Category	Overvoltage Category II (as defined in IEC61010-1, Annex J)
Pollution Degree	Pollution Degree 2 (as defined in IEC61010-1). Note: Rated for indoor use only.

Table 1-11: 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. (3048 m). Derated 1° C/1000 ft. (305 m) above 5000 ft. (1524 m) altitude
Nonoperating	To 40,000 ft. (12,192 m)

Table 1-12: Mechanical

Characteristic	Description
Overall dimensions	(See Figure 1-1 for overall chassis dimensions) Dimensions are without front feet extended, front cover attached, pouch attached, nor power cord attached.
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 7P4 modules and standard accessories (including probes and clips)
Acoustic noise level (typical)	42.7 dBA weighted (operator) 37.0 dBA weighted (bystander)
Construction materials	Chassis parts are constructed of aluminum alloy; front panel and trim peaces are constructed of plastic; circuit boards are constructed of glass.
Finish type	Tektronix blue body and Tektronix silver-gray trim and front with black pouch, FDD feet, handle, and miscellaneous trim pieces

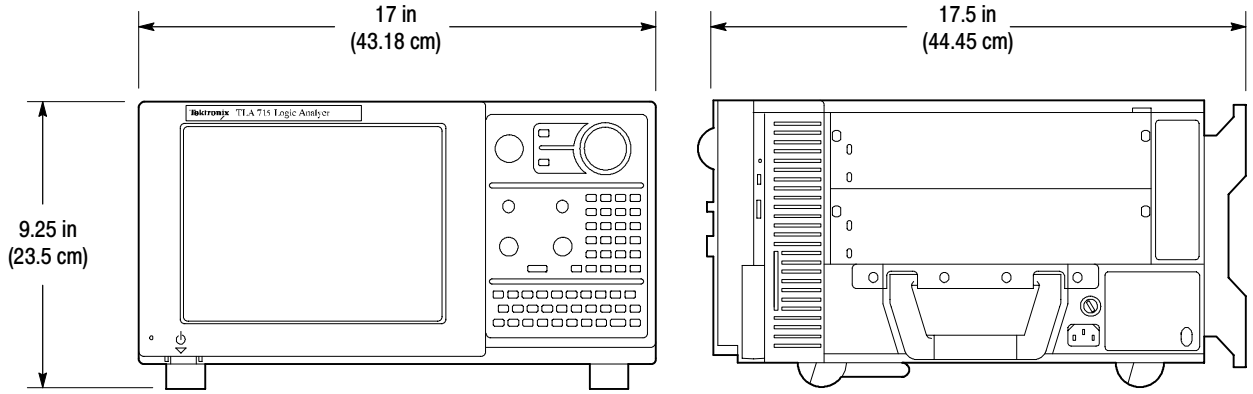


Figure 1-1: Front and side views

Operating Information

This chapter contains high-level information about operating the portable mainframe. It also provides information on the controls and connectors on the instrument.

Installation

Complete installation instructions are available in the *Tektronix Logic Analyzer Family User Manual*; refer to that manual for detailed installation instructions. Install any modules that you may require to operate the instrument before applying power to the mainframe.

Ensure a two-inch (5.1 cm.) clearance at the bottom and sides of the portable mainframe to ensure proper cooling.

Follow these steps to turn on the logic analyzer for the first time:



CAUTION. *Connect the keyboard, mouse, and other accessories before applying power to the mainframe.*

Connecting the accessories after turning on the mainframe can damage the accessories.

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

Table 2-1: TLA700 series line fuses

Line voltage	Rating	Tektronix part number
Portable mainframe		
90 V to 132 V operation	8 A, fast blow, 250 V	159-0046-xx
207 V to 250 V operation	6.3 A, fast blow, 250 V	159-0381-xx

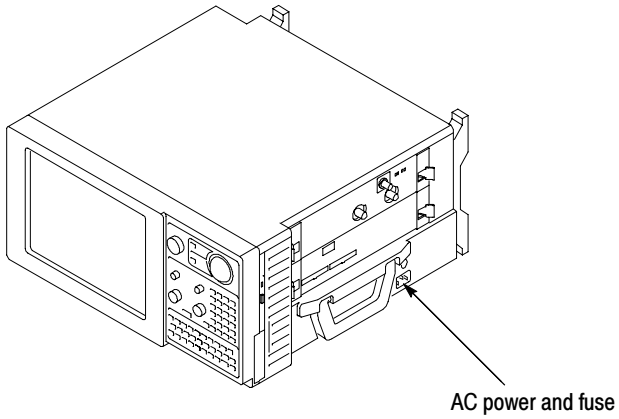


Figure 2-1: Line fuse and power cord connector locations

4. Turn on the mainframe as follows:

   a. Press the On/Standby switch to turn on the mainframe (see Figure 2–2 for the switch location).

   b. Wait for the mainframe to complete power-on self-tests, start Windows, and start the TLA700 application.

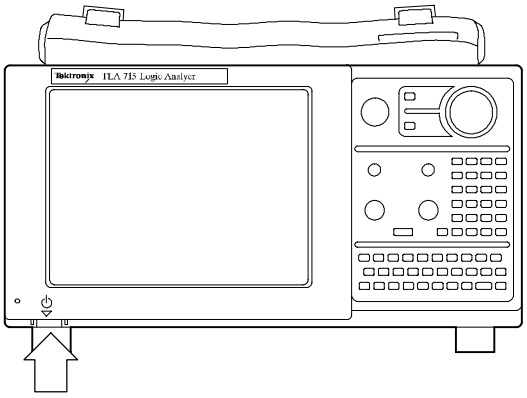


Figure 2-2: On/Standby switch location

Front Panel and Rear Panel Controls and Connections

This section describes the front panel and rear panel controls and connectors on the TLA715 Portable Mainframe. Figure 2–3 shows the front panel. Figure 2–4 on page 2–5 shows the rear panel.

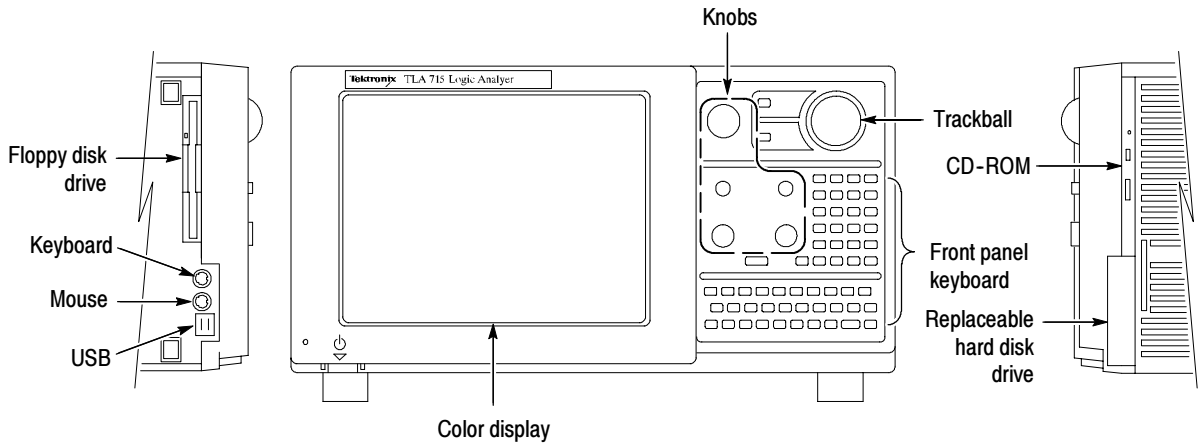


Figure 2-3: TLA715 Portable Mainframe front panel

Color LCD Display

The portable mainframe features a 10.4-inch diagonal, 800 X 600 pixel, flat-panel LCD 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. The front panel knobs include a large multi-function knob and four smaller positioning/scale knobs.

Trackball Pointing Device

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

PC Card Port

There are two PCMCIA card slots that support an industry standard Type I, II, or III PCMCIA PC card. Table 2–2 shows the pin assignments for the port.

Table 2-2: PC CardBus32 port pin assignments

Pin number	Pin assignment	Pin number	Pin assignment	Pin number	Pin assignment
1	GND	24	A5	47	A18
2	D3	25	A4	48	A19
3	D4	26	A3	49	A20
4	D5	27	A2	50	A21
5	D6	28	A1	51	VCC
6	D7	29	A0	52	VPP2
7	CE1*	30	D0	53	A22
8	A10	31	D1	54	A23
9	OE*	32	D2	55	A24
10	A11	33	ISI16*	56	A25
11	A9	34	GND	57	VS2
12	A8	35	GND	58	RESET
13	A13	36	CD1*	59	WAIT*
14	A14	37	D11	60	INPACK*
15	WE*	38	D12	61	REG*
16	IREQ*	39	D13	62	SPKR*
17	VCC	40	D14	63	STSCHG*
18	VPP1	41	D15	64	D8
19	A16	42	CE2*	65	D9
20	A15	43	VS1	66	D10
21	A12	44	IORD*	67	CD2*
22	A7	45	IOWR*	68	GND
23	A6	46	A17		

USB Ports

There are two USB (universal serial bus) ports. The USB ports can be used for any USB complaint device. Table 2–3 shows the pin assignments for the USB port.

Table 2-3: USB pin assignments

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

Mouse Port The 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 (wheel) mouse.

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

Replaceable Hard Disk Drive There is a replaceable hard drive. This service manual lists the size of the hard disk drive available at the time the product was introduced. Consult your Tektronix Sales Representative for the maximum hard disk drive available.

CD ROM Drive The mainframe has one CD ROM drive.

Floppy Disk Drive The mainframe has one standard 1/2 inch drive that supports 3.5 inch, 1.44 MB, high-density/double-sided floppy disk media.

External I/O BNCs The mainframe has four BNC connectors on the rear panel (see Figure 2–4) these connectors are labeled: SYSTEM TRIG IN, SYSTEM TRIG OUT, EXTERNAL SIG IN, EXTERNAL SIG OUT.

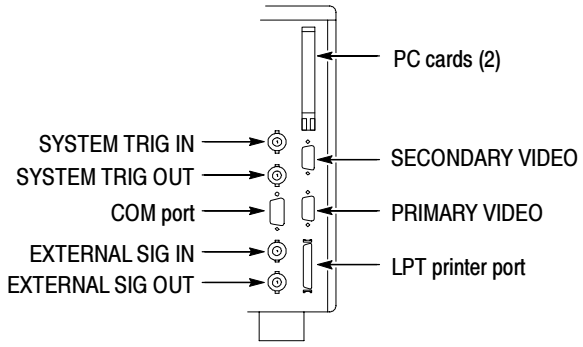


Figure 2-4: Portable mainframe rear panel

SVGA Ports

Two SVGA OUT ports support industry standard SVGA color monitors. One connector is labeled SECONDARY VIDEO and the other is labeled PRIMARY VIDEO. The connectors are 15-pin, sub-D SVGA-compliant connectors. See Table 2–4 for pin assignments.

Table 2-4: SVGA OUT pin assignments

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

COM Port

The COM port is an industry standard RS-232 serial port. Table 2–5 shows the pin assignments.

Table 2-5: Serial port 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 uses a 36-pin high density Centronics-compliant connector. See Table 2–6 for pin assignments.

Table 2-6: 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			

Operating System and Application Interface

The TLA715 Portable Mainframe comes with the Microsoft Windows 2000 Professional operating system factory-installed. Operations and capabilities when running on the mainframe are the same as with Microsoft Windows running on a high-performance personal computer. Windows Help is available from the Start menu of the Windows Task Bar.

The mainframe also comes with the Tektronix Logic Analyzer Family application software configured at the factory to launch after the logic analyzer boots up and the operating system is running. The application software controls data acquisition and processing by the logic analyzer. The application software is included with the product; refer to the *Tektronix Logic Analyzer Family User Manual* if you need to reinstall any software.

Online Help

Most of the user information for operating the portable mainframe is available through online help. Refer to the online help for more information on the individual menus, icons, and fields within each window.

System Window

The System window provides an overview of the entire logic analyzer. Use the System window to navigate through the logic analyzer. The center of the system window displays icons that represent logic analyzer modules, DSO modules, or pattern generator modules. These icons provide links to other windows in the instrument.

Setup Window

A setup window exists for each module in the instrument. It contains the setup information for the module, such as clocking, memory depth, threshold information, and channel information.

Trigger Window

Each trigger window provides access to the trigger setups. DSO and logic analyzers have their own trigger windows. Use the trigger window to determine when you want the logic analyzer or DSO to acquire data and how much data to acquire.

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 represents a different time that data was acquired: newer samples display below older samples.

Waveform Window

The waveform window displays acquired data as graphical waveforms. All defined channels display as Busforms for the logic analyzer and as individual data channels for the DSO.

Other Windows

Other windows may exist on the logic analyzer depending on the installed setup. For more information on the logic analyzer application, refer to the *Tektronix Logic Analyzer Family User Manual*.

Theory of Operation

This chapter provides a brief overview of the theory of operation for the TLA715 Portable Mainframe. Figure 3–1 shows a functional block diagram of the major components.

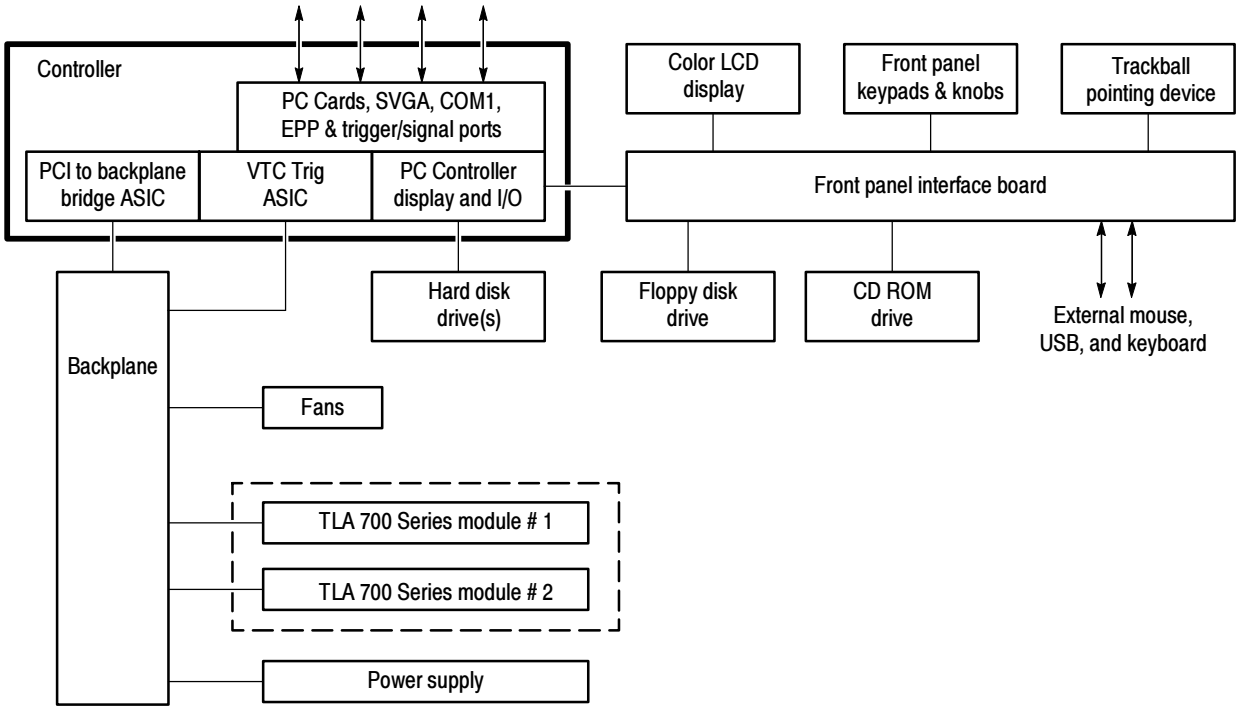


Figure 3-1: TLA715 Portable Mainframe block diagram

Block Level Description

The following paragraphs provide a high-level overview of the major components of the TLA715 Portable Mainframe. Refer to Figure 3–1 while reading the following paragraphs.

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 the front panel. The controller board mounts vertically on the left side of the instrument and connects to the back of the backplane. The controller provides signals to the rear panel and front panel interface.

The controller uses a standard Intel Pentium III microprocessor using the 815E chip-set. The controller has a 733 MHz Pentium III processor with up to 512 MB of SDRAM, 16 KB of Li instruction cache, 16 KB of LI data cache, 256 KB of L2 cache, and 8 MB of flashed-based BIOS.

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

A Silicon Motion Lynx3DM SVGA/XGA display controller with up to 4 MB of internal DRAM supports the flat panel LCD display and an external SVGA port. The 815E chip-set provides and additional SVGA/XGA output port.

The backplane interface appears as a standard PCI device to the PC-based controller. The PCI-to-Backplane interface is managed by a Tektronix-designed ADG343 CMOS ASIC which includes support for DMA transfers with FIFO, IRQ management, programmable byte swapping, backplane address space management and windowing (A16, A24, and A32 space), backplane arbitration, and MODID control lines.

The backplane trigger lines are managed by the Tektronix-designed Backplane Trigger Crossbar (VTC) ASIC. The VTC ASIC cross-connects any of the ten trigger lines (ECL and TTL) to any of the four BNC ports on the rear I/O panel of the mainframe. The four BNC ports accommodate two inputs (System Trigger In and External Signal In) and two outputs (System Trigger Out and External Signal Out). The VTC ASIC also supports several standard trigger protocols (including START/STOP protocol), which support a synchronous start of all modules to System Time Zero (STZ), and several custom features including time interpolation to support the VTC ASIC in individual module applications.

Backplane

The backplane supports up to four single-wide slots, where most modules require two slots. The backplane connects the power supply to the rest of the instrument. It also distributes the 10 MHz system clock and supports all communication to, from, and between the modules, including real time intermodule communications.

Front Panel Interface

The front panel interface assembly interacts with the system controller, LCD flat panel display, floppy disk drive, front panel keypad and trackball, USB ports, mouse, and keyboard. Dual 50-pin cables connect the front panel interface board to the internal slot-0 controller. The interface also supplies a speaker for the PC.

LCD Display

The internal display is a 10.4-inch diagonal Active Matrix Thin-Film-Transistor (TFT) liquid crystal display with a built-in back light similar to those found in many notebook PCs. The color-cathode fluorescent back light can be dimmed to 60% of its value via a custom Tektronix screen saver or mainframe utilities applet to extend its life and to prevent burning of the TFT LCD screen. The LCD has an external DC switching regulator board to provide the back light high voltage and a display adapter board which supports interfacing from the front panel interface board to the LCD display.

Front Panel Controls

The front panel key pad consists of a Hex keypad and a partial QWERTY keypad. The front panel keypads are active simultaneously with an optional external keyboard through an MC68HC705B16 front panel processor. The front panel processor combines the two devices to generate and receive standard keyboard scan codes from the system controller.

The front panel knobs include the following controls:

- Detented horizontal size control
- Detented vertical size control
- Nondetented horizontal position control
- Nondetented vertical position control
- A nondetented multifunctional knob

A second MC68HC705B16 control panel processor and a custom WIN32 knob API (DLL and VxD drivers) control the front panel knobs.

The trackball pointing device is a standard, off-the-shelf OEM PC pointing device mechanically integrated into the mainframe. The trackball is simultaneously active with an external mouse through the USB. The external mouse connects directly to the controller through a PS2 interface.

Hard Disk Drives

The hard disk drives (HDD) are standard 2.5-inch IDE drives which interface directly to the system controller through an Enhanced Integrated Device Electronics (IDE) extension of the PCI bus. The main HDD is easily removable from the mainframe without removing any covers. The HDD is available in two configurations: minimum and maximum (the sizes depend on the availability of the hard disk drives).

The mainframe is electrically capable of accepting dual master-slave IDE HDD configurations for a total of four drives (or other HDD devices) but is mechanically limited to mounting two drives. The CD-ROM uses the A slot on the secondary IDE interface which reduces the number of HDD devices to three.

Floppy Disk Drive The floppy disk drive is a standard 0.5-inch drive supporting a 3.5-inch, 1.44 MB high-density, double sided floppy disks

CD-ROM Drive The CD-ROM is a standard 24x CD-ROM drive.

Mouse and Keyboard Ports The mouse and keyboard ports are standard PS2 compliant ports. They interface through the front panel processor to the system controller.

USB Ports A dual USB port is available to connect USB devices to the mainframe.

Mechanical Chassis The mechanical chassis provides the mechanical support structure for the mainframe and includes the cooling system, modular-card cage, and EMI shielding system.

Performance Verification Procedures

This chapter contains procedures for functional verification, certification, and performance verification procedures for the TLA715 Portable Mainframe. Generally, you should perform these procedures once per year or following repairs that affect certification.

Summary Verification

Functional verification procedures verify the basic functionality of the instrument inputs, outputs, and basic instrument actions. These procedures include power-on diagnostics, extended diagnostics, and manual check procedures. These procedures can be used for incoming inspection purposes.

Certification procedures certify the accuracy of an instrument and provide a traceability path to national standards. Certification data is recorded on calibration data reports provided with this manual. The calibration data reports are intended to be copied and used for calibration/certification procedures.

After completing the performance verification procedures or the certification procedures, you can fill out a calibration data report to keep on file with your instrument.

Performance verification procedures confirm that a product meets or exceeds the performance requirements for the published specifications documented in the *Specifications* chapter of this manual. Refer to Figure 4–1 on page 4–2 for a graphic overview of the procedures.

Test Equipment

These procedures use external, traceable signal sources to directly test characteristics that are designated as checked (✓) in the *Specifications* chapter of this manual. Table 4–1 on page 4–3 shows the required equipment list. Always warm up the equipment for 30 minutes before beginning the procedures.

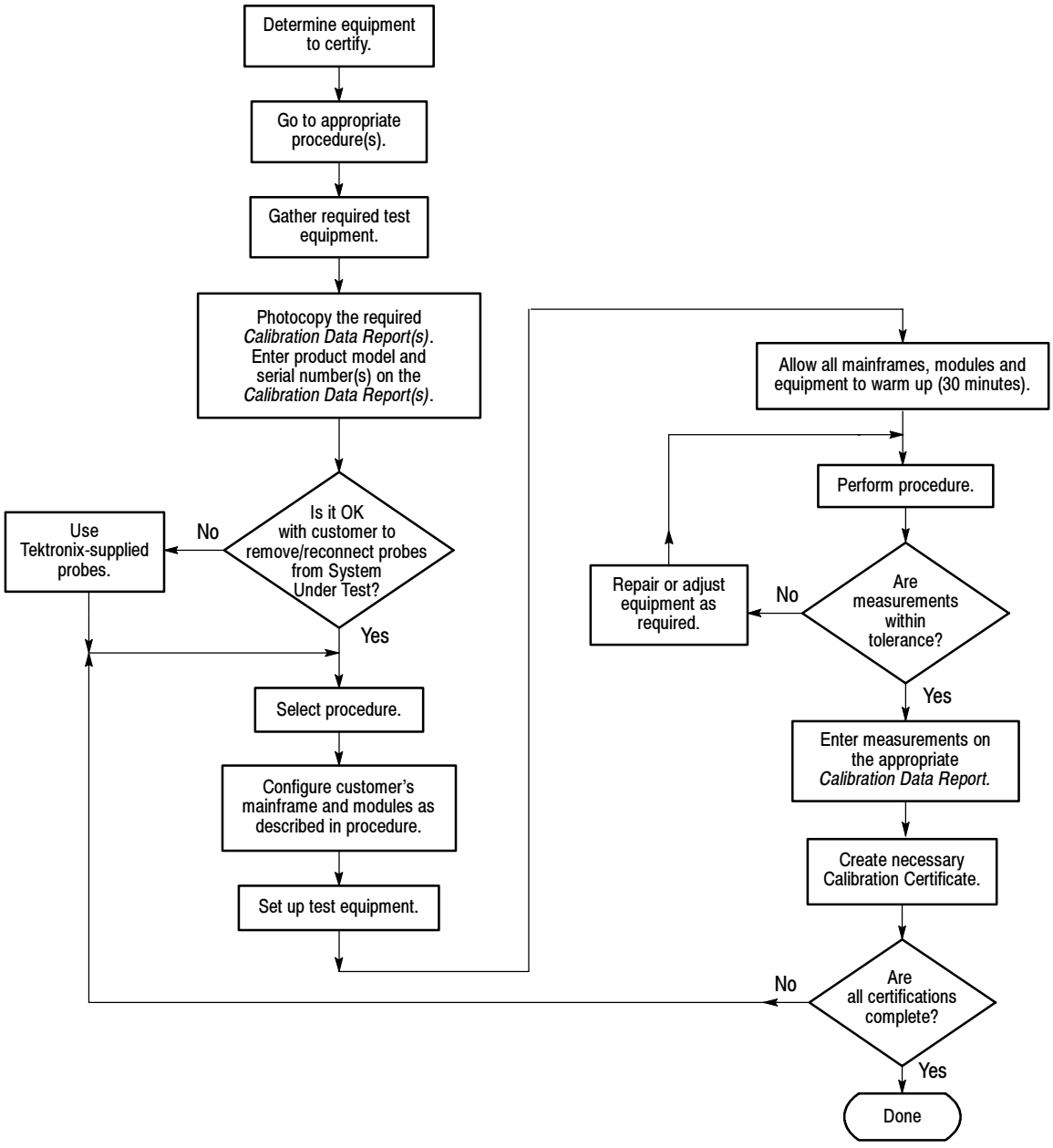


Figure 4- 1: Calibration/certification procedure flow chart

Table 4-1: Test equipment

Item number and description	Minimum requirements	Example
1. Mainframe	TLA715 Portable mainframe with a LA, DSO, or Patgen module installed	
2. Frequency counter	Frequency accuracy: <0.0025% Frequency range: 1 kHz to 100 MHz	Hewlett Packard 5314A
3. Miniature probe-to-square pin adapters	Two required	Tektronix part number 103-0177-XX
4. 0.025-inch square pin	3/4-inch length, (two required)	Tektronix part number 131-1426-XX
5. Digital multimeter with test leads	VDC accuracy: 0.1% from -10 V to +100 V	Tektronix DMM 900 Series
6. Cable, precision 50 Ω coaxial	50 Ω, 36 in, male-to-male BNC connectors	Tektronix part number 012-0482-XX

Functional Verification

Table 4–2 lists the functional verification procedures that are available for the portable mainframe.

Table 4-2: Functional verification procedures

Instrument	Procedure
Portable mainframe	Power-on and fan operation
Portable mainframe	Extended diagnostics
Portable mainframe	TLA Mainframe diagnostics
Portable mainframe	CheckIt Utilities diagnostics

***NOTE**. Running the extended diagnostics will invalidate any acquired data. If you want to save any of the acquired data, do so before running the extended diagnostics.*

You will need a portable mainframe with an LA or DSO module installed.

Equipment required	Cable, 50 Ω coaxial (item 6)
Prerequisites	Warm-up time: 30 minutes

Perform the following tests to complete the functional verification procedure.

Fan Operation

Power on the instrument and inspect the rear of the instrument to verify that all six cooling fans are rotating.

Extended Diagnostics

Do the following steps to run the extended diagnostics:

1. If you have not already done so, power on the instrument and wait for the logic analyzer application to start.
2. Go to the System menu and select Calibration and Diagnostics.
3. Verify that all power-on diagnostics pass.
4. Click the Extended Diagnostics tab.
5. Select All Modules, All Tests and then click the Run button on the property sheet.

   All tests that displayed an "Unknown" status will change to a Pass or Fail status depending on the outcome of the tests.
6. Scroll through the tests and verify that all tests pass.

TLA Mainframe Diagnostics

The TLA Mainframe Diagnostics are a comprehensive software test that checks the functionality of the portable mainframe. To run the TLA Mainframe Diagnostics, do the following steps:

1. Quit all other applications.
2. Click the Windows Start button.
3. Select Programs → Tektronix Logic Analyzer → TLA Mainframe Diagnostics.
4. Run the mainframe diagnostics by clicking the Run button or the Single-Step button in the tool bar.

CheckIt Utilities

CheckIt Utilities is a comprehensive software application used to check and verify the operation of the PC hardware in the portable mainframe. To run the software, you must have either a keyboard, mouse, or other pointing device.

***NOTE**. To check the floppy disk drive or the CD-ROM drive, you must have a test floppy disk or CD installed before starting the CheckIt Utilities.*

To run CheckIt Utilities, follow these instructions:

1. Quit the logic analyzer application.
2. Click the Windows Start button.
3. Select Programs → CheckIt Utilities.
4. Run the tests. If necessary, refer to the CheckIt Utilities online help for information on running the software and the individual tests.

Portable Mainframe Certification

The system clock is checked for accuracy. The instrument is certifiable if this parameter meets specifications. Do the performance verification procedures and record the values on a copy of the calibration data report located at the end of this chapter.

Performance Verification Procedures

Table 4–3 lists the performance verification procedures available for the portable mainframe.

Table 4-3: Performance verification procedures

Parameter	Procedure
Power supply voltages	Voltage level check
System clock (CLK10)[1]	Signal output check

[1] **Certifiable parameter**

Use the following steps to complete the performance verification procedure. You will need some of the equipment shown in Table 4–1 on page 4–3 to complete the performance verification procedures. If you substitute equipment, always choose instruments that meet or exceed the minimum requirements specified.

Checking Power Supply Voltages

Do the following to verify power supply performance:

Equipment required	DMM with test leads (item 5) Two miniature probe-to-square pin adapters (item 3) 0.025-inch square pin (item 4) Frequency counter (item 2) Precision BNC cable (item 6)
Prerequisites	Warm-up time: 30 minutes for the portable mainframe and test equipment Power-on, mainframe, and QA+WIN32 diagnostics pass

1. Power off the portable mainframe and remove any modules installed in it.
2. Power on the portable mainframe and connect the reference lead of a digital voltmeter to chassis ground, such as the top of the power supply.
3. Attach a 0.025-inch square pin to the probe tip of the other lead and insert it into one of the pins on the backplane connectors listed in Table 4–4.



CAUTION. *Use of a square pin of other dimensions will damage the backplane connectors.*

The pins that should be carrying voltages are listed in Table 4–4. The arrangement of J1 and J2 connectors on the backplane is shown in Figure 4–2. Measure the power supply voltages with the voltmeter and compare each reading to the values listed in the tables. If the voltages are within the ranges listed in the table, the power supply is operating properly.

Table 4-4: Power supply voltages and backplane connector pins

J1 pin	Voltage (range)	J2 pin	Voltage (range)
Row A		Row A	
31	-12 V (-12.60 V to -11.64 V)	2	-2 V (-2.10 V to -1.90 V)
		25	+5 V (4.875 V to 5.250 V)
Row C		Row C	
31	+12 V (11.64 V to 12.60 V)	4	-5.2 V (-5.460 V to -5.044 V)
		31	+24 V (23.28 V to 25.20 V)
		32	-24 V (-25.20 V to -23.28 V)

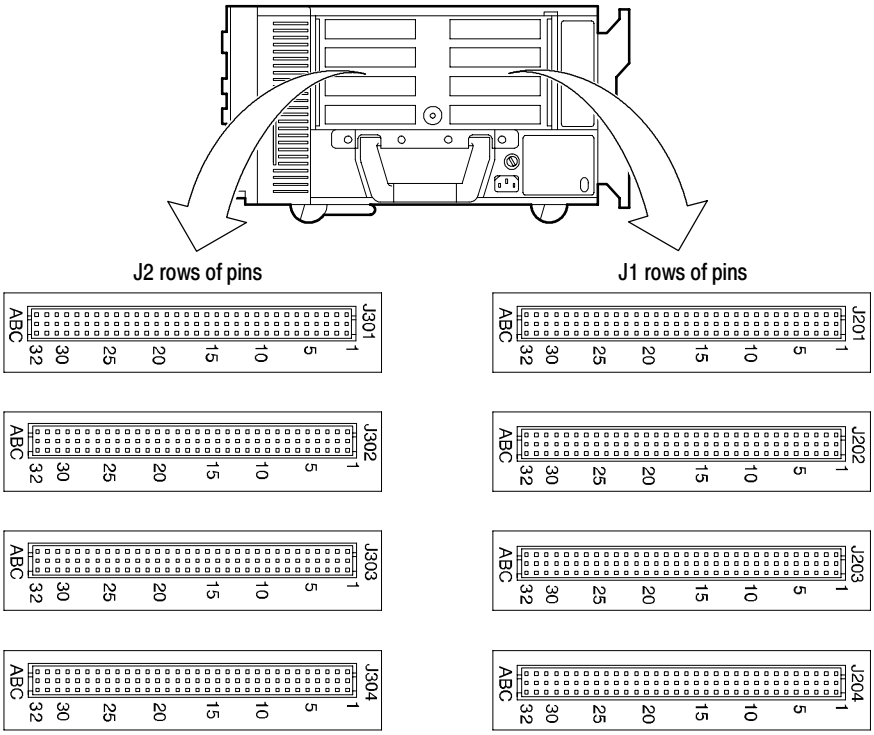


Figure 4-2: Location of J1 and J2 pins in the portable mainframe

Checking the 10 MHz System Clock (CLK10)

Do the following to check the accuracy of the system clock.

1. Connect the frequency counter to the External Signal Out TTL BNC connector on the rear of the portable mainframe.
2. Verify that the logic analyzer application is running.
3. Go to the System window and select System Configuration from the System menu.
4. In the System Configuration dialog box, select 10 MHz Clock from the list of routable signals in the External Signal Out selection box and click OK.
5. Verify that the output frequency at the External Signal Out TTL connector is 10 MHz ±1 kHz. Record the measurement on a copy of the calibration data report.
6. In the system configuration dialog box, reset the External Signal Out signal to None.
7. Disconnect the frequency counter and power off the portable mainframe.
8. Reinstall any modules that were removed at the beginning of the performance verification procedure.

Calibration Data Report

TLA715 Portable Mainframe

Instrument model number: _____

Serial number: _____ Certificate number: _____

Verification performed by: _____ Verification date: _____

System Clock Test Data

Characteristic	Specification	Tolerance	Procedure reference	Incoming data	Outgoing data
Clock frequency	10 MHz	±1 kHz (9.9990 MHz-10.0010 MHz)	Page 4-7, Step 5		

Tektronix

Adjustment Procedures

There are no adjustments for the Portable Mainframe. For adjustment procedures on the individual modules, refer to the appropriate module service manual.

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 instrument, adhere to the following precautions to avoid damaging internal circuit boards and their components due to electrostatic discharge (ESD).



CAUTION. *Many components within the 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. Do not allow anything capable of generating or holding a static charge 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 instrument is inspected mechanically and electrically before shipment. It should be free of marks or scratches and should meet or exceed all electrical specifications. To confirm this, inspect the chassis for physical damage incurred during transit. Retain the 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 TLA700 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 LCD 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 section contains procedures for removal and installation of all mechanical and electrical field-replaceable parts. You may also want to refer to the exploded view illustrations in the *Mechanical Parts List* chapter at the end of this document to get an overall view how all the instrument parts fit together.



WARNING. *Before performing this or any other procedure in this manual, read the safety summaries found at the beginning of this manual.*

To prevent possible injury to service personnel or damage to the portable mainframe, read Installation on page 2–1*, and* Preventing ESD *on page 6–1 in this section.*



WARNING. *Dangerous voltages may be present when instrument covers are removed. Before performing any procedure in this section, disconnect the power cord from the line voltage source. Failure to do so could cause serious injury or death.*

Read all 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. Refer to the *Mechanical Parts List* at the end of this document for descriptions and part numbers of all replaceable parts in the instrument.

Equipment Required

Most parts in this mainframe can be removed with a screwdriver with a T-15 Torx tip. Table 6–1 lists additional tools that may be required to service the instrument to the module level.

Table 6-1: Equipment required to service the portable mainframe

Item number	Item	Description
1	Flat blade screwdriver	Small flat blade screwdriver
2	Cutters	Diagonal cutters (for removing cable ties)
3	Spudger tool	Used for removing the trim ring
4	Torque screwdriver handle	Accepts Torx driver bits
5	T-15 Torx tip	Torx drive bit for T-15 size screws
6	T-10 Torx tip	Torx drive bit for T-10 size screws
7	Phillips screwdriver	Phillips #1 screwdriver and 6-inch long shaft
8	Needle nose plier	
9	Soldering iron, solder, solder wick	For replacing soldered components
10	Cable ties	4-inch tie-down straps (Tektronix part number 343-0549-00)
11	Scribe	Scribe or jeweler's screwdriver

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

Removing the Replaceable Hard Disk Drive

Complete the following steps to remove the replaceable hard disk drive from the mainframe. You should always remove the hard disk drive before accessing any of the replaceable components in the instrument.



CAUTION. *Do not remove the replaceable hard disk drive while the instrument is powered on. You can permanently damage the replaceable hard disk drive if you remove it while the instrument is powered on. Always power down the mainframe before removing the replaceable hard disk drive.*

1. Power down the instrument.
2. Press the latch on the side of the instrument as shown in Figure 6–1 to unlatch the hard disk drive.
3. Remove the hard disk drive from the instrument by pulling on the handle.

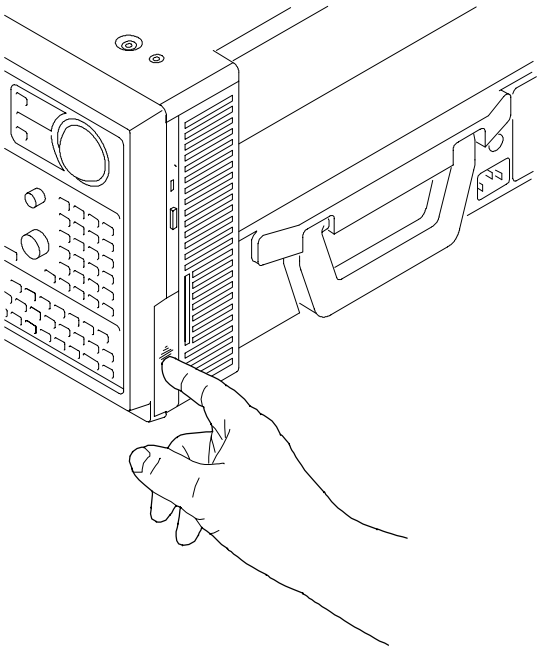


Figure 6-1: Removing the replaceable hard disk drive

4. To replace the hard disk in the cartridge, remove the four screws that fasten the hard disk drive to the cartridge shown in Figure 6–2.
5. Carefully remove the hard disk drive from the cartridge, and remove the cable assembly from the connector on the hard disk drive.

6. When you reinstall the four screws, start the screws by hand and then tighten them to 4 in-lbs.

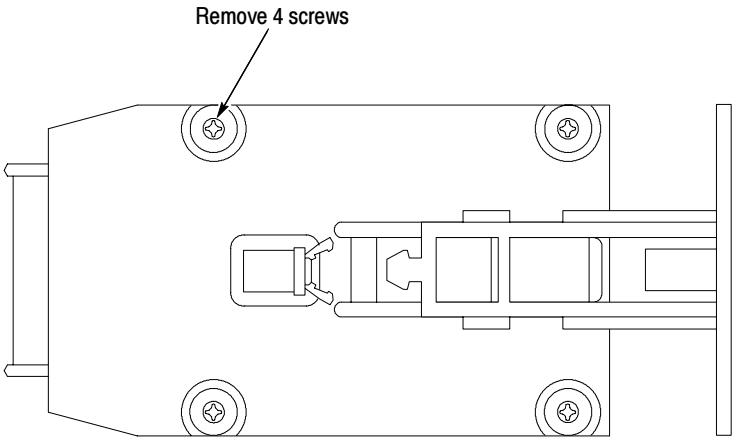


Figure 6-2: Removing the hard disk drive from the cartridge

***NOTE**. The remaining procedures in this section assume that the removable hard disk drive is not installed in the controller.*

Accessories Pouch

The accessories pouch is held in place on the top cover by snaps. Gently lift up on each corner of the pouch until the pouch snaps free from the top cover. To reinstall the pouch, align the pouch over each snap and push down on the corners of the cover (it may be easier to open the pouch and press down on the corners from inside the pouch).

***NOTE**. The remaining procedures assume that you have removed the accessories pouch.*

Trim Ring

You will need a spudger tool to remove the trim ring.

Removal

Use the following procedure to remove the trim ring:

1. Set the mainframe with the cord-wrap feet on the work surface and the bottom facing you.
2. Use the spudger tool to detach the three plastic snaps from the bottom cover (see Figure 6–3). Then, swing the bottom of the ring upward and work the rest of the ring off the front panel.

Installation

To replace the trim ring on the front panel. Place 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 around each edge until it is completely seated.

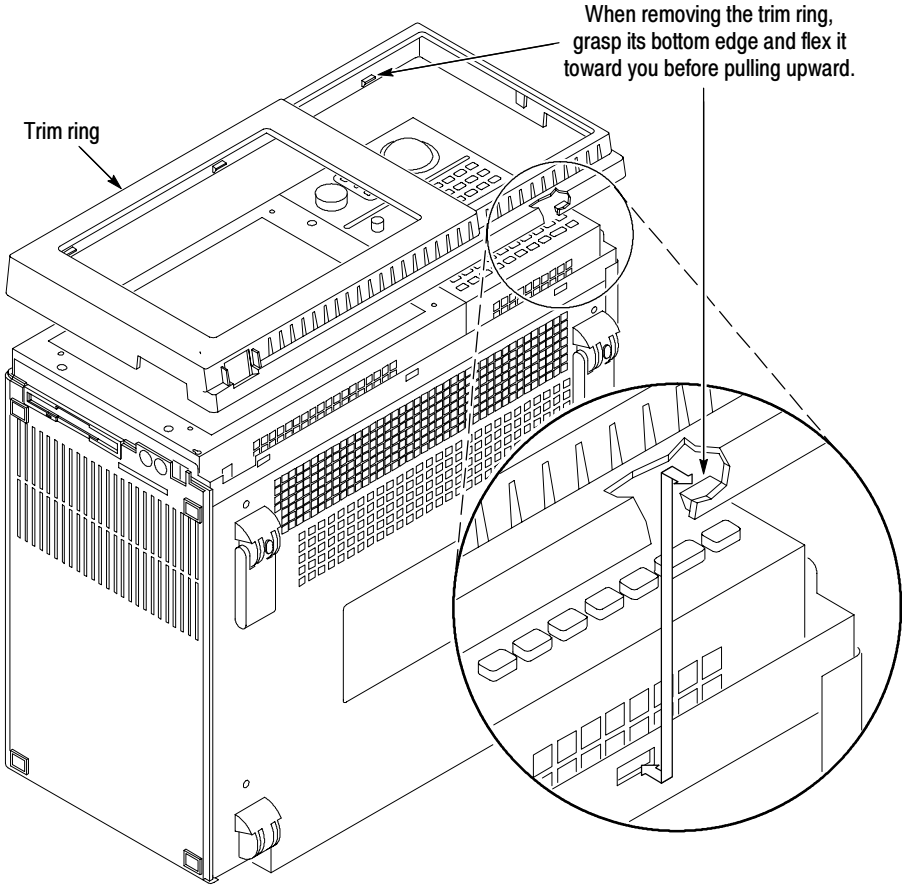


Figure 6-3: Trim ring removal

Flat Panel Display Assembly

You will need a screwdriver with a size T-15 Torx tip to perform this procedure.

Removal

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

1. Remove the trim ring using the procedure on page 6–9.
2. Remove 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, one screw on the left side, and two screws on the top. (See Figure 6–4).
3. Lift the bottom edge of the flat panel display assembly and rotate it upward and off the front face of the instrument.
4. Detach the ribbon cable connecting the flat panel display assembly to the front panel interface board.
5. Detach the five-pin display backlight power connector and then set the assembly aside.

***NOTE**. When removing the flat pane display assembly, make sure that you do not lose the clear plastic light pipe that is located inside the bottom left corner of the assembly.*

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. Reattach the display backlight power cable.
3. 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).
4. Reinstall the trim ring.

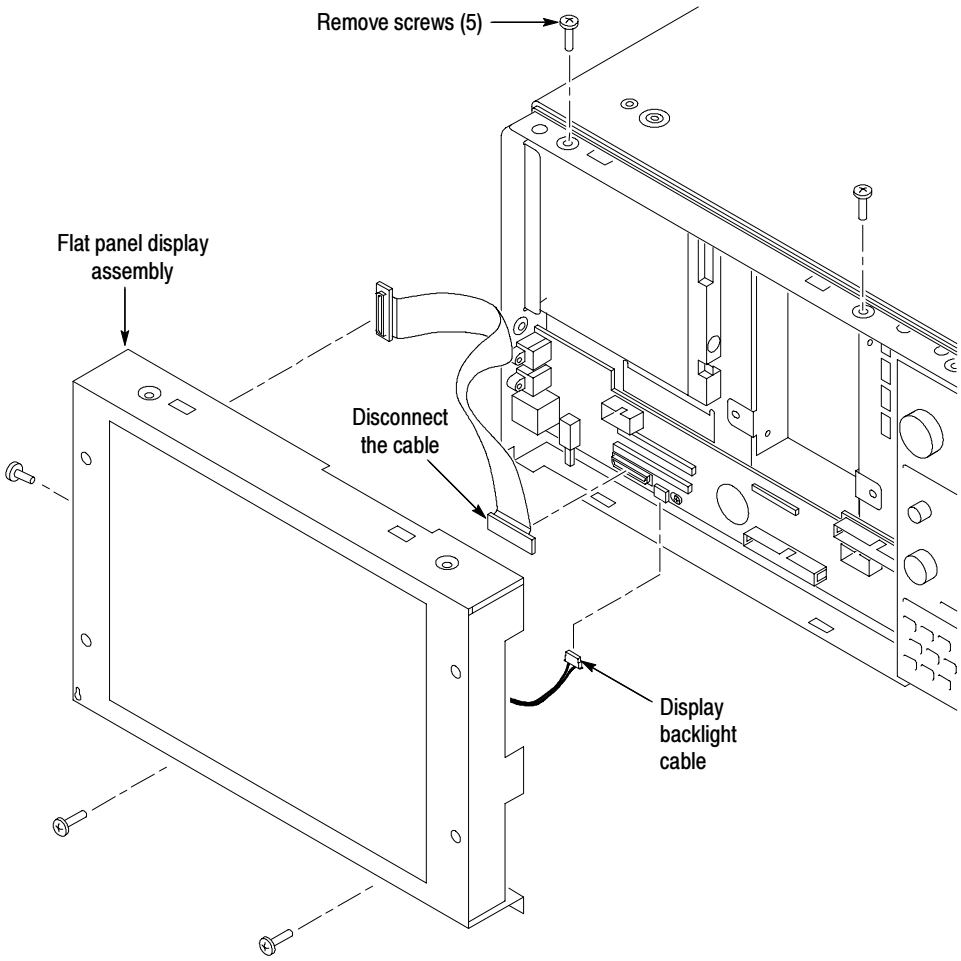


Figure 6-4: Flat panel display assembly removal

Floppy Disk Drive

You will need a torque screwdriver with a size T-15 Torx tip and a Phillips #0 tip to perform this procedure.

Removal

Use the following procedure to remove the floppy disk drive:

1. Remove the trim ring.
2. Do the *Flat Panel Display Assembly* removal procedure.
3. Detach the data cable from J103 on the front panel interface board; there is a locking latch on both the floppy disk drive and on the interface board connectors.
4. Remove the two screws securing the floppy disk drive assembly to the chassis.
5. Remove the floppy disk drive assembly.
6. Remove the data cable from the floppy disk drive assembly.
7. Use a small Phillips screwdriver to remove the two screws holding the floppy disk drive to the bracket.
8. Remove the floppy disk drive from the bracket.

Installation

To install the floppy disk drive, complete the removal procedures in reverse order. When you reinstall the Phillips screws, tighten them to 4 in-lbs.

NOTE*. When you reinstall the data cable on the floppy disk drive assembly and on the interface board, lift up the locking latch before you insert the cable in the connector. When the cable is in place, apply pressure to the cable and push the locking latch closed.*

Fixed Hard Disk Drive

A fixed hard disk drive is available through the TLA7UP mainframe upgrade kit; the fixed hard disk drive is not normally installed in the mainframe unless the instrument has been upgraded through the TLA7UP kit. Use the following procedures to replace the hard disk drive. The fixed hard disk drive is mounted to the chassis behind the display assembly (see Figure 6–5).

Prior to performing these procedures, back up any files that you want saved to another computer, file server, removeable hard disk drive, or other media.

You will need a screwdriver with a size T-15 Torx tip to perform this procedure.

Removal

Use the following procedure to remove the fixed hard disk drive:

1. Remove the trim ring using the procedure on page 6–9.
2. Do the *Flat Panel Display Assembly* removal procedure on page 6–10.
3. Disconnect the data cable to the fixed hard disk drive.
4. Remove the four screws that hold the fixed hard disk drive bracket to the chassis as in Figure 6–5.
5. Remove the screws holding the hard disk drive to the bracket.

Installation

Use the following procedure to install the fixed hard disk drive.

1. Remove the slave jumper from the old fixed hard disk drive and place it in the correct (or similar) position on the new fixed hard disk drive.
2. Position the fixed hard disk drive and attach it to the bracket with the two screws as shown in figure 6–5.
3. Position the fixed hard disk drive bracket in the chassis and install the four screws that hold the bracket in place.
4. Connect the data cable to the fixed hard disk drive.
5. Reinstall the flat panel display assembly.
6. Reinstall the trim ring.
7. Verify proper operation by running the Power-on diagnostics and the CheckIt Utilities on the memory, and disk drive verification.

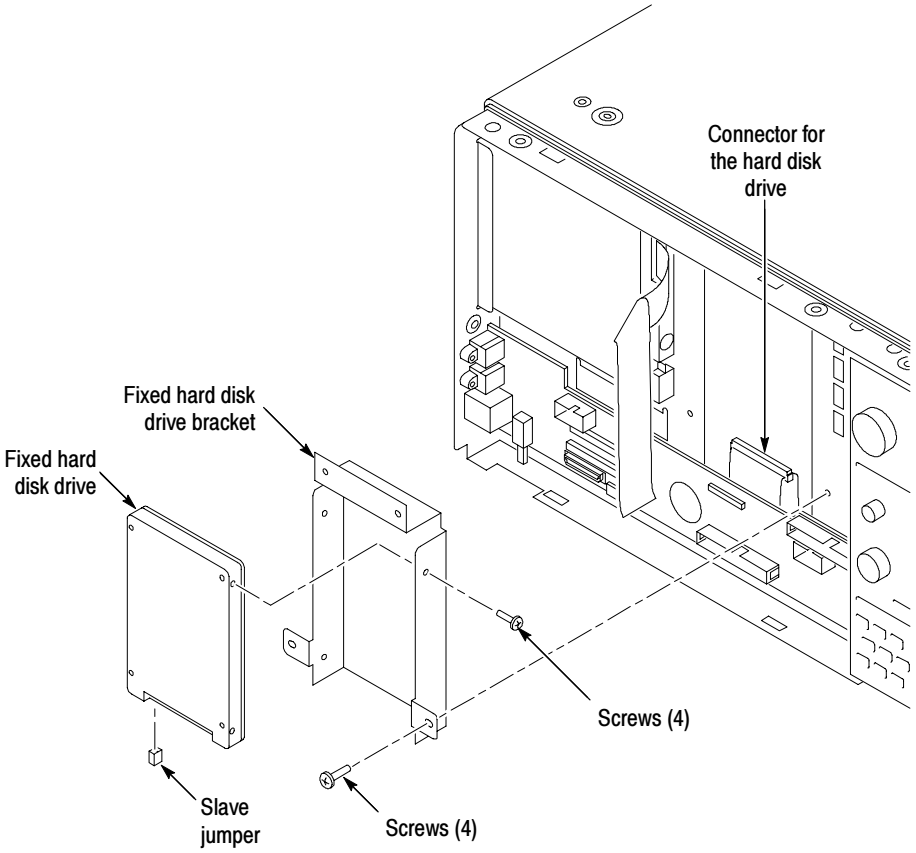


Figure 6- 5: Installing the fixed hard disk drive

Front Panel Interface Board

You will need a screwdriver with a T-15 Torx head and a small Phillips screwdriver to perform this procedure. You may have to remove the left side cover to access the two Phillips screws on the front left side of the instrument.

Removal

The front panel interface board is located under the front panel display. Use the following procedure to remove the interface board:

1. Remove the trim ring.
2. Remove the four screws holding the top cover on the instrument and then set the top cover aside.
3. Remove the left side cover from the instrument by sliding it away from the bottom cover; set the left side cover aside (you may also need to loosen the screws on the bottom cover before you can remove the left side cover).
4. Do the *Flat Panel Display Assembly* removal procedure on page 6–10.
5. Detach the ribbon cables at J100, J101, J102, and J103.
6. Remove the one screw securing the interface board.
7. Use a small Phillips screwdriver to remove the two screws on the side panel.
8. Grasp the board and slide the board to the right (toward the front panel control assembly) and lift the board out.

Installation

To install the front panel interface board complete the removal procedures in reverse order.

Front Panel Control Assembly

You will need a screwdriver with a size T-15 Torx tip to perform this procedure.

Removal

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

1. Remove the trim ring.
2. Do the *Flat Panel Display Assembly* removal procedure, page 6–10.
3. Disconnect the cable at J102 on the front panel interface board.
4. Remove the four 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. (See Figure 6–6 on page 6–16).

5. Lift the bottom edge of the front control panel assembly and rotate it up and off the front face of the mainframe.

6. Detach the ribbon cable connecting the CD-ROM to the interface board.

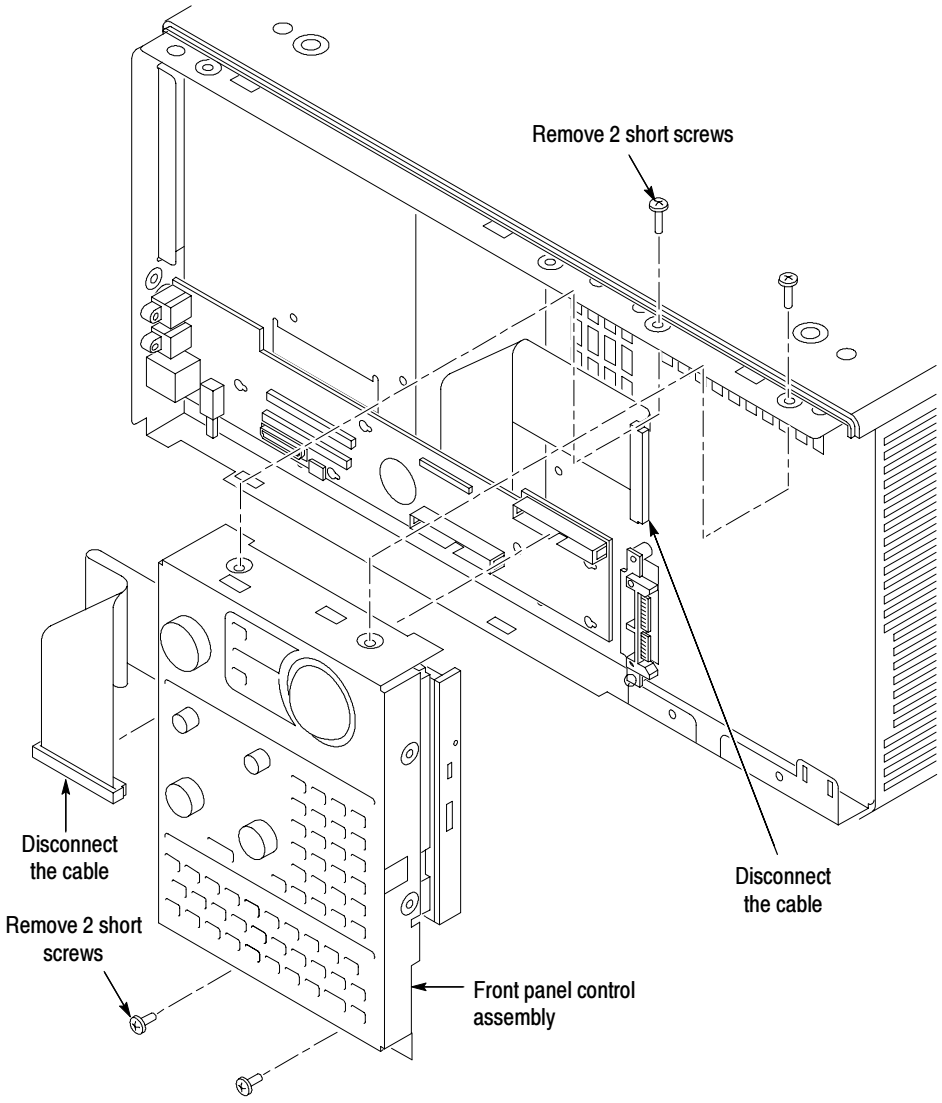


Figure 6- 6: Front-panel control assembly removal

Installation

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

1. Reattach the cable connecting the CD-ROM to the interface board.
2. Reattach the cable from the front panel control assembly to J102 on the interface board.
3. 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.
4. Insert the four short screws that attach the front panel control assembly to the mainframe (See Figure 6–6 on page 6–16).

***NOTE**. Make sure that you only use the short screws on the front panel control assembly. You will be unable to install the removable hard disk if you use longer screws.*

---

5. Reinstall the Front Panel Display assembly.
6. Install the trim ring.

CD-ROM Drive

The CD-ROM drive is attached to the underside of the front panel control assembly. You will need a screwdriver with a size T-15 Torx tip and a small Phillips screw driver.

Removal

Use the following procedure to remove the CD-ROM drive:

1. Remove the trim ring.
2. Do the *Front Panel Display Assembly* removal procedure on page 6–10.
3. Do the *Front Panel Control Assembly* removal on page 6–15.
4. Remove the four screws that attach the CD-ROM drive to the front panel control assembly.
5. Remove the small Phillips screws that hold the CD-ROM drive to the bracket and then slide the CD-ROM drive out of the bracket.
6. Disconnect the CD-ROM interface board from the CD-ROM drive.

Installation

To reinstall the CD-ROM drive, install the CD-ROM interface board, position the CD-ROM drive within the bracket, and then complete the removal procedures in reverse order.

Trackball Assembly

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

You will need a screwdriver with a size T-15 Torx tip to perform this procedure.

Removal

Use the following procedure to remove the trackball assembly:

1. Do the *Front Panel Control Assembly* removal procedure on page 6–15.
2. Remove the CD-ROM drive assembly from the front panel control assembly.
3. Refer to Figure 6–7 and detach the trackball cable at the two connectors on the trackball assembly.
4. Remove the four screws holding the trackball assembly to the front panel control assembly.

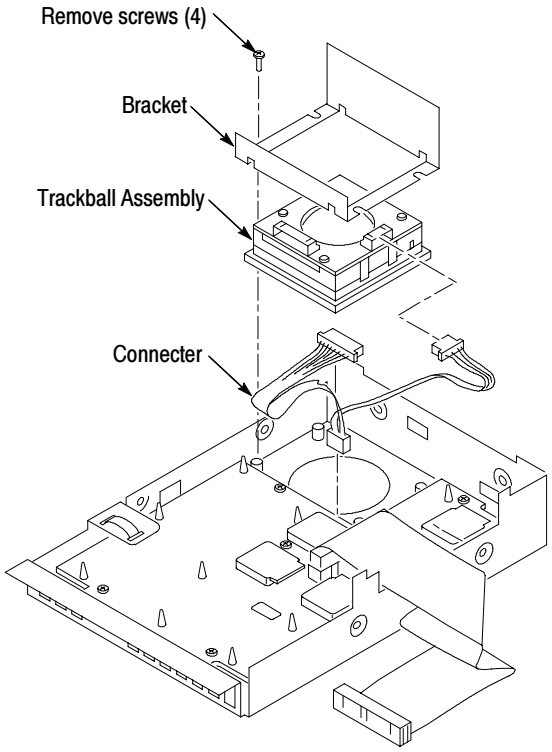


Figure 6- 7: Front panel control assembly parts locations

Installation

To install the trackball assembly, position the trackball assembly as shown in Figure 6–7 and then complete the removal procedure in reverse order.

Front Panel Control Board

You will need a screwdriver with a size T-15 Torx tip and a flat-bladed screwdriver or other small prying tool to perform this procedure.

Removal

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

1. Do the *Front Panel Control Assembly* removal procedure (page 6–15).
2. Position the assembly face-down on a clean working surface and remove the CD-ROM drive assembly and set it aside.
3. Turn the assembly over and then remove the knobs from the front of the front panel control assembly by grasping them and pulling them up and away from the assembly.
4. Detach the trackball cable at the connector on front panel control board.
5. Remove the six screws that attach the front panel control board to the front panel control assembly as shown in Figure 6–8.
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.

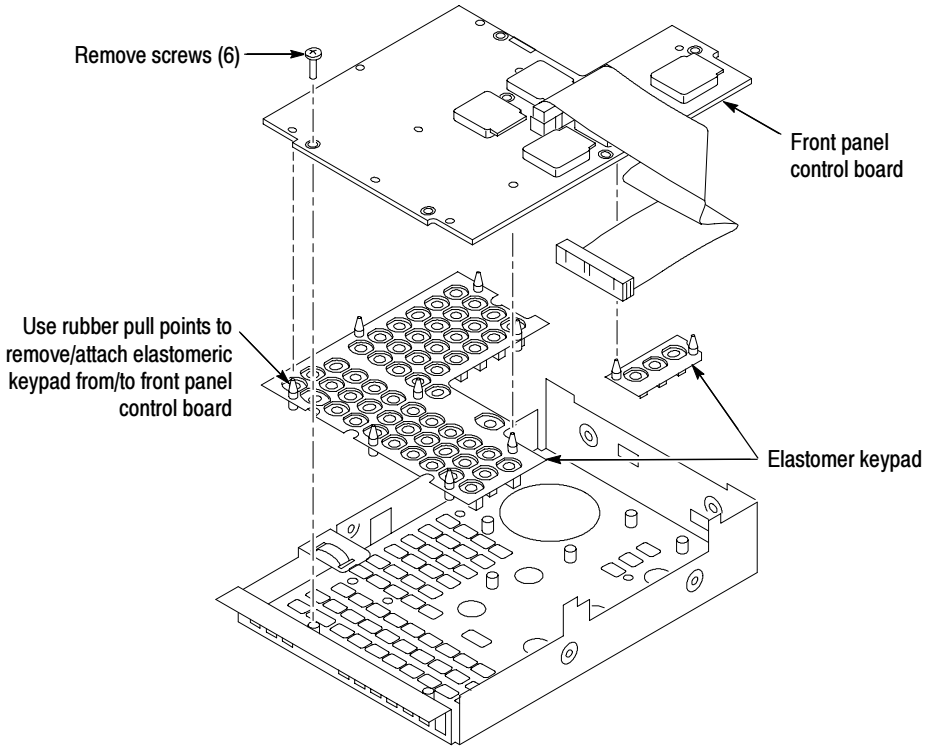


Figure 6- 8: Front panel control assembly parts locations

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 trackball cable.
4. Replace the knobs on the front panel.

NOTE*. When you reinstall the CD-ROM drive assembly, make sure that you do not damage the front panel knobs by applying too much preasure on the back of the front panel control assembly.*

---

5. Reinstall the CD-ROM drive assembly.
6. Reinstall the front panel assembly.

Elastomeric Keypad

You will need a screwdriver with a size T-15 Torx tip to perform this procedure.

Removal

Use the following procedure to remove the elastomeric keypad:

1. Do the *Front Panel Control Assembly* removal procedure on page 6–15.
2. Do the *Front Panel Control Board* removal procedure on page 6–19.
3. 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 two keys next to the trackball assembly, the rubber of the keypad should line up with the edge of the board.*

2. Do the *Front Panel Control Board* installation procedure.
3. Do the *Front Panel Control Assembly* installation procedure.
4. Reinstall the trim ring.

Card Guides

The following procedure applies to the card guide and shutter assembly. You will need a small flat-bladed screwdriver or other small prying tool to perform this procedure. You can perform this procedure without removing any covers from the instrument.

Removal

Use the following procedure to remove the card guides or the shutter assembly:

1. Position the instrument with the side facing you so that you can easily access the card guides or the shutter assembly.
2. Refer to Figure 6–9 and locate the card guide tabs.
3. Use a small, flat-blade screwdriver to gently pry back the tabs until the card guide or the shutter assembly pops loose.
4. Slide the card guide or shutter assembly out of the instrument.

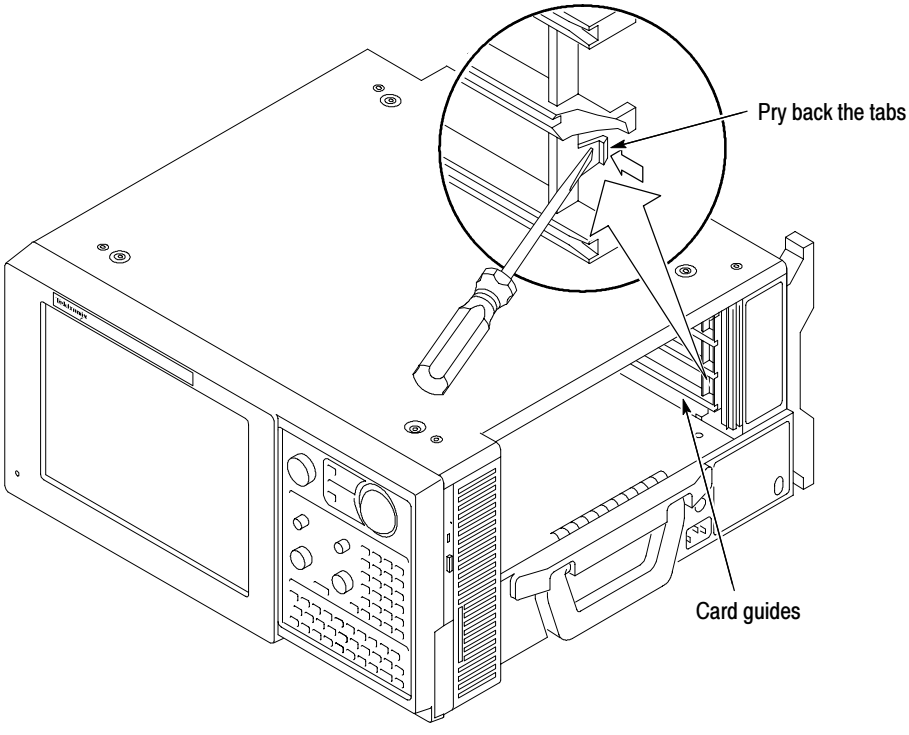


Figure 6- 9: Removing the card guide or the shutter assembly

Installation

Use the following procedure to install the card guide or the shutter assembly:

1. Insert the card guide or shutter assembly into the chassis opening.
2. Refer to Figure 6–10 and align the card guide pegs with the holes in the rear of the chassis.
3. Insert the card guide pegs into the chassis holes.
4. Snap the card guide tabs in to the chassis slots near the front of the chassis.
5. For the shutter assembly, verify that the shutters open when you push against the shutter tabs.

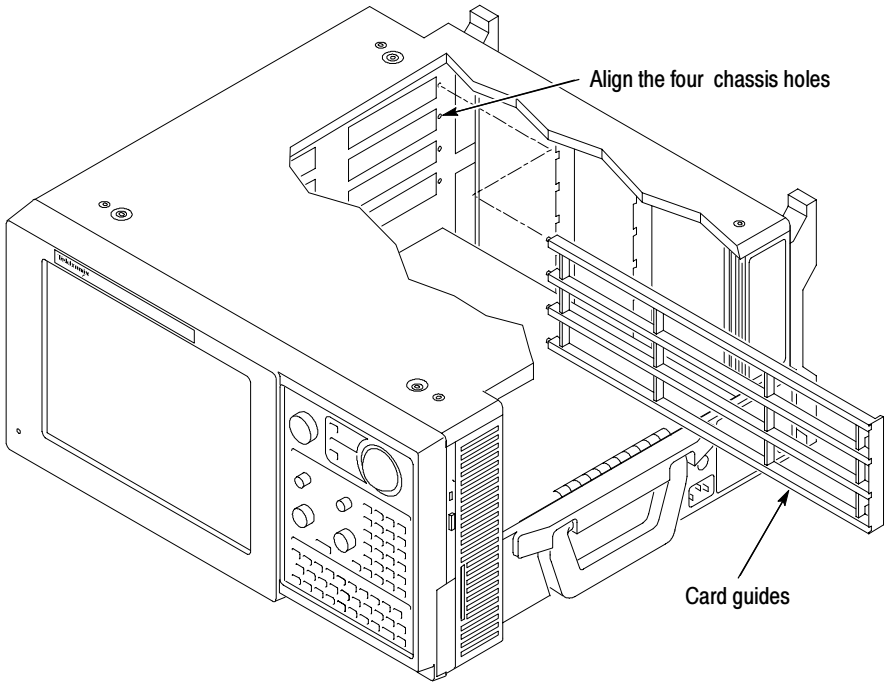


Figure 6- 10: Installing the card guide or shutter assembly

Bottom Cover and Feet

You will need a screwdriver with a size T-15 Torx tip and a small Phillips screwdriver to perform this procedure.

***NOTE**. The T–15 Torx screws holding the plastic covers and the bottom cover in place are longer than the rest of the T-15 Torx screws in the instrument. Avoid mixing these screws up when reassembling the instrument.*

Removal

Use the following procedure to remove the bottom cover:

1. Set the mainframe with the cord-wrap feet on the work surface and the bottom facing you.
2. Remove the four screws that attach the bottom cover to the mainframe.
3. Lift bottom cover off.
4. To remove the flip stand or rear feet, remove the two Phillips screws attaching the flip stand or rear foot to the bottom cover. (See Figure 6–11.)

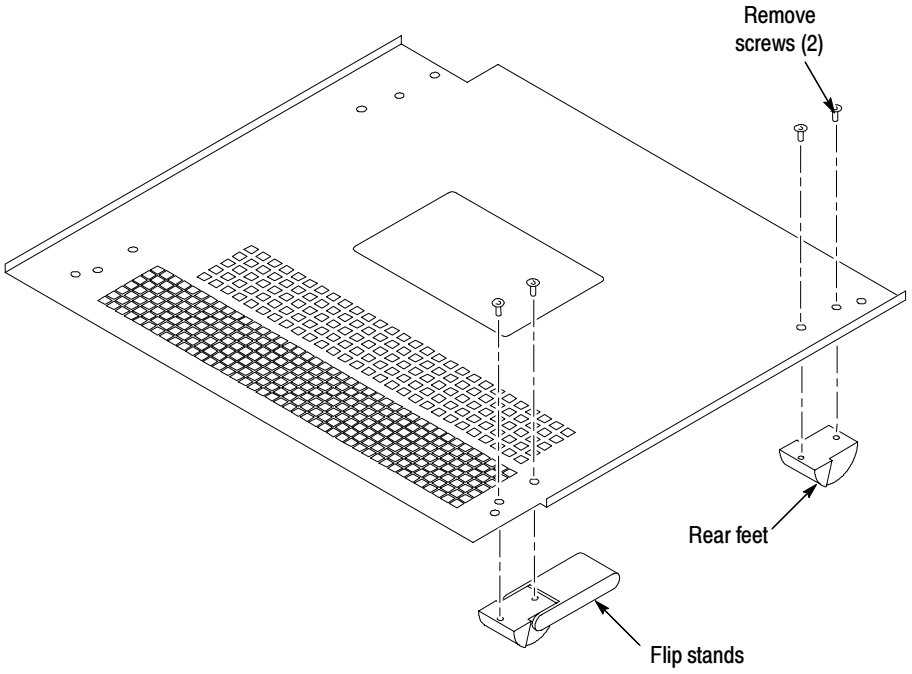


Figure 6- 11: Flip stand and rear feet removal

Installation

Reposition the bottom cover on the bottom surface of the portable mainframe. Insert the four screws that attach the bottom cover to the mainframe.

Top Cover

You will need a screwdriver with a size T-15 Torx tip to perform this procedure.

***NOTE**. The T-15 Torx screws holding the plastic covers and the bottom cover in place are longer than the rest of the T-15 Torx screws in the instrument. Avoid mixing these screws up when reassembling the instrument.*

Removal

Use the following procedure to remove the top cover:

1. Set the mainframe with the bottom on the work surface and the front facing you.
2. Unsnap the accessories pouch from the top cover.
3. Remove the trim ring.
4. Remove the four screws that attach the top cover to the mainframe. (See Figure 6-12.)
5. Lift the top cover off.

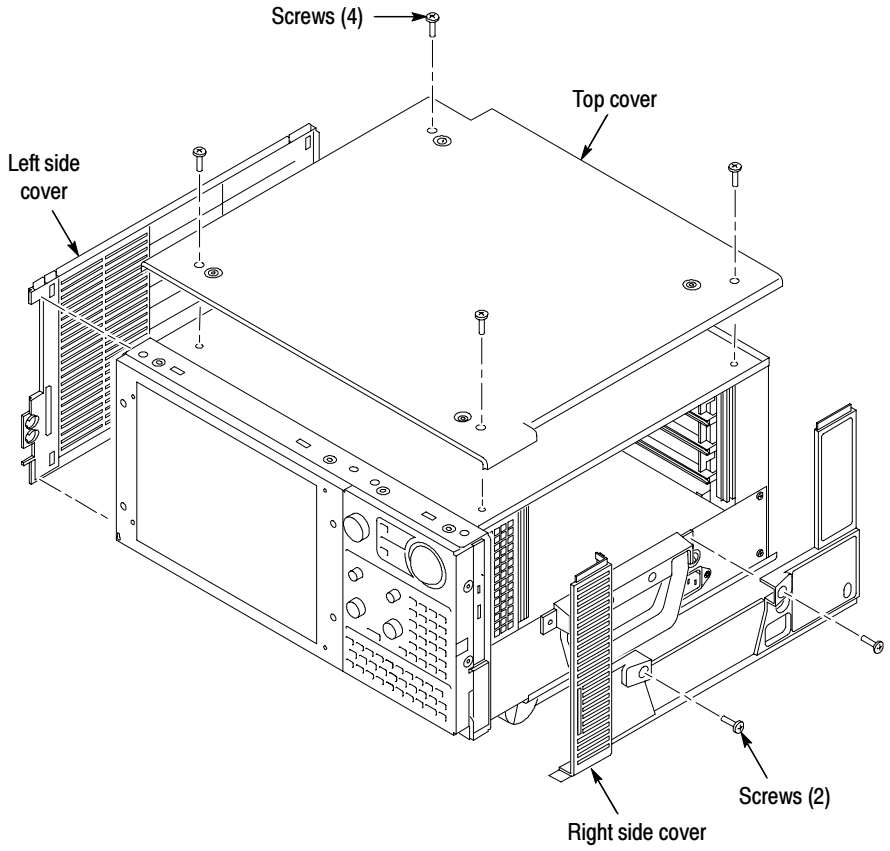


Figure 6- 12: Top and side cover removal

Installation

Reposition the top cover on the instrument and then complete the removal procedures in reverse order.

Left Side Cover

You will need a screwdriver with a size T-15 Torx tip to perform this procedure.

Removal

Use the following procedure to remove the left side cover:

1. Remove the trim ring.
2. Do the *Top Cover* removal procedure on page 6–25.
3. Loosen the two screws on the bottom cover closest to the left side of the mainframe.
4. Remove the left side cover.

Installation

Reposition the left side cover and tighten the two bottom cover screws nearest the left side of the mainframe. Reinstall the top cover and then the trim ring.

Right Side Cover

You will need a screwdriver with a size T-15 Torx tip to perform this procedure.

Removal

Use the following procedure to remove the left side cover:

1. Remove any installed modules.
2. Remove the trim ring.
3. Locate and unplug the line cord from the right side of the instrument (See Figure 6–13).
4. Grasp the line cord on either side of the retaining clamp and then rotate the line cord 90 degrees counterclockwise.
5. Pull the line cord and clamp away from the side panel mounting hole.
6. Do the *Top Cover* removal procedure on page 6–25.
7. Loosen the two screws on the bottom cover closest to the right side of the mainframe.
8. Remove the two screws that attach the right side cover to the power supply. (See Figure 6–12 on page 6–26.)
9. Remove the right side cover.

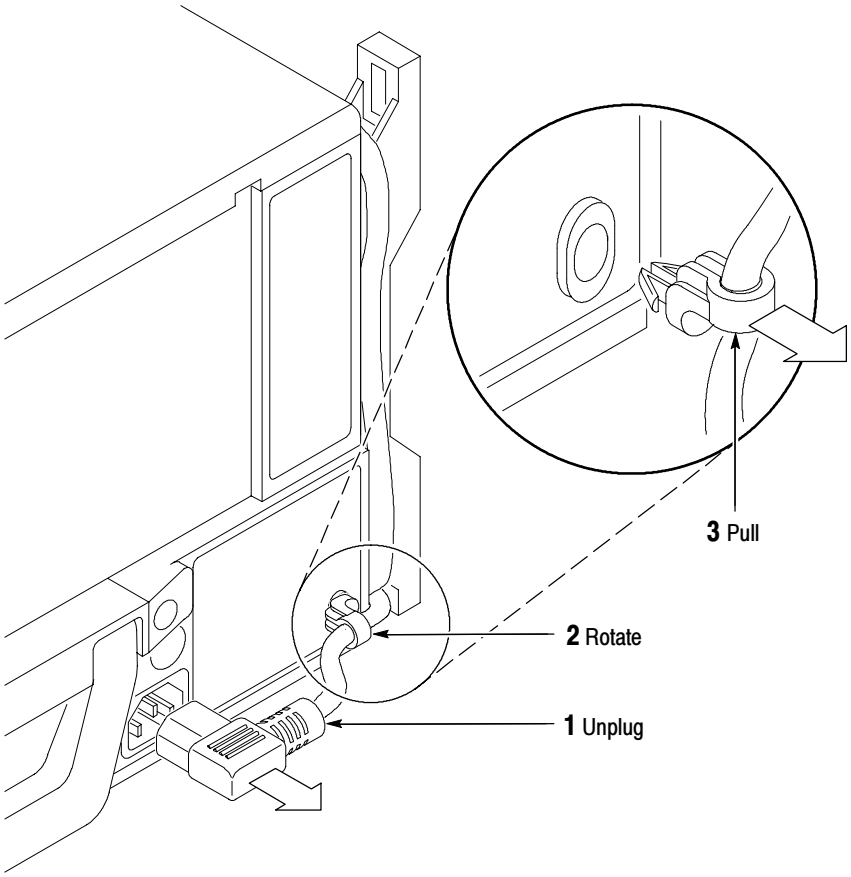


Figure 6- 13: Removing the line cord from the right side cover

Installation

To reinstall the right side cover, complete the removal procedures in reverse order.

Power Supply

You will need a screwdriver with a size T-15 Torx tip to perform this procedure.

Removal

Use the following procedure to remove the power supply:

1. Do the removal procedures for *Bottom Cover and Feet* (page 6–24), *Top Cover* (page 6–25), and *Right Side Cover* (page 6–27).
2. Remove the four screws from the right side and the four screws from the bottom that secure the power supply to the chassis (see Figure 6–14).

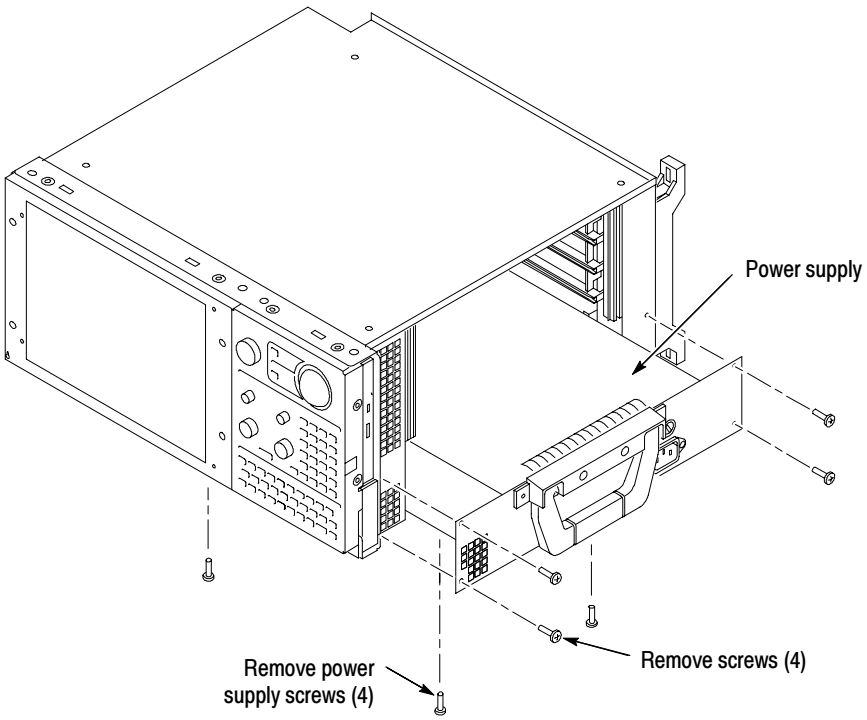


Figure 6-14: Power supply removal

3. Pull on the handle to remove the power supply from the chassis.

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

4. Remove the two inner screws connecting the handle to the power supply. (See Figure 6–15) and then lift off the plastic handle mount and handle.
5. Remove the panel from the power supply by lifting it off.

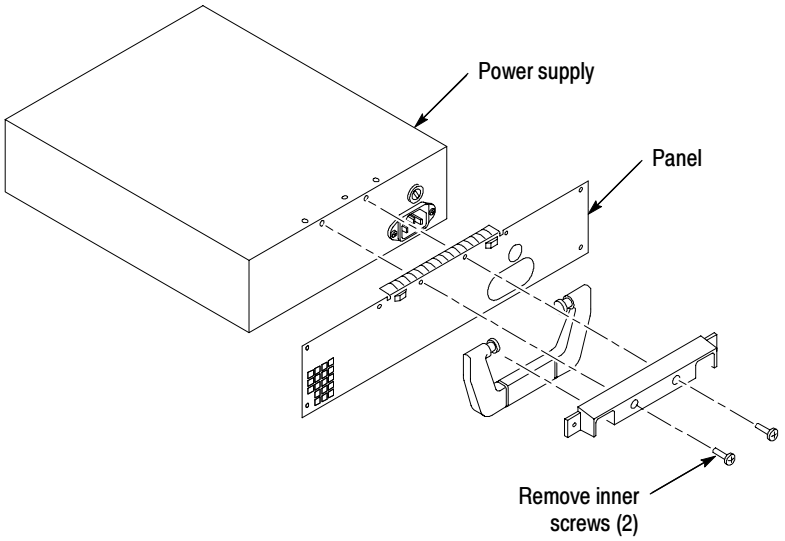


Figure 6- 15: Removing the handle and the panel from the power supply

Installation

To reinstall the power supply, complete the removal procedures in reverse order. When you insert the power supply into the chassis, press firmly to make sure the power supply connectors are fully seated.

Rear Chassis Fan Tray

You will need a screwdriver with a size T-15 Torx tip to perform this procedure.

Removal

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

1. Set the mainframe so that the bottom is on the work surface and the rear chassis fan tray faces you.
2. Remove the four screws located within the cord-wrap feet that secure the rear chassis fan tray to the mainframe. (See Figure 6–16.)
3. Grasp the left cord-wrap foot (facing the fan tray) and swing the left side of the fan tray away from the mainframe.
4. Disconnect the cable connecting the rear chassis fan tray to the backplane board.
5. Remove the rear chassis fan tray.

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.

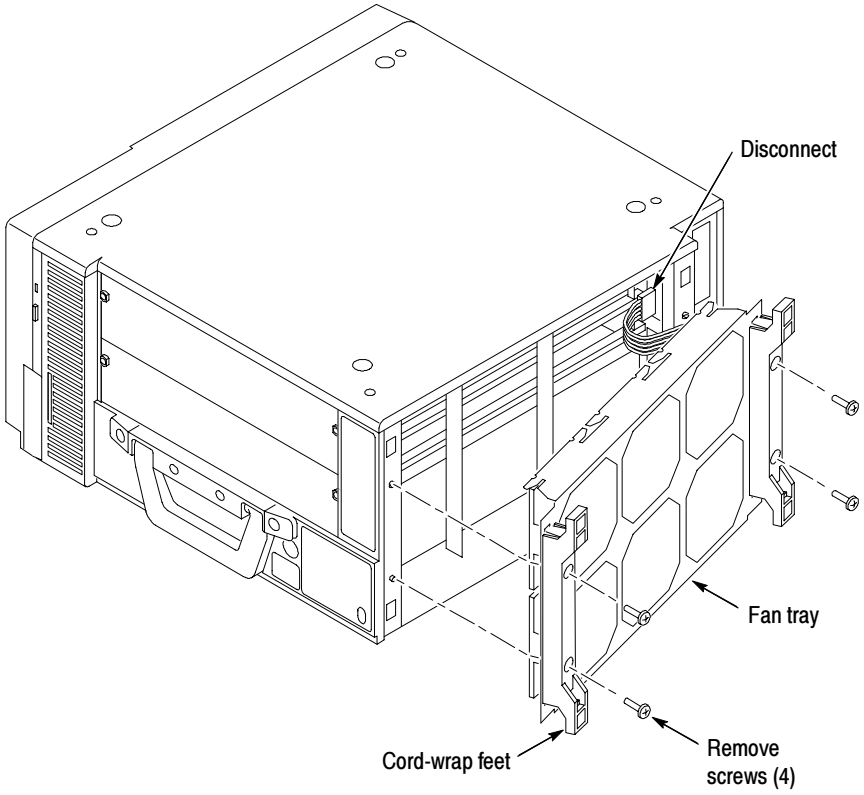


Figure 6- 16: Rear chassis fan tray removal

Individual Fans

You will need a screwdriver with a size T-15 Torx tip, a Philips screwdriver, pliers, a side cutter, and a scribe or jeweler's screwdriver or other small, pointed tool 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 6–30.
2. Remove the screw that secures the hold down brackets to the rear chassis fan tray. (See Figure 6–17 on page 6–33.) 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. Lift the fan from the rear chassis fan tray. If necessary, use the pliers to gently straighten the metal tabs holding the fan to the rear chassis fan tray and then remove the fan.
4. Note the fan cable dress and remove the tie holding the cables together near the connector. Remove the cable tie(s) if necessary.
5. Remove the fan wires from the cable connector. (Pay attention to the wire color locations for reinstallation.) Use a scribe or jeweler's screwdriver to gently push down the "finger" of metal that secures (latches) the wire end into the connector. (See insert, Figure 6–17 on page 6–33.) At the same time, pull gently on the wire until it comes out of the connector.

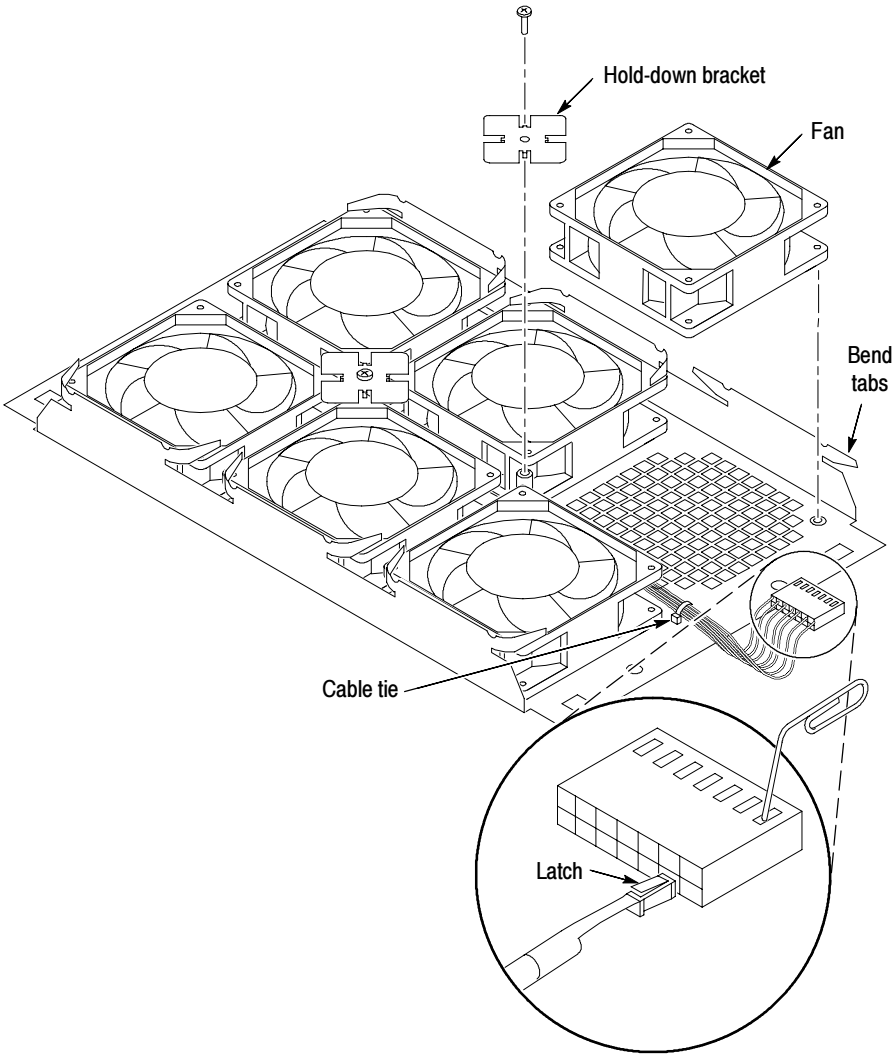


Figure 6-17: Individual fan removal

Installation

Use the following procedure to reinstall the individual fans from 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 5. 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 6-17.)
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. If necessary, use use the pliers to gently bend the metal tabs that hold the fan to the rear chassis fan tray until the fan is 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 6–31.

Cord Wrap Feet

You will need a screwdriver with a size T-15 Torx tip 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 6–30.
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 6–18 on page 6–34.)
5. Remove the cord-wrap feet.

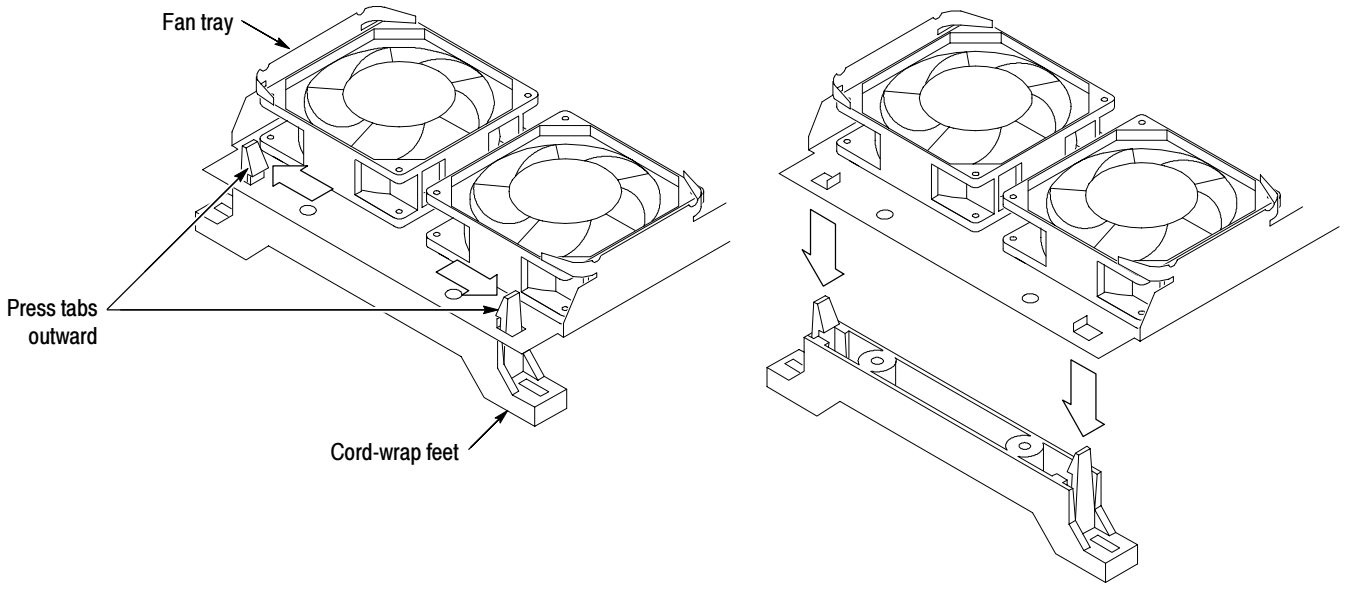


Figure 6-18: Cord-wrap feet removal

Installation

Push the cord-wrap feet into the holes in the rear chassis fan tray to snap them into position. Do the *Rear Chassis Fan Tray* installation procedure as shown on page 6–31.

Internal Components

These procedures describe how to access and replace the following items located on the left side of the instrument:

- Memory (SODIMM)
- Battery
- Controller board
- Backplane board (requires you to remove the controller board)

You will need a screwdriver with a T-15 Torx tip to complete the procedures.

Complete the following steps to access the internal components:

1. Remove the trim ring.
2. Remove the top and left side covers.
3. Loosen the screws closest to the sides of the bottom cover.
4. Remove the eight screws securing the cover to the chassis (see Figure 6–19), and then lift off the cover.

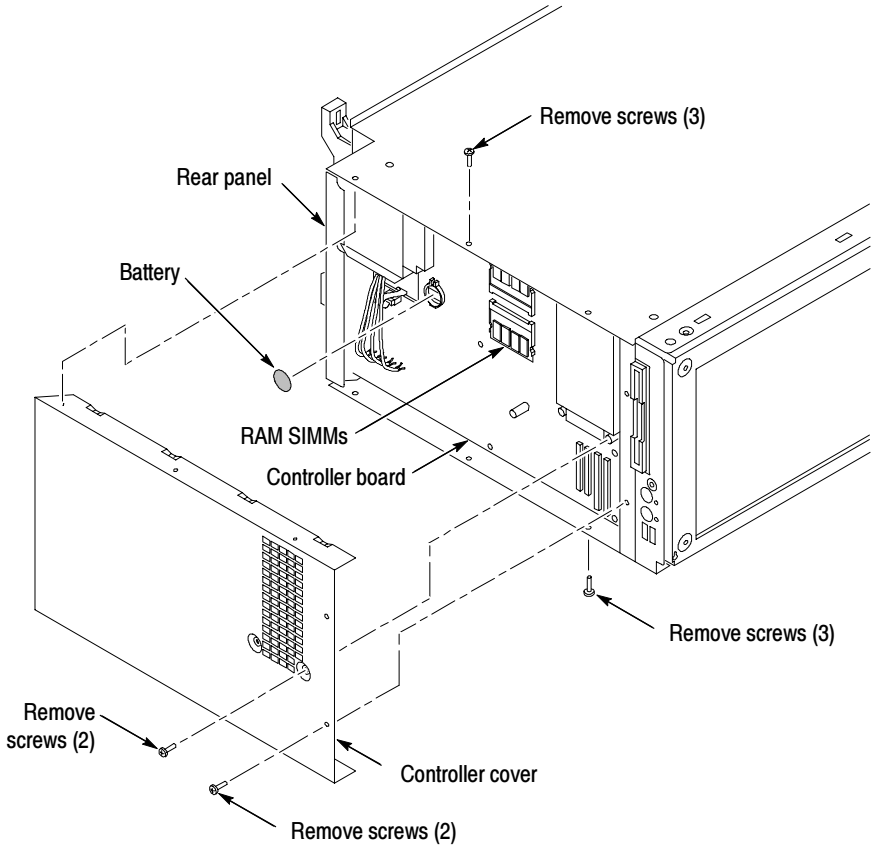


Figure 6-19: Accessing the internal parts

Main Memory

Refer to Figure 6–19 and locate the SODIMM (RAM) module on the controller board. To remove the memory, press outward on the clips holding each SO-DIMM module to the controller board, and then lift off the module board.

CAUTION. *SODIMM modules must have gold plated contacts.*

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

To install the memory, insert the new SODIMM module. Press down gently until the clips that hold the modules to the controller board snap into place.

Battery

Refer to Figure 6–19 and locate the 3 V lithium battery on the controller board. Remove the battery from the clip by using a small tool and prying the battery until it pops out of the clip.

Controller Board

You will need a screwdriver with a size T-15 Torx tip to perform this procedure.

Removal

Refer to Figure 6–20 and complete the following steps to remove the controller board from the mainframe:

1. Detach the four ribbon cables located near the bottom front corner of the controller board.
2. Remove the center screw from the controller board.
3. Remove the two screws securing the controller board to the chassis at the back panel.
4. Pull firmly on the rear panel until the controller board disconnects from the backplane board connectors.

Installation

Complete the following steps to reinstall the controller board:

1. Reposition the controller board, and then push firmly on the backplane 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.



CAUTION. *There are no guides on the ribbon cable connectors. When you reattach the cables, make sure that you center the cable connectors in their respective sockets on the controller board. If you install the connectors off by one pin, you will damage the instrument when you power up the instrument.*

4. Reattach the four cables located near the bottom front corner of the controller board.
5. Reposition the cover by sliding it back and under the edge of the rear panel.
6. Install the remaining T-15 screws that hold the cover in place.
7. Reinstall the top, bottom, and left side covers
8. Reinstall the trim ring.

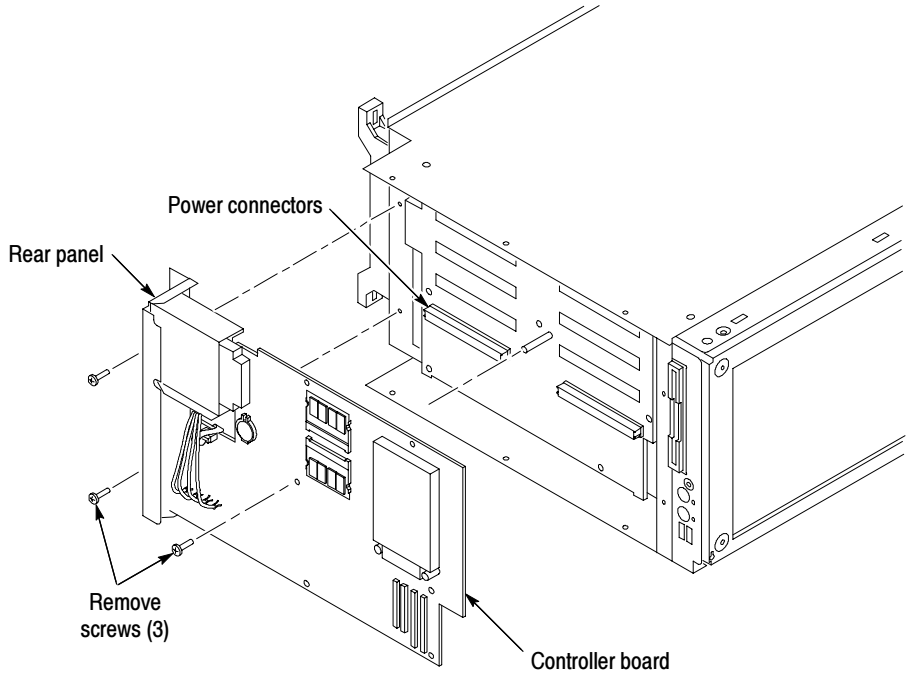


Figure 6- 20: Removing the controller board

Backplane Board

You will need a screwdriver with a size T-15 Torx tip to perform this procedure.

Removal

Refer to Figure 6–21 and complete the following steps to remove the backplane board from the chassis:

1. Remove the controller board.
2. Remove the eight remaining screws that secure the backplane board to the chassis.
3. Pull on the edges of the board nearest the front and rear surfaces of the mainframe to remove the backplane board.
4. Detach fan cable.

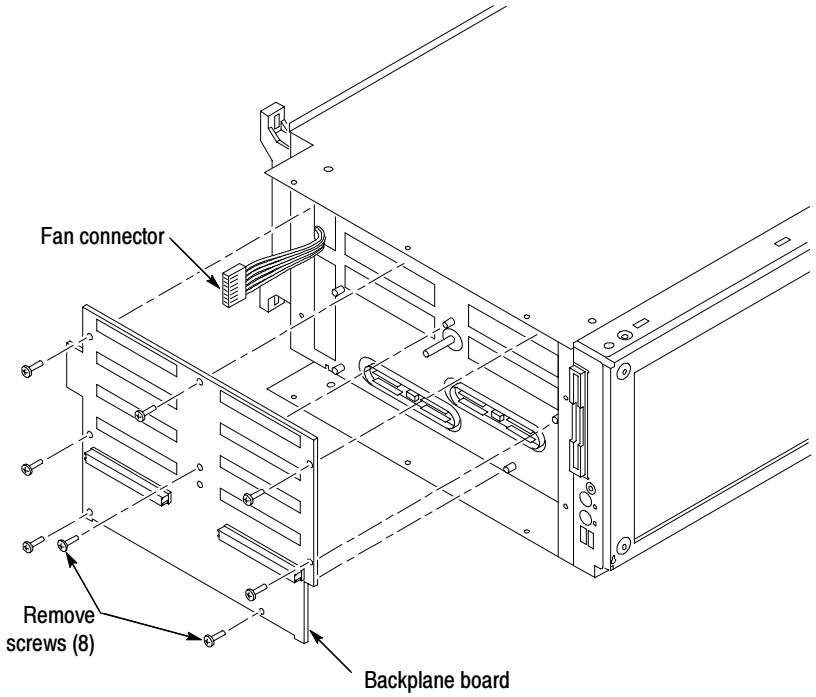


Figure 6-21: Removing the backplane board

Installation

Use the following procedure to reinstall the backplane board:

1. Reattach the fan cable.
2. Reposition the backplane board, and insert the screws that secure the backplane board to the chassis.
3. Reinstall the controller board.
4. Reinstall any modules removed from the portable mainframe.
5. Reposition the cover by sliding it back and under the edge of the rear panel.
6. Install the short T-15 screw on the top cover near the rear of the chassis (refer to Figure 6–19 on page 6–36, if necessary).
7. Install the remaining seven T-15 screws that hold the cover in place.
8. Reinstall the top, bottom, and left side covers
9. Reinstall the trim ring.

Troubleshooting



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

To prevent 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. The process is as follows:

- Do *Check for Common Problems* on page 6–42 to eliminate easy-to-find problems first.
- Do *Eliminate Other Problem Sources* on page 6–44 to eliminate the probes and DSO or Logic Analyzer modules as the fault source next.
- Do *Troubleshoot the Portable Mainframe*, beginning on page 6–44, 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 instrument 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.

Check for Common Problems

Use Table 6-2 to quickly isolate possible failures. The table lists problems related to the instrument and possible causes. The list is not exhaustive, but it may help you eliminate a problem that is quick to fix, such as a 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	■ SO DIMMs incorrectly installed or missing. ■ Defective controller board.
External monitor does not power on	■ Monitor power cord not plugged in. ■ Monitor connected to Secondary Video Out and the Dual Monitor operation not enabled. ■ Failed fuse. ■ Monitor failure.
External monitor powers on, but is blank	■ External monitor controls turned down. ■ Monitor cable faulty or not connected to mainframe. ■ Monitor defective.
External monitor powers on, but nothing is displayed on screen	■ Monitor connected to Secondary Video Out and the Dual Monitor operation is enabled. Drag items from desktop of Primary Video Out to desktop of Secondary Video Out.
Hard disk drive related symptoms	■ Defective hard disk drive. ■ Incorrect hard disk type selected in the BIOS setup. ■ Replaceable hard disk drive not installed. ■ Corrupted controller BIOS module firmware, reinstall firmware. ■ Controller BIOS setup problem. See BIOS Settings. ■ Replaceable hard disk drive or optionally field installed fixed hard disk drive not configured as bootable (slave) master hard disk drive.

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

Symptom	Possible cause(s)
CD-ROM related symptoms	■ Defective CD-ROM. ■ Defective CD-ROM drive cable. ■ Defective CD-ROM board. ■ Incorrect CD-ROM configuration in the BIOS setup.
Flat panel display blank	■ 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. ■ TLA 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. ■ Flash jumper installed on module.
BIOS error messages	■ Refer to the BIOS error message table on page 6-51.

Eliminate Other Problem Sources

The TLA715 Portable Mainframe is part of the Tektronix Series Logic Analyzer Family, which comprises modules and the mainframe. If power-on diagnostics indicate that a module test failed, troubleshoot the module using the service manual for that module.

Troubleshoot the Portable Mainframe

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

Testing may be required to correct some faults. Under those circumstances, you will need the test equipment listed in the *Performance Verification Procedures* chapter of this manual.

Fault Isolation Procedure

Follow the primary troubleshooting tree in Figure 6–22 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.

Controller and PC Diagnostics

The primary diagnostics for the portable mainframe are the power-on diagnostics, the CheckIt diagnostics, and the TLA Mainframe Diagnostics. Procedures for running these diagnostics are described below.

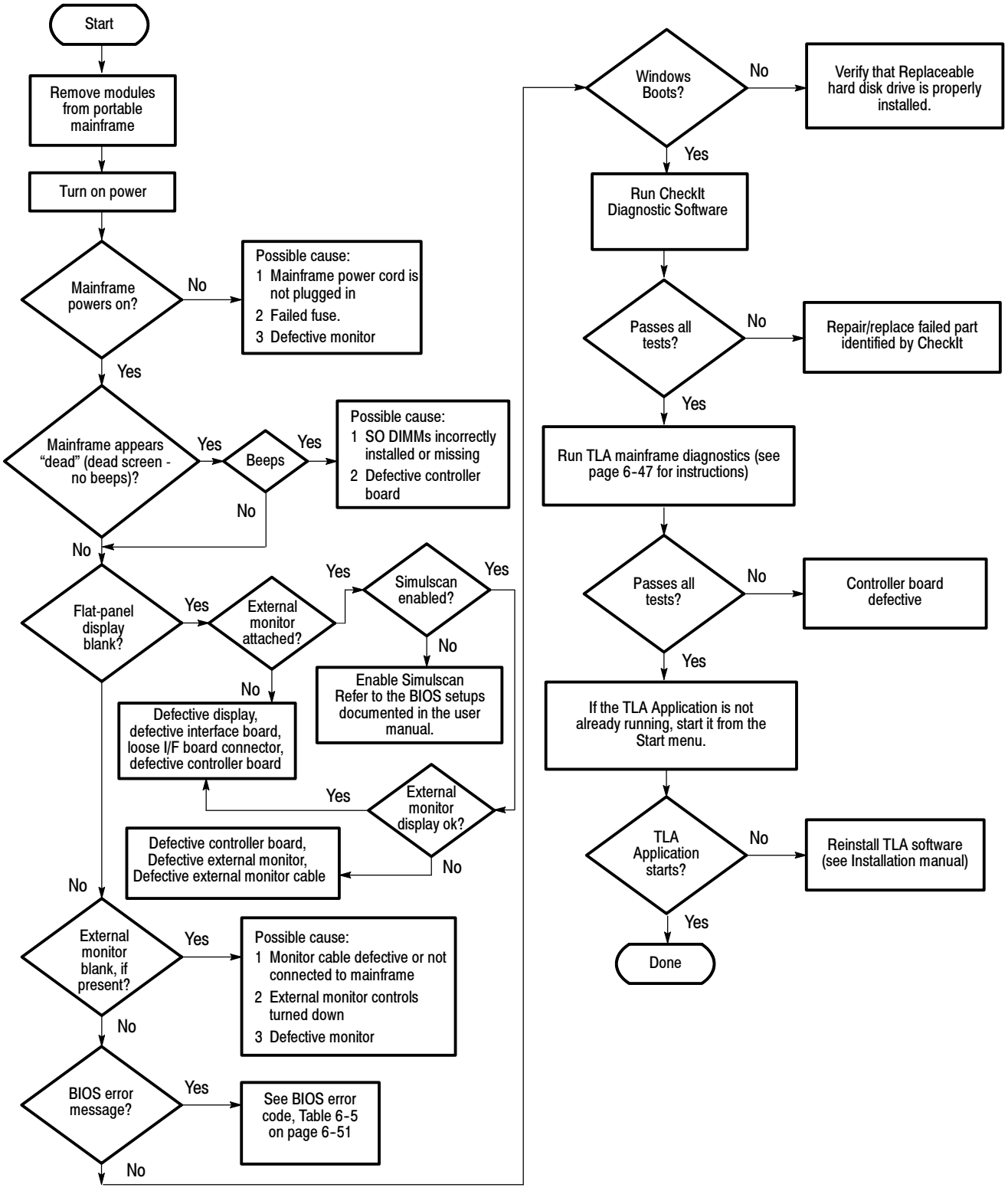


Figure 6-22: Primary troubleshooting tree

Power-On Diagnostics

The power-on diagnostics check the basic functionality of the instrument at every power on. If any failures occur, 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 Mainframe Diagnostics provide more extensive tests than the power-on diagnostics.

Part of the power on tests work with the Windows operating system to check generic hardware including the keyboard, mouse, memory, CPU, and associated peripherals. More detailed tests include those items listed in Table 6–3. The interrupt lines and trigger lines are tested for each installed application module.

To view the Extended diagnostics, click on the Extended tab.

Table 6–3: TLA Power-on diagnostic tests

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

CheckIt Utilities

If the instrument passes all the BIOS tests, the primary tree calls for you to run the CheckIt diagnostics software. CheckIt Utilities is a comprehensive diagnostic software application to check and verify the operation of the PC hardware in the mainframe.

To run the software, you must have either a working keyboard or a working mouse or other pointing device and have the Windows operating system running. Repair or replace any failed component identified by diagnostics.

To run the diagnostic software, do the following steps:

1. Turn off all other applications and exit all windows.
2. Click Start → Programs → CheckIt Utilities.

3. Run the various utilities from the application; if necessary refer to the CheckIt Utilities online help for more information on the utilities.

4. Reboot the mainframe after the diagnostic tests to restore the mainframe to normal operating condition.

TLA Mainframe Diagnostics

If the instrument passes all the CheckIt tests, the primary tree calls for you to run the TLA Mainframe Diagnostics. The TLA Mainframe Diagnostics are a comprehensive software test that checks the functionality between the portable mainframe and any installed modules.

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

1. Turn off all other applications.

2. Click Start → Programs → Tektronix Logic Analyzer → TLA Mainframe Diagnostics.

Bypassing Front Panel Controls

You can bypass the front panel control assembly if necessary to assist in troubleshooting. Bypassing the front panel control assembly allows an external keyboard to functionally 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 to 34 and pins 31 to 32 as shown in Figure 6-23.

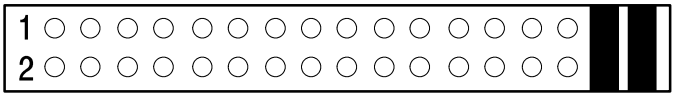


Figure 6-23: Jumper locations for bypassing front panel control assembly

Isolating System Problems

If you have completed all of the troubleshooting procedures up to this point and the logic analyzer 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 mainframe.
- Verify that the module address switches are set correctly. Power off the instrument and remove the modules. Set the address switches to FF (if not already set) and verify that the modules do not have the flash programming jumper installed on the rear of the module. Power off the instrument 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 1 and 2, power off the instrument, move the module to slots 3 and 4, and try the tests again If the module works in the new location, you have identified a faulty slot.
- Check for broken connectors on the backplane, and broken connectors or bent pins on the module connectors.
- Faulty module. Replace the suspected faulty module with a known-good module, or contact your local Tektronix service center.
- Incompatible module firmware and instrument software versions. Refer to the *Tektronix Logic Analyzer Family User Manual* for software and module firmware update instructions.
- 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 instrument slots. Table 6–4 lists some of the command line options for executing ResMan32.

Table 6–4: Command line options for ResMan32

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

Table 6-4: Command line options for ResMan32 (Cont.)

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

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

   `C:\Program Files\TLA700\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 6–24. In this example the instrument 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.

```
Auto Exit - Off
Identify Static Configure Devices
             Found a device at LA 1
             Found a device at LA 2
Identify Dynamic Configure Devices
Finding expansion devices
Matching Devices to Slots
Configuring slots for 2 instruments ...
             match la=1 to slot=1 in frame=0
             match la=2 to slot=3 in frame=0
Checking device self test
Setting VISA Attributes
        la 1, slot 1: device_class 2, manf_id 0xffd, model_code 0x7eb, addr_spc 0
        la 2, slot 3: device_class 2, manf_id 0xffd, model_code 0x7f4, addr_spc 0
Setting VISA Address Maps
        A24 device @ la 1 - reqmem:7
        A24 device @ la 1 - starting address 200000x, size 65536
        A24 device @ la 2 - reqmem:7
        A24 device @ la 2 - starting address 210000x, size 65536
Enabling Events & Responses
             Default IRQ for system: 4
             la 1: Int ID 1 assigned to IRQ 4
             Enabling Events: 8-9 16-32 47-63 124-125 127
             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
        Frame 0, Slot 01:  la_1=1,1,4093,2027,2,0,1,7,2097152
        Frame 0, Slot 03:  la_2=2,3,4093,2036,2,0,1,7,2162688
```

Figure 6-24: ResMan32 program output

BIOS Setup Error Messages

The instrument runs a BIOS test when it boots up. If the BIOS test encounters a problem, the program displays the error on the display. Table 6–5 lists the error codes, an explanation of each error code, and actions that can be taken. Refer to the *Tektronix Logic Analyzer Family User Manual* for information on BIOS setup parameters and feature settings.

Table 6–5: BIOS error codes and explanations

Error code	Explanation	Action to be taken
Check date and time settings.	The date and time settings have been reset to their factory default values.	In the BIOS Setup, enter the correct time and date.
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 SO DIMMs. If one of the SO DIMMs 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 SO DIMMs. If one of the SO DIMMs 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. Replaceable hard disk drive not installed. Replaceable hard disk drive may be jumpered as a slave, and there is not a master fixed hard disk drive present.	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 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.

Table 6-5: BIOS error codes and explanations (Cont.)

Error code	Explanation	Action to be taken
Keyboard error (Front panel keypad error)	The keyboard may be missing or defective. Note: This error is quite uncommon because both the external keyboard and the front panel keypad would have to 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.
Operating system not found	The operating system cannot be found. The replaceable hard disk drive is not present. The replaceable hard disk drive is jumpered as a slave drive, and a fixed (master) hard disk drive is not present.	Insert a bootable disk into the floppy disk drive and try to reboot. Reload the Windows operating system.
Parity Check 1	A parity error was found on the communications bus. The BIOS will return the address of the error or display ???? if it cannot.	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 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 SO DIMMs; if one of the SO DIMMs is defective, the error address should change.

Table 6-5: BIOS error codes and explanations (Cont.)

Error code	Explanation	Action to be taken
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 SO DIMMs; if one of the SO DIMMs 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. Refer to your *Tektronix Logic Analyzer Family User Manual* for more information.

Verify the BIOS Version

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

> Copyright 1996 By RadiSys Corporation. Version 2.xx.xx.
> RadiSys boot block version 2.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 disk.

Verify Operation

Run the CheckIt diagnostic software to verify that all of the functions of the controller are functioning correctly.

Adjustment After Repair

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

Startup Sequence

The following information is intended to provide troubleshooting hints in case the logic analyzer fails to complete the startup sequence. You may want to refer to Figure 6–25 on page 6–55 while reading the following paragraphs.

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

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

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

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

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

If no failures occur, the logic analyzer system is ready to use for regular tasks.

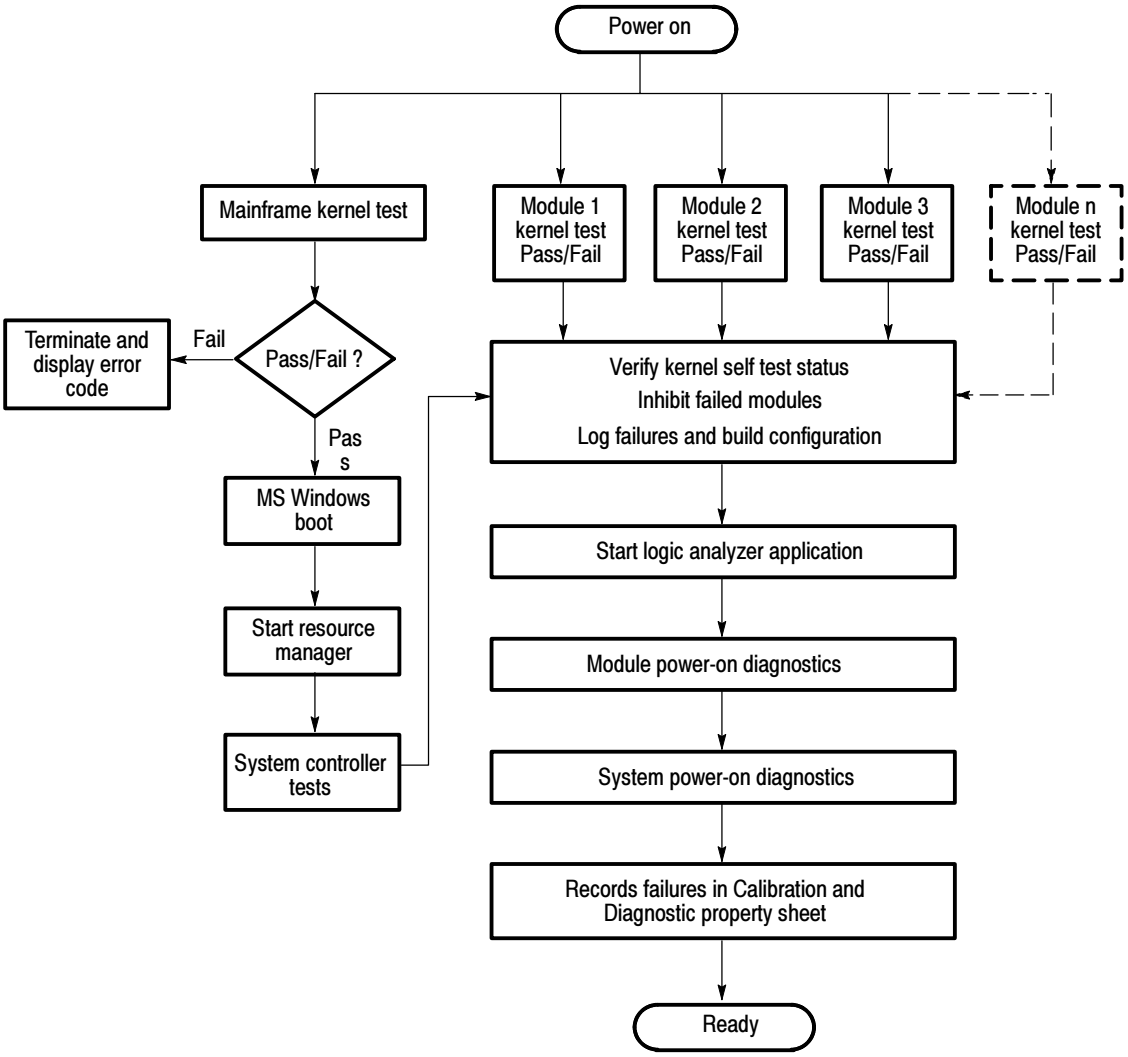


Figure 6-25: Startup sequence

Repackaging Instructions

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

Packaging

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

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

Shipping to the Service Center

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

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

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

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

Options

This chapter provides a list of advertised options for the portable mainframe. Refer to the *Mechanical Parts List* chapter for a list of standard and optional accessories.

For the most up-to-date information on options and upgrades, contact your Tektronix sales representative.

Tektronix Options

The following Tektronix options are available for the portable mainframe.

- Option 1A, LAN PC Card, 10/100 LAN Cardbus/32 32-bit PC Card, 10BaseT
- Option 1K, LACART
- Option 3M, 18-inch LCD flat panel monitor
- Option 4M, 21-inch LCD flat panel monitor
- Option IC, iView cable, iView external oscilloscope kit
- Option 1S, DRAM/HDD; increase to maximum DRAM & replaceable hard disk drive
- A1, 230V European power cord
- A2, 230V United Kingdom power cord
- A3, 230V Austrialian power cord
- A4, 230V North American power cord
- A5, 230V Swiss power cord
- A99, No power cord

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 S1 and S3), which helps keep downtime to a minimum.

Product installation service[1]	Option IN	Provides initial product installation/configuration and start-up training session including front panel and product familiarization.
Three years of calibration services	Option C3	Provides factory calibration certification on delivery, plus two more years of calibration coverage. Throughout the coverage period the instrument will be calibrated according to its Recommended Calibration Interval.
Test data	Option D1	Provides initial Test Data Report from factory on delivery.
Test data	Option D3	Provides test data on delivery plus a Test Data Report for every calibration performed during 3 years of coverage – requires Option C3.
Three years repair coverage	Option R3	Extends product repair warranty to a total of three years.
One year upgrade to on-site service[1,2]	Option S1	Upgrades the standard one year, “return to depot” warranty to an on-site warranty.
Three year upgrade to on-site service[1,2]	Option S3	Upgrades any C3, D3, and R3 options purchased to on-site coverage for three years

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

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

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

Electrical Parts List

Refer to the *Mechanical Parts List* chapter for a complete listing and description of replaceable parts for the TLA715 Portable Mainframe.

Diagrams

This chapter contains the interconnection diagram and the block diagram for the TLA715 Portable Mainframe.

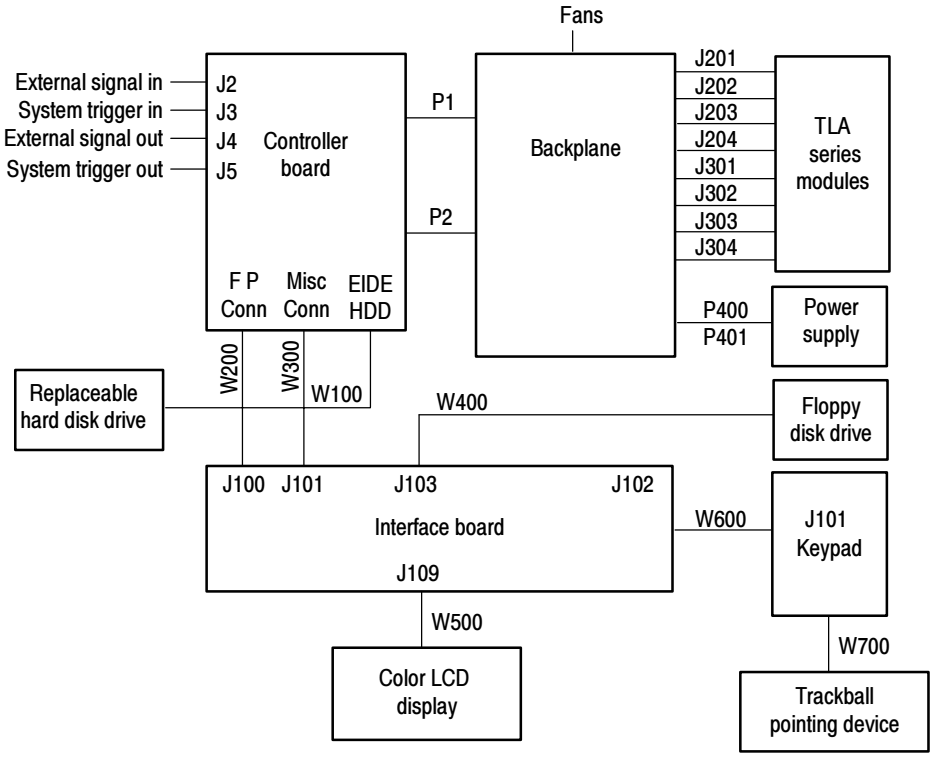


Figure 9-1: TLA715 Portable Mainframe interconnection diagram

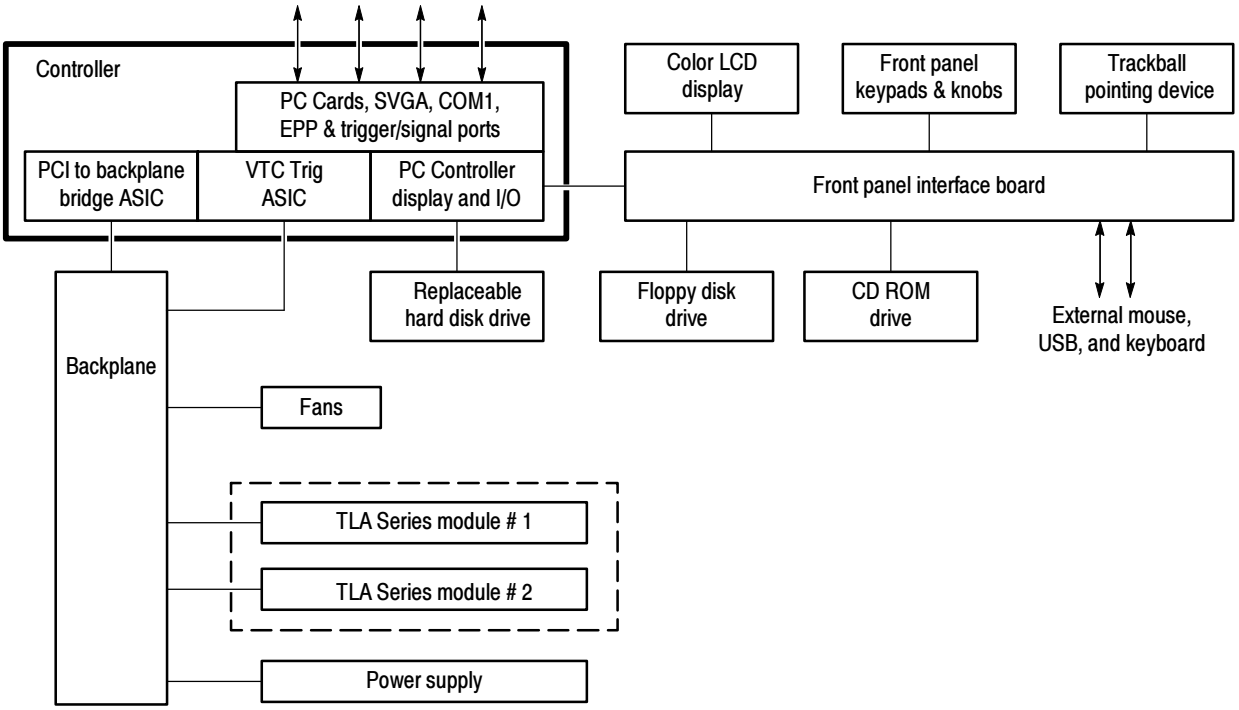


Figure 9-2: TLA715 Portable Mainframe block diagram

Mechanical Parts List

This chapter contains a list of the replaceable parts for the TLA715 Portable Mainframe. Use this chapter to order replacement parts for the portable mainframe. Refer to the individual module service manuals for replaceable parts for those product modules.

***NOTE**. The term "module" in this chapter refers to a replaceable subcomponent of the mainframe such as a power supply. It does not refer to a TLA product module.*

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.

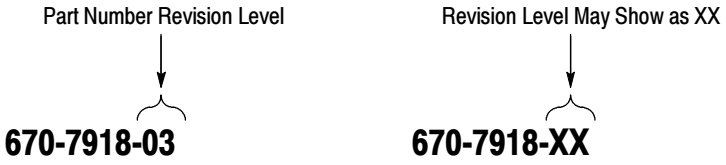
- Part number (see Part Number Revision Level below)
- Instrument type or model number
- Instrument serial number
- Instrument modification number, if applicable

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.

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 10-1: 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.

Table 10-1: Parts lists column descriptions (Cont.)

Column number	Column name	Description
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
0VF15	TOTAL TECHNOLOGIES LTD	9 STUDEBAKER	IRVINE, CA 92618
00779	AMP INC.	CUSTOMER SERVICE DEPT PO BOX 3608	HARRISBURG, PA 17105-3608
049S6	FUJITSU COMPUTER PRODUCTS OF AMERICA INC	2904 ORCHARD PARKWAY	SAN JOSE, CA 95134-2009
060D9	TENSOLITE COMPANY	PRECISION HARNESS AND ASSEMBLY 3000 COLUMBIA HOUSE BLVD #120	VANCOUVER, WA 98661
06383	PANDUIT CORP	17303 RIDGELAND AVE	TINLEY PARK, IL 60477–3048
09353	C & K COMPONENTS CORP	57 STANLEY AVE	WATERTOWN, MA 02172-4802
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
0KB05	NORTH STAR NAMEPLATE INC	5750 NE MOORE COURT	HILLSBORO, OR 97124-6474
0KM03	INSTRUMENT SPECIALTIES CO INC.	505 PORTER WAY	PLACENTIA, CA 92670
0L0L7	RADISYS CORPORATION	5445 NE DAWSON CREEK DRIVE	HILLSBORO, OR 97124
0RAG4	MERITEC	1359 W JACKSON ST PO BOX 8003	PAINESVILLE, OH 44077
0TZP3	ENERGY ACCESS INC	ATTEN: ADVANCED POWER PRODUCTS IN C 10550 SW ALLEN BLVD,#118	BEAVERTON, OR 97005
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
1ES66	MAXIM INTEGRATED PRODUCTS INC	120 SAN GABRIEL DR	SUNNYVALE, CA 94086
1GM54	ZYTEC CORP	7575 MARKET PLACE DR	EDEN PRAIRIE, MN 55344

Manufacturers Cross Index (Cont.)

Mfr. code	Manufacturer	Address	City, State, Zip code
22526	BERG ELECTRONICS INC	825 OLD TRAIL ROAD	ETTERS, PA 17319-9769
22670	GM NAMEPLATE INCORPORATED	2040 15TH AVE WEST	SEATTLE, WA 98119-2783
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
31918	ITT SWITCH PRODUCTS	8081 WALLACE RD	EDEN PRAIRIE, MN 55344-8798
34416	PARSONS MANUFACTURING CORP	1055 O'BRIEN DRIVE	MENLO PARK, CA 940251476
46628	LOGITECH INC	6505 KAISER DR	FREMONT, CA 94555
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
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
62803	NEC-MITSUBISHI ELECTRONICS DISPLAY OF AMERICA INC	1250 N ARLINGTON HEIGHTS	ITASCA, IL 60143-1248
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
7X318	KASO PLASTICS INC	5720-C NE 121ST AVE, STE 110	VANCOUVER, WA 98682
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
80126	PACIFIC ELECTRICORD CO	747 WEST REDONDO BEACH PO BOX 10	GARDENA, CA 90247-4203
9F560	IBM CORPORATION	420 E SOUTH TEMPLE ST	SALT LAKE CITY, UT 84145
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	,
S5769	NEC CORPORATION	NEC BUILDING 7-1, SHIBA 5 CHOME MINATO-KU	TOKYO, JP 108
TK1163	POLYCAST INC	9898 SW TIGARD ST	TIGARD, OR 97223
TK1373	PATELEC–CEM	10156 TORINO	VAICENTALLO, ITALY 62/456
TK1943	NEILSEN MANUFACTURING INC	3501 PORTLAND RD NE	SALEM, OR 97303
TK2157	CONNECTOR TECHNOLOGY INC	5065 E HUNTER AVE	ANAHEIM, CA 92807–6001
TK2376	CONDUCTIVE RUBBER TECH	22125 17TH AVE SE, SUITE 117	BOTHELL, WA 98021
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
TK6110	OWNCO MARKETING	14150 SW MILTON CT	TIGARD, OR 97224

Replaceable Parts List

Fig. & index number	Tektronix part number	Serial no. effective	Serial no. discont'd	Qty	Name & description	Mfr. code	Mfr. part number
10-1-1	016-1441-00			1	POUCH, PLASTIC: PLASTIC POUCH	80009	016-1441-00
-2	200-4275-00			1	COVER,TOP: PLASTIC TOP COVER	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	80009	348-1479-00
-5	348-1254-01			8	PAD,FOOT:TEK BLACK,SANTOPRENE	80009	348-1254-01
-6	343-1213-00			1	CLAMP,PWR CORD:POLYMIDE	TK1163	ORDER BY DESCRIPTION
-7	200-4430-00			1	COVER:RIGHT,PLASTIC	7X318	2TEK1581X
-8	200-4280-00			1	COVER:BOTTOM COVER,0.050 SHEET METAL	80009	200-4280-00
-9	348-1515-00			0	FOOT,CABINET:BLACK PLASTIC,63-526,SET OF 4	80009	348-1515-00
-10	200-4279-00			1	COVER,FRONT:FRONT, PROTECTIVE, ABS, TEK BLUE	80009	200-4279-00
-11	214-4718-00			1	ACTUATOR,SWITCH:ACTUATOR,ON/STANDBY	80009	214-4718-00
-12	101-0149-00			1	TRIM,RING:FRONT TRIM RING,PLASTIC	80009	101-0149-00
-13	335-0478-00			1	MARKER,IDENT:LABEL, GE LEXAN,W/ADHESIVE	0KB05	335-0478-00
-14	200-4469-01			1	COVER:LEFT,PLASTIC	7X318	200-4469-01

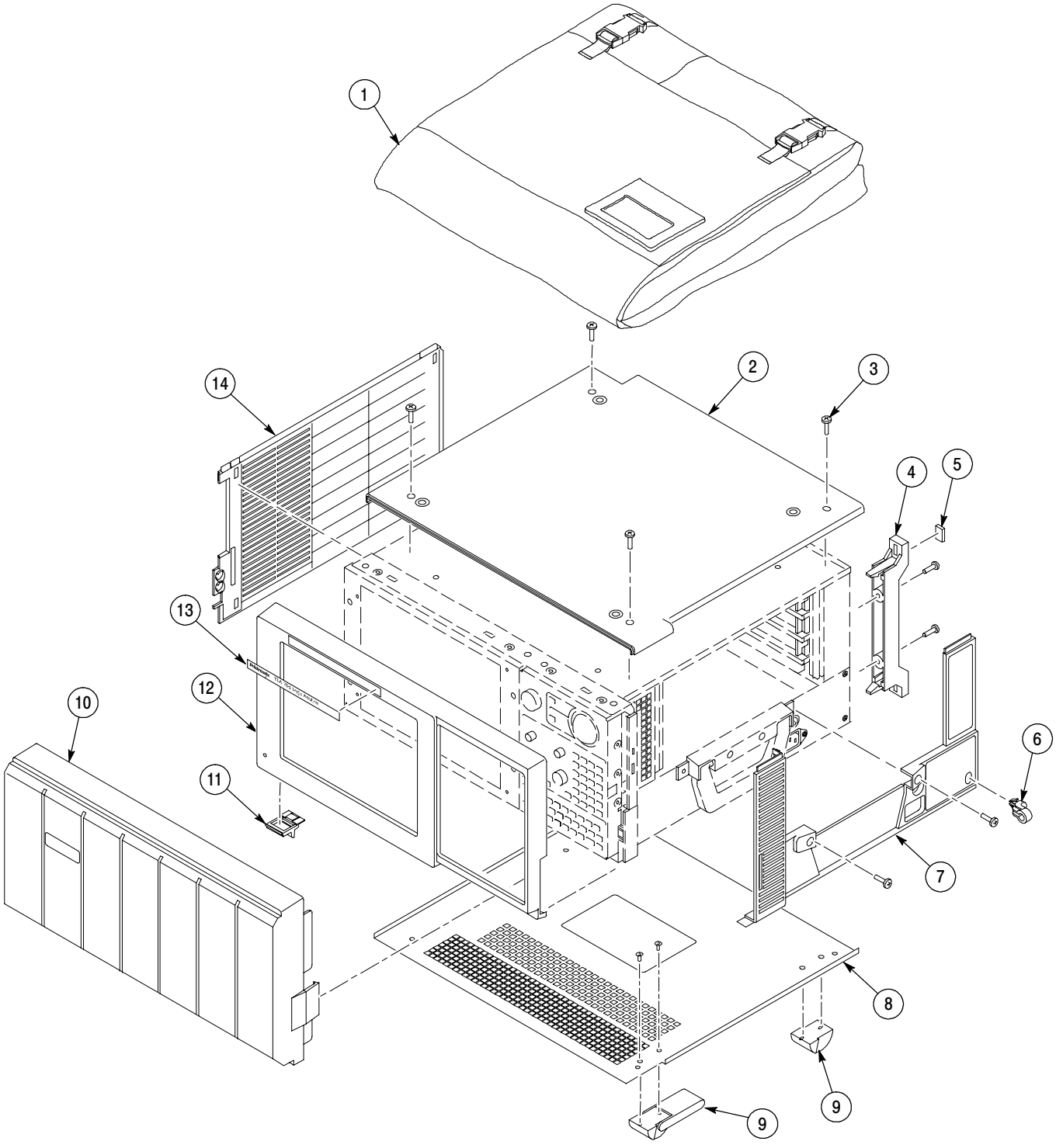


Figure 10- 1: External parts

Replaceable Parts List

Fig. & index number	Tektronix part number	Serial no. effective	Serial no. discont'd	Qty	Name & description	Mfr. code	Mfr. part number
10-2-1	650-4244-00			1	FRAME ASSEMBLY:DISPLAY	80009	650-4244-00
-2	337-4173-01			1	SHIELD: DISPLAY, 0.025 AL, CLR CHROMATE	TK1943	337-4173-01
-3	174-4187-00			1	CABLE ASSY,SP:RIBBON,DISPLAY,IDC,40 2 X 10,6.7 L,RCPT BOTH ENDS,SPECIAL FOLD	0RAG4	174-4187-00
-4	211-0722-00			14	SCREW,MACHINE:6-32 X 0.250,PNH,STL,CDPL,T-15 TORX DR	0KB01	ORDER BY DESCRIPTION
-5	671-4379-00			1	CIRCUIT BD ASSY: CONNECTOR CONVERSION	80009	671-4379-00
-6	211-1081-00			4	SCREW,MACHINE:M3 X 0.5 X 3.5MM,FLAT WAFER HD W/SERRATIONS STRESS RELIEVED,PHL,0.0002 STL ZI PL	0KB01	211-1081-00
-7	671-4378-00			1	CIRCUIT BD ASSY: HARD DISK DRIVE	80009	671-4378-00
-8	174-3925-00			1	CA ASSY,SP:RIBBON,CD ROM AUDIO CABLE,IDC,44,28 AWG,1MM,1.0 L,2 X 22,0.079 CTR (2MM),RCPT,W/	060D9	174-3925-00
-9	119-6493-00			1	DISK DRIVE:WINCHESTER,2.5 IN,10GB,SINGLE PLATTER,IDE,07N4390,	9F560	119-6493-00
-9	119-6494-00			1	DISK DRIVE:WINCHESTER,2.5 IN,30.0GB,SINGLE PLATTER,IDE,07N4392,	9F560	119-6494-00
-10	437-0494-00			1	CABINET ASSY:PLASTIC,REMOVEABLE HARD DISK DRIVE HOLDER	7X318	437-0494-00
-11	650-4271-00			1	DRIVE ASSEMBLY:REMOVEABLE HARD DISK DRIVE,MIN REPLACEABLE HDD,W/O SOFTWARE INSTALLED,TLA700	80009	650-4271-00
-11	650-4272-00			1	DRIVE ASSEMBLY:REMOVEABLE HARD DISK DRIVE,MAX REPLACEABLE HDD,W/O SOFTWARE INSTALLED,TLA700	80009	650-4272-00
-12	671-4377-00			1	CIRCUIT BD ASSY: CD ROM INTERFACE	80009	671-4377-00
-13	119-5728-00			1	DISK DRIVE:OPTICAL, 644MB, CD-ROM, 16.7 MB/SEC, IDE/ATAPI, CD-224	50356	CD-224E-903
-14	211-1071-00			3	SCREW:M2 X 2MM,FLT, PHL, STL NI PLT	0KB01	211-1071-00
-15	407-4570-XX			1	BRACKET: CD ROM	TK1943	407-4570-00
-16	671-5344-00			1	CIRCUIT BD ASSY:FRONT PANEL	80009	671-5344-00
-17	174-4505-00			1	CABLE ASSEMBLY:FRONT PANEL TO TRACKER BALL	060D9	174-4505-00
-18	119-6489-00			1	TRACK BALL:USB,PANEL MOUNT,GREY,P38-550428	1ES66	P38-550428
-19	407-4858-00			1	BRACKET:HOLD DOWN CLIP,0.028 EG STEEL	TK1943	407-4858-00
-20	260-2756-00			1	SWITCH,KEYPAD:ELASTOMERIC,FRONT PANEL,PUSHBUTTON,TWO PIECES	TK2376	260-2756-00
-21	211-0747-00			4	SCREW,MACHINE:6-32 X 0.188,PNH,STL,CDPL,T-15 TORX DR	0KB01	ORDER BY DESCRIPTION
-22	366-0821-00			2	KNOB,CAP:0.650 D,SOFT FEEL COATING,PC/ABS BAYBLEND,FR110,TEK SILVER GRAY	22670	366-0821-00
-23	366-0820-00			2	KNOB,CAP:0.425 DIA,SOFT FEEL COATING,PC/ABS,BAYBLEND,FR110,TEK SILVER GRAY	22670	366-0820-00

Replaceable Parts List (Cont.)

Fig. & index number	Tektronix part number	Serial no. effective	Serial no. discont'd	Qty	Name & description	Mfr. code	Mfr. part number
-24	366-0822-00			1	KNOB,CAP:0.925 DIA,SOFT FEEL COATING,PC/ABS BAYBLEND,FR110,TEK SILVER GRAY	22670	366-0822-00
-25	352-1063-00			1	OPTO, PASSIVE:LIGHT PIPE, 0.14 DIA X 1.445 INCHES LONG, CLEAR ACRYLIC	80009	352-1063-00

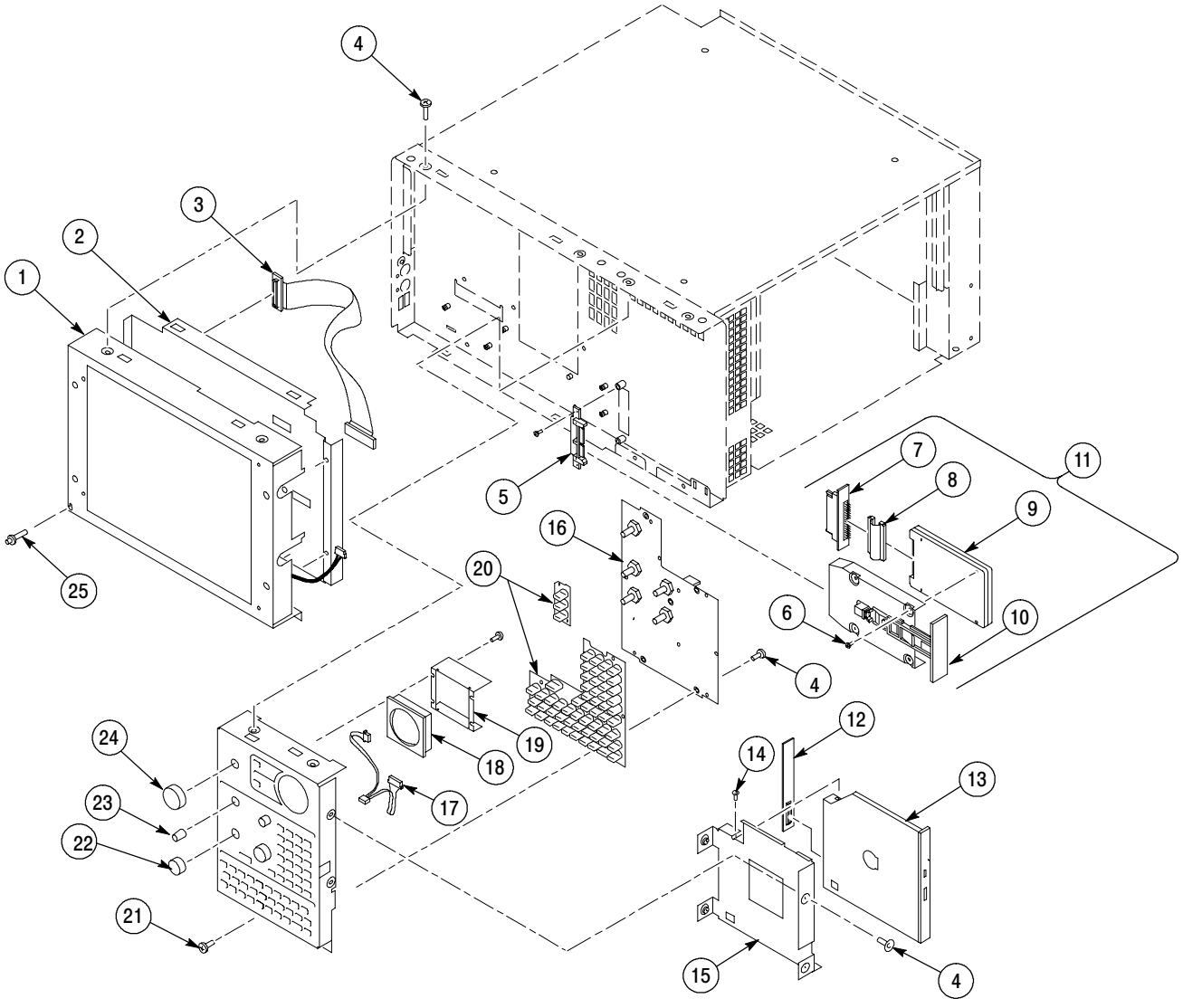


Figure 10-2: Front panel assembly

Replaceable Parts List

Fig. & index number	Tektronix part number	Serial no. effective	Serial no. discont'd	Qty	Name & description	Mfr. code	Mfr. part number
10-3-1	407-4682-00			1	BRACKET: HARD DRIVE	TK1943	407-4682-00
-2	211-0722-00			5	SCREW,MACHINE:6-32 X 0.250,PNH,STL,CDPL,T-15 TORX DR	0KB01	ORDER BY DESCRIPTION
-3	174-3923-00			1	CA ASSY,SP:RIBBON,IDC,44, 28 AWG,1MM,2X22,0.079 CTR,2MM,RCPT W/O STRAIN RELIEF BOTH ENDS,1	060D9	174-3923-00
-4	671-4381-00			1	CIRCUIT BD ASSY: INTERFACE	80009	671-4381-00
-5	174-4186-00			1	CA ASSY,SP:RIBBON,FRONT PANEL,IDC,34,28 AWG,6.0 L,2 X 17,0.1 CTR,RCPT,NON PLZ,BOTH ENDS,SPE	060D9	174-4186-00
-6	174-3732-00			1	FLOPPY DRIVE CABLE		
-7	174-3924-00			1	CA ASSY,SP:RIBBON,HD, IDC,44, 28 AWG,1MM,2X22,0.079 CTR,2MM,RCPT W/O STRAIN RELIEF THREE EN	060D9	174-3924-00
-8	211-0721-00			1	SCREW,MACHINE: 6-32 X 0.375, PNH, T-15 TORX DR	0KB01	ORDER BY DESCRIPTION
-9	211-0840-00			1	SCREW,MACHINE: M2.6 X 0.45MM PITCH X 4.0MM L, PHILIPS, PNH	0KB01	.26C4MXPHY
-10	407-4381-01			1	BRACKET: FLOPPY DRIVE BRACKET	80009	407-4381-00
-11	119-5677-02			1	DISK DRIVE: FLOPPY, 3.5 INCH, 1.44MB, BLACK, 0.5 INCH HIGH, DSDD, FD-05HG-2600	50356	FD-04HG-2600
-12	211-0895-00			2	SCREW,MACH:M2.6 X 0.45 X 8MM,PHILLIPS,PNH,ZINC YELLOW	0KB01	211-0895-00

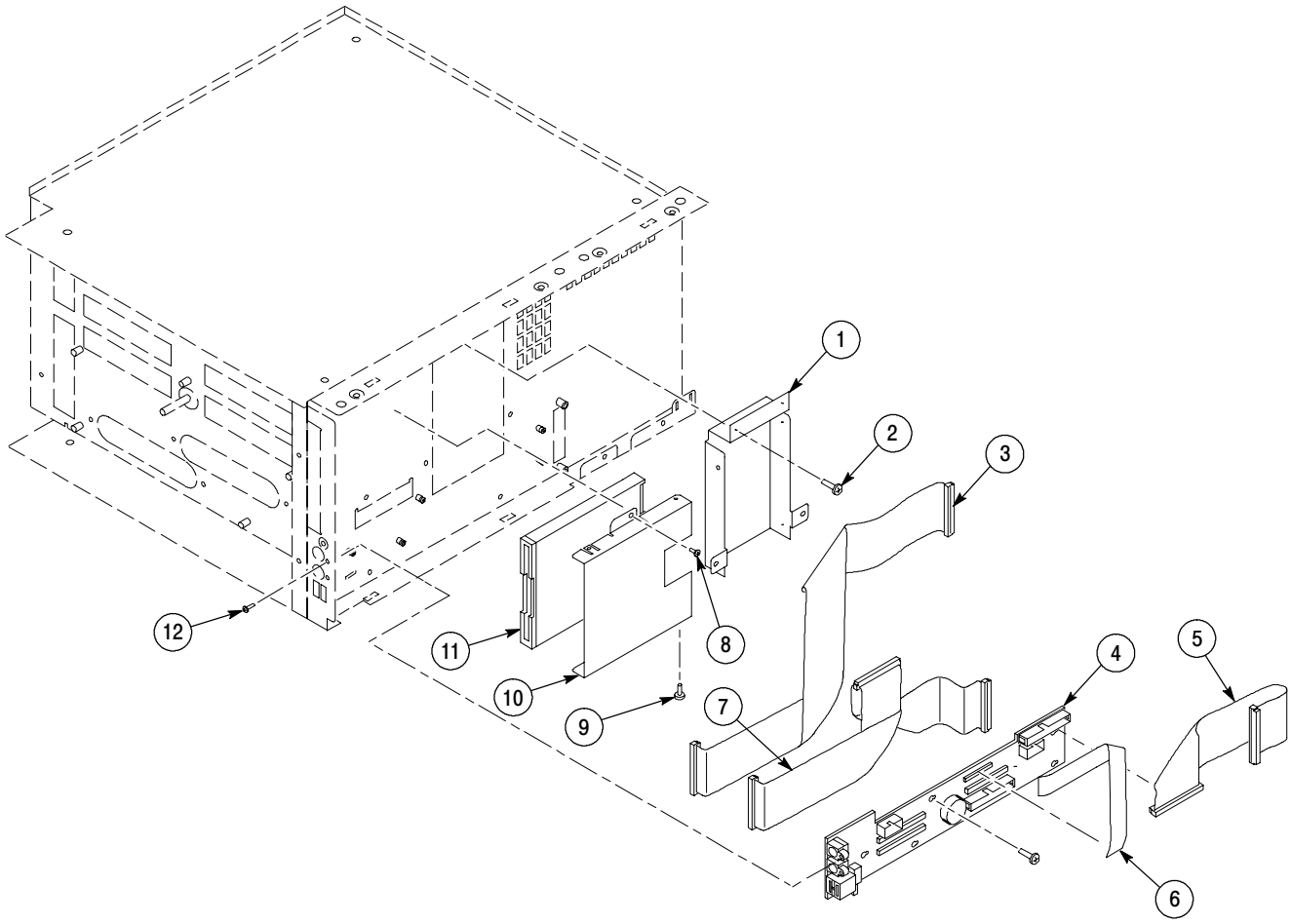


Figure 10-3: Floppy disk drive, front panel interface board, and related cables

Replaceable Parts List

Fig. & index number	Tektronix part number	Serial no. effective	Serial no. discont'd	Qty	Name & description	Mfr. code	Mfr. part number
10-4-1	118-9160-00			1	BACK PLANE:4 SLOT BACKPLANE ASSY,VXI	TK2157	118-9160-00
-2	211-0722-00			12	SCREW,MACHINE:6-32 X 0.250,PNH,STL,CDPL,T-15 TORX DR	0KB01	ORDER BY DESCRIPTION
-3	039-0114-00			1	CONTROLLER:SINGLE BOARD,PENTIUM III 500 MHZ MMX PROCESSOR	0L0L7	OBD
-4	174-4259-00			1	CA ASSY,SP:RIBBON,IDC,28 AWG,1MM,8.0 L,2 X 25,0.079CTR(2MM) BOTH ENDS,SAME SIDE,SPECIAL FO	060D9	174-4259-00
-5	156-4857-00			1	IC,MEMORY:CMOS,DRAM,32MEG X 64, 256MB SDRAM,PC133,MT8LSDT3264HG-133B1,SODIMM144	6Y440	MT8LSDT3264HG-133B1
-6	337-4244-00			1	SHIELD,ELEC:PROCESSOR,0.050 AL,	TK1943	337-4244-00
-7	012-0057-01			1	CA ASSY,RF:COAXIAL,RFD,50 OHM,43 L,BNC,MALE,STR,BOTH ENDS,W/STRAIN RELIEF BOOT BOTH ENDS,	060D9	012-0057-01
-8	PART OF ITEM 3			1	REAR PANEL		
-9	146-0132-00			1	BATTERY, 3V,1AH,LITHIUM COIN CELL, 1 IN DIA X 0.3 IN HEIGHT,SAFETY CONTROLLED	TK6379	CR2477N

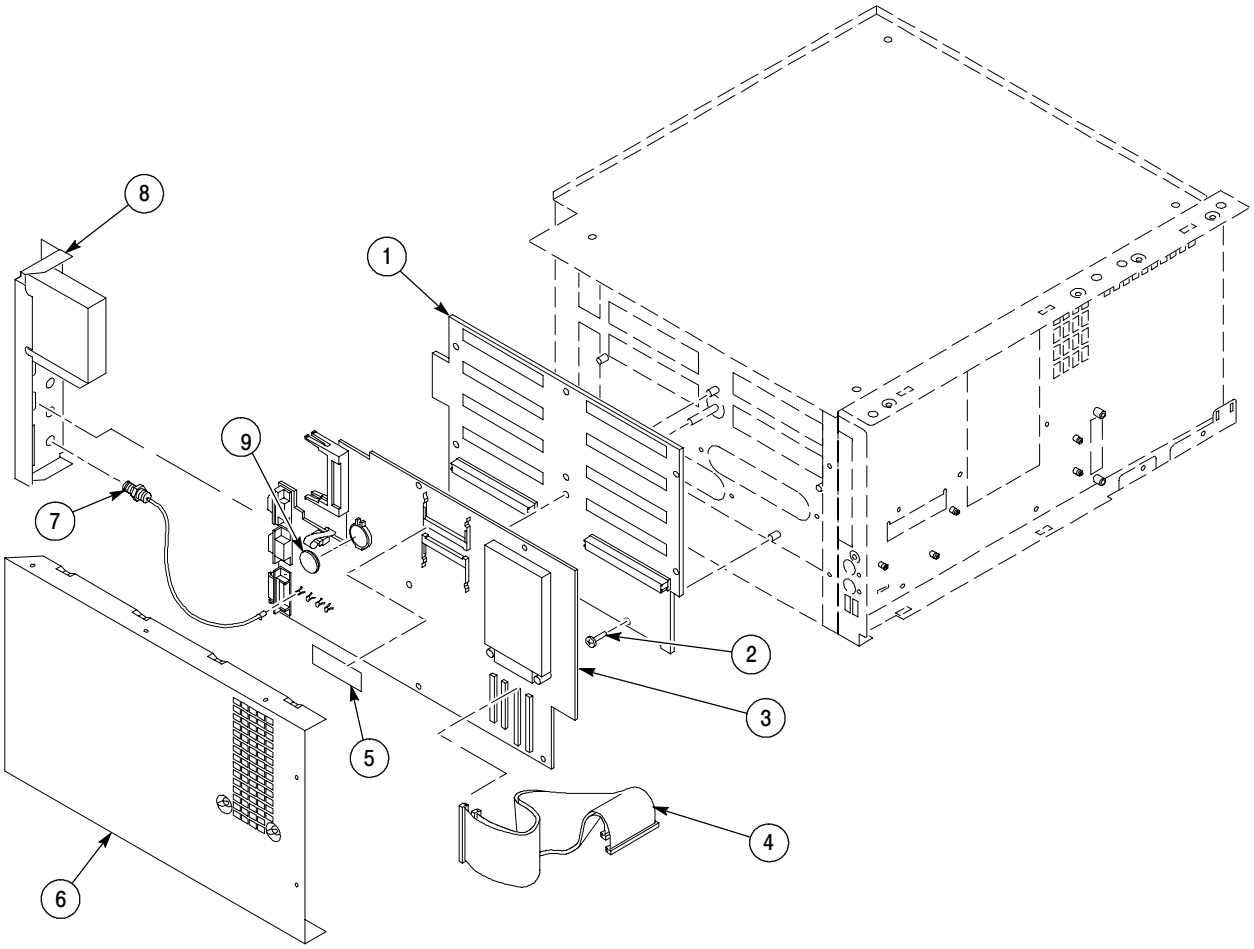


Figure 10-4: Controller board and EMI shield

Replaceable Parts List

Fig. & index number	Tektronix part number	Serial no. effective	Serial no. discont'd	Qty	Name & description	Mfr. code	Mfr. part number
10-5-1	441-2154-XX			1	CHASSIS,MAIN:AL	TK1943	441-2154-00
-2	436-0296-00			1	TRAY,FAN:CHASSIS ASSY,W/FANS MOUNTED	80009	436-0296-00
-3	119-5522-00			6	FAN,DC: TUBE AXIAL, 24V, 4.3W, 3200RPM, 54.7CFM RIBBED MOUNTING FLANGE	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			2	SCREW,MACHINE: 6-32 X 0.375, PNH,T-15 TORX DR	0KB01	ORDER BY DESCRIPTION
-14	211-0722-00			4	SCREW,MACHINE:6-32 X 0.250,PNH,STL,CDPL,T-15 TORX DR	0KB01	ORDER BY DESCRIPTION
-15	119-4933-01			1	POWER SUPPLY: POWER SUPPLY ASSY	1GM54	119-4933-01
-16	650-3591-01			1	PWR SUPPLY ASSY: HANDLE AND POWER SUPPLY	80009	650-3591-01
-17	020-2205-00			2	NUTBAR/SET SCREWS		
-18	378-0449-00			1	SHUTTER ASSY: INCLUDING FRAME, ACTUATOR, FIN, SPRING	7X318	2TEK1588
-19	131-6417-00			3	CONTACT, ELEC: GROUNDING	TK2647	7701118003

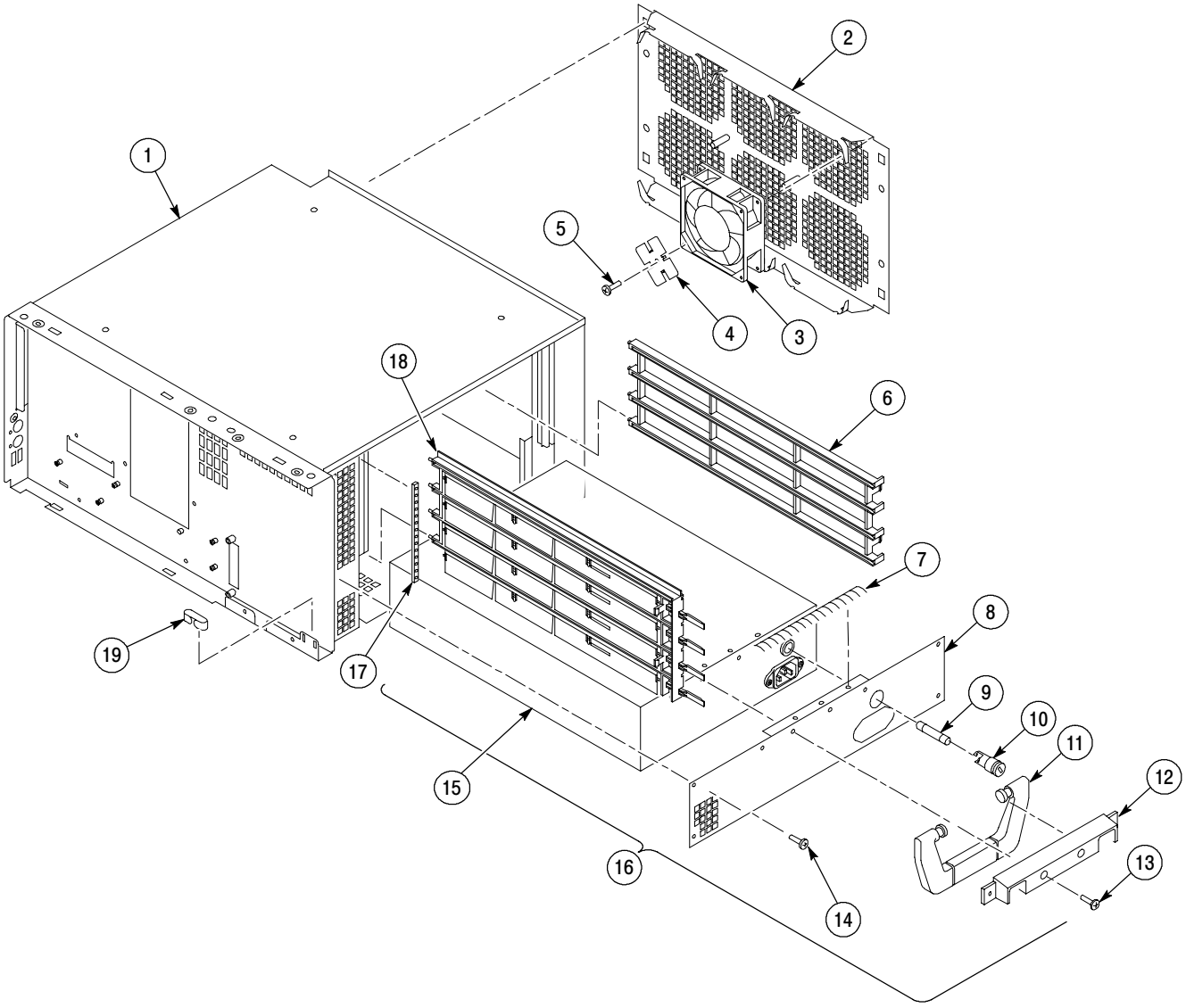


Figure 10- 5: Power supply and fan

Replaceable parts List

Fig. & index number	Tektronix part number	Serial no. effective	Serial no. discont'd	Qty	Name & description	Mfr. code	Mfr. part number
10-6-1	012-1614-00			1	CA ASSY:INTEROPTIBILITY ADAPTER CABLE	060D9	012-1614-00
-2	174-4583-00			1	CA ASSY:SMB TO BNC ADAPTER	060D9	174-4583-00

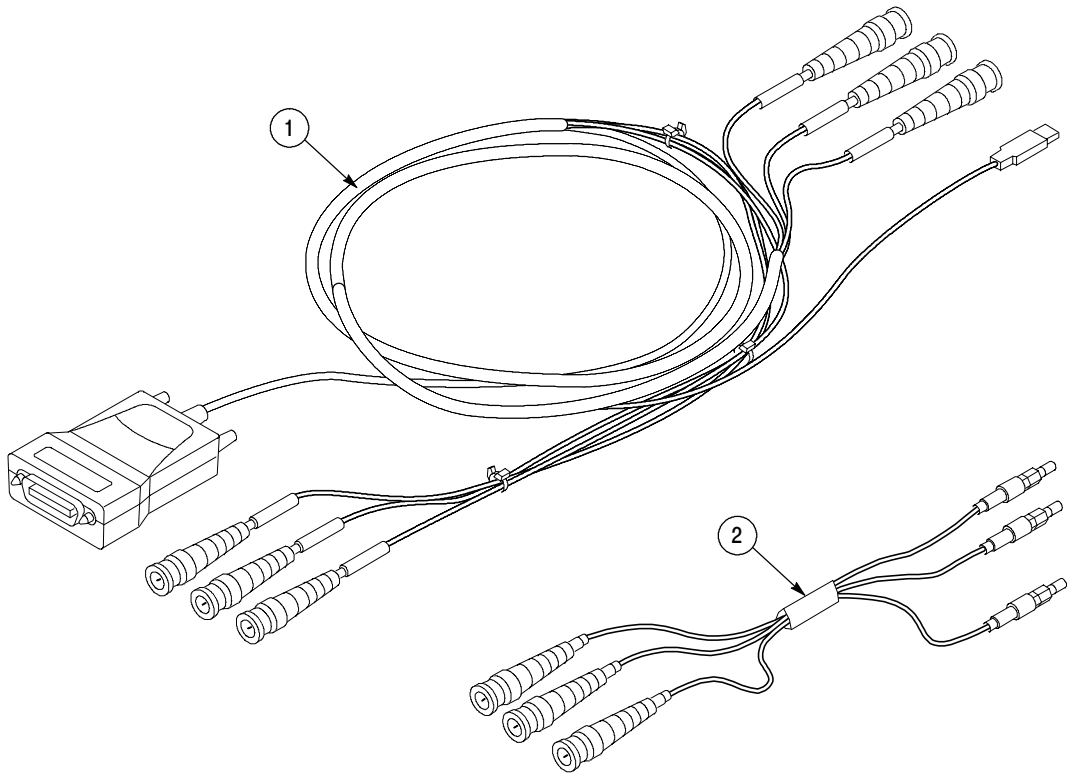


Figure 10-6: IView cables

Replaceable parts List

Fig. & index number	Tektronix part number	Serial no. effective	Serial no. discont'd	Qty	Name & description	Mfr. code	Mfr. part number
					STANDARD ACCESSORIES		
	015-0687-00			1	CABLE,INTCON:IEEE1284,SHIELDED COMPOSITE, 25,28 AWG,17 TW PR,1 METER, 25 POSITION,FEMALE DSUB	0VF15	015-0687-00
	016-1524-XX			2	MOUSE PAD: TEKTRONIX TLA SERIES	TK6110	016-1524-XX
	119-6574-XX			1	POINTER ASSY: WHEEL MOUSE	80009	119-6574-XX
	071-0863-XX			1	MANUAL,TECH: USER,TLA700 SERIES	TK2548	071-0863-XX
	119-5662-00			1	KEYBOARD:104 WINDOWS,RT5156TW	0D1M6	122761-001
	131-4356-00			5	CONN,SHUNT:SHUNT/SHORTING,FEMALE,1 X 2,0.1 CTR,0.63 H,BLK,W/HANDLE,JUMPER,30 GOLD	26742	9618-302-50
	200-4279-00			1	COVER,FRONT:FRONT, PROTECTIVE, ABS, TEK BLUE	7X318	1425
	016-1441-00			1	POUCH, PLASTIC PLASTIC POUCH	80009	016-1441-00
	161-0104-00			1	CA ASSY,PWR:3,18 AWG,98 L,250V/10AMP,98 INCH,RTANG,IEC320,RCPT X STR,NEMA 15-5P,W/CORD GRIP	S3109	ORDER BY DESCRIPTION
	161-0310-00			1	CA ASSY,PWR:3,18 AWG,BLACK,125V/2.5A,STR,118L,RECP IEC320 C5 X NEMA 5-15P,US,	0TZP3	LC5-UL
					OPTIONAL ACCESSORIES		
	119-6072-00			1	LAN PC CARD:10/100 LAN CARDBUS,32-BIT PC CARD,10BASE-T,3COM MODEL #3CXFE575BT	0ZQ35	3CCFE575BT
	020-2194-00			1	COMPONENT KIT:BACKPLANE,EMI SHIELD W/SCREWS,BACKPLANE,TLA704/TLA711	TK2157	020-2194-00
	071-0864-XX			1	MANUAL,TECH:SERVICE,LOGIC ANALYZER MODULE,TLA7NX/TLA7PX/TLA7QX SERIES	TK2548	071-0864-XX
	071-0567-XX			1	MANUAL.TECH:INSTRUCTION,P6417/P6418 LOGIC ANALYZER PROBE	TK2548	071-0567-XX
	070-9780-XX			1	MANUAL, TECH: SERVICE, TLA7D1, TLA7E1 DIGITIZING OSCILLOSCOPE MODULE	80009	070-9780-XX
	003-0008-00			1	ALIGN TOOL,ELEK:6.0 L X 0.375 DIA NYLON W/SCDR SHAPED ENDS	80009	003-0008-00
	016-1895-00			1	CASE,TRANSPORT:WHEELED,HARD,18.0 FLAT PANEL MONITOR	34416	016-1895-00
	016-1896-00			1	CASE,TRANSPORT:WHEELED,HARD,21.0 FLAT PANEL MONITOR	34416	016-1896-00
	119-6568-00			1	MONITOR,DISPLAY:FLAT PANEL,18.1 INCH, 1280 X 1024 RESOLUTION, WHITE CABINET, LCD1830	62803	LCD1830
	119-6569-00			1	MONITOR,DISPLAY:FLAT PANEL, 21.3 INCH DIAGONAL, 1600 X 1200 RESOLUTION, WHITE CABINET, LCD2110	62803	LCD2110

Replaceable parts List (Cont.)

Fig. & index number	Tektronix part number	Serial no. effective	Serial no. discont'd	Qty	Name & description	Mfr. code	Mfr. part number
	161-0104-06			1	CA ASSY,PWR:3,1.0MM SQ,250V/10A,2.5 METER,RTANG,IEC320,RCPT,EUROPEAN,SAFTEY CONTROLLED	TK1373	ORDER BY DESCRIPTION
	161-0104-07			1	CA ASSY,PWR:3,1.0MM SQ,240V/10A,2.5 METER,RTANG,IEC320,RCPT X 13A,FUSED,UK PLUG,(13A FUSE)	TK2541	ORDER BY DESCRIPTION
	161-0104-05			1	CA ASSY,PWR:3,1.0MM SQ,250V/10A,2.5 METER,RTANG,IEC320,RCPT,AUSTRALIA,SAFTEY CONTROLLED	TK1373	161-0104-05
	161-0104-08			1	CA ASSY,PWR:3,18 AWG,250/10A,98 INCH L,RTANG,IEC320,RCPT X STR,NEMA 6-15P,US,SAFTEY CONTROLL	2W733	161-0104-08
	161-0167-00			1	CA ASSY,PWR:3,0.75MM SQ,250V/10A,2.5 METER,RTANG,IEC320,RCPT,SWISS,NO CORD GRIP,SAFTEY CONTR	S3109	ORDER BY DESCRIPTION
	161-0311-00			1	CA ASSY,PWR:3,250V/2.5A,STR,IEC320 C5,EUROPEAN,BLACK,	0TZP3	LC5-EC
	161-0312-00			1	CABLE ASSY,PWR:3,1.0MM SQ,250V/2.5A,STR,RECP IEC320 C5,UNITED KINGDOM,BLACK,	0TZP3	LC5-UK
	161-0313-00			1	CA ASSY, PWR:3,0.75mm sq,BLACK,250v/2.5A,STR,RECP IEC320 C5,AUSTRALIAN,	0TZP3	LC5-AS
	161-0314-00			1	CA ASSY,PWR:3,0.75MM SQ,BLACK,250V/2.5A,STR, RECP IEC320 C5,SWISS,	0TZP3	LC5-SW

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