Tektronix®

RSA5100B Series
Real-Time Signal Analyzer

Service Manual

Contacting Tektronix

Tektronix, Inc.
14150 SW Karl Braun Drive
P.O. Box 500
Beaverton, OR 97077
USA

For product information, sales, service, and technical support:
- In North America, call 1-800-833-9200.
- Worldwide, visit www.tek.com to find contacts in your area.

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Important safety information

This manual contains information and warnings that must be followed by the user for safe operation and to keep the product in a safe condition.

To safely perform service on this product, additional information is provided at the end of this section. (See page vi, *Service safety summary*.)

General safety summary

Use the product only as specified. Review the following safety precautions to avoid injury and prevent damage to this product or any products connected to it. Carefully read all instructions. Retain these instructions for future reference.

Comply with local and national safety codes.

For correct and safe operation of the product, it is essential that you follow generally accepted safety procedures in addition to the safety precautions specified in this manual.

The product is designed to be used by trained personnel only.

Only qualified personnel who are aware of the hazards involved should remove the cover for repair, maintenance, or adjustment.

Before use, always check the product with a known source to be sure it is operating correctly.

This product is not intended for detection of hazardous voltages.

Use personal protective equipment to prevent shock and arc blast injury where hazardous live conductors are exposed.

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

When incorporating this equipment into a system, the safety of that system is the responsibility of the assembler of 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.

Do not use the provided power cord for other products.

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, make sure that the product is properly grounded.

Do not disable the power cord grounding connection.

Power disconnect. The power cord disconnects the product from the power source. See instructions for the location. Do not position the equipment so that it is difficult to operate the power cord; it must remain accessible to the user at all times to allow for quick disconnection if needed.

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

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 float the common terminal above the rated voltage for that terminal.

The measuring terminals on this product are not rated for connection to mains or Category II, III, or IV circuits.

Do not operate without covers. Do not operate this product with covers or panels removed, or with the case open. Hazardous voltage exposure is possible.

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

Do not operate with suspected failures. If you suspect that there is damage to this product, have it inspected by qualified service personnel.

Disable the product if it is damaged. Do not use the product if it is damaged or operates incorrectly. If in doubt about safety of the product, turn it off and disconnect the power cord. Clearly mark the product to prevent its further operation.

Before use, inspect voltage probes, test leads, and accessories for mechanical damage and replace when damaged. Do not use probes or test leads if they are damaged, if there is exposed metal, or if a wear indicator shows.

Examine the exterior of the product before you use it. Look for cracks or missing pieces.

Use only specified replacement parts.

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

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

Do not operate in wet/damp conditions. Be aware that condensation may occur if a unit is moved from a cold to a warm environment.

Do not operate in an explosive atmosphere.

Keep product surfaces clean and dry. Remove the input signals before you clean the product.

Provide proper ventilation. Refer to the installation instructions in the manual for details on installing the product so it has proper ventilation.

Slots and openings are provided for ventilation and should never be covered or otherwise obstructed. Do not push objects into any of the openings.

Provide a safe working environment. Always place the product in a location convenient for viewing the display and indicators.

Avoid improper or prolonged use of keyboards, pointers, and button pads. Improper or prolonged keyboard or pointer use may result in serious injury.

Be sure your work area meets applicable ergonomic standards. Consult with an ergonomics professional to avoid stress injuries.

Use care when lifting and carrying the product. This product is provided with handles for lifting and carrying.

Use only the Tektronix rackmount hardware specified for this product.

Service safety summary

The *Service safety summary* section contains additional information required to safely perform service on the product. Only qualified personnel should perform service procedures. Read this *Service safety summary* and the *General safety summary* before performing any service procedures.

To avoid electric shock. Do not touch exposed connections.

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 product power and disconnect the power cord from the mains power before removing any covers or panels, or opening the case for servicing.

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.

Verify safety after repair. Always recheck ground continuity and mains dielectric strength after performing a repair.

Terms in this manual

These terms may appear in this manual:

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

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

Symbols and terms on the product

These terms may appear on the product:

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

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

■ CAUTION indicates a hazard to property including the product.

⚠ When this symbol is marked on the product, be sure to consult the manual to find out the nature of the potential hazards and any actions which have to be taken to avoid them. (This symbol may also be used to refer the user to ratings in the manual.)

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

⚠ CAUTION
Refer to Manual

⏚ Protective Ground
(Earth) Terminal

⏚ Earth Terminal

⏻ Standby

RSA5100B Series Service Manual

Preface

This is the service manual for the RSA5100B Series Real-Time Signal Analyzers.

Manual content

This manual contains information related to servicing an RSA5100B Series Real-Time Signal Analyzer. For information related to installing and operating the instrument, or for a list of instrument specifications, refer to the appropriate user document. (See page x, *Related documentation*.)

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

Manual conventions

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

Module
The term module refers to a collection of items that are replaceable as a unit. A module may contain electrical and mechanical assemblies, circuit boards, and interconnecting cables.

Plug-in module
The term Plug-in module refers to the units that plug into the Main digital interface board.

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

Safety
Symbols and terms related to safety appear in the General Safety Summary found at the beginning of this manual. Be sure to read both the General Safety Summary and Service Safety Summary before performing any service to this instrument.

Related documentation

The following related English user documents are available if you need more information about operating the instrument. These documents can be downloaded from the Tektronix Web site (www.tektronix.com/manuals).

- *RSA5100B Series Real-Time Signal Analyzer Quick Start User Manual.* This document provides the basic information you need to install and operate the instrument. The document includes a listing of the available instrument options and accessories.

- *RSA5100B Series Real-Time Signal Analyzer Series Specifications and Performance Verification Technical Reference* (English). This document contains the following technical information about the instrument:

    - Electrical and physical specifications, including a list of certifications and compliances.

    - A performance verification procedure to check instrument performance against guaranteed specifications.

- *RSA5100B Series Real-Time Signal Analyzer Programmer Manual* (English). Describes the GPIB instrument programming commands and interface.

- *RSA5100B Series Real-Time Signal Analyzer Declassification and Security Instructions* (English). Provides instruction on how customers with data security concerns can sanitize or remove memory devices from the instrument.

Theory of operation

Theory of operation

This section provides a basic description of the Real-Time Signal Analyzer (RSA) operation. Refer to the following block diagram of the instrument while reading through this section.
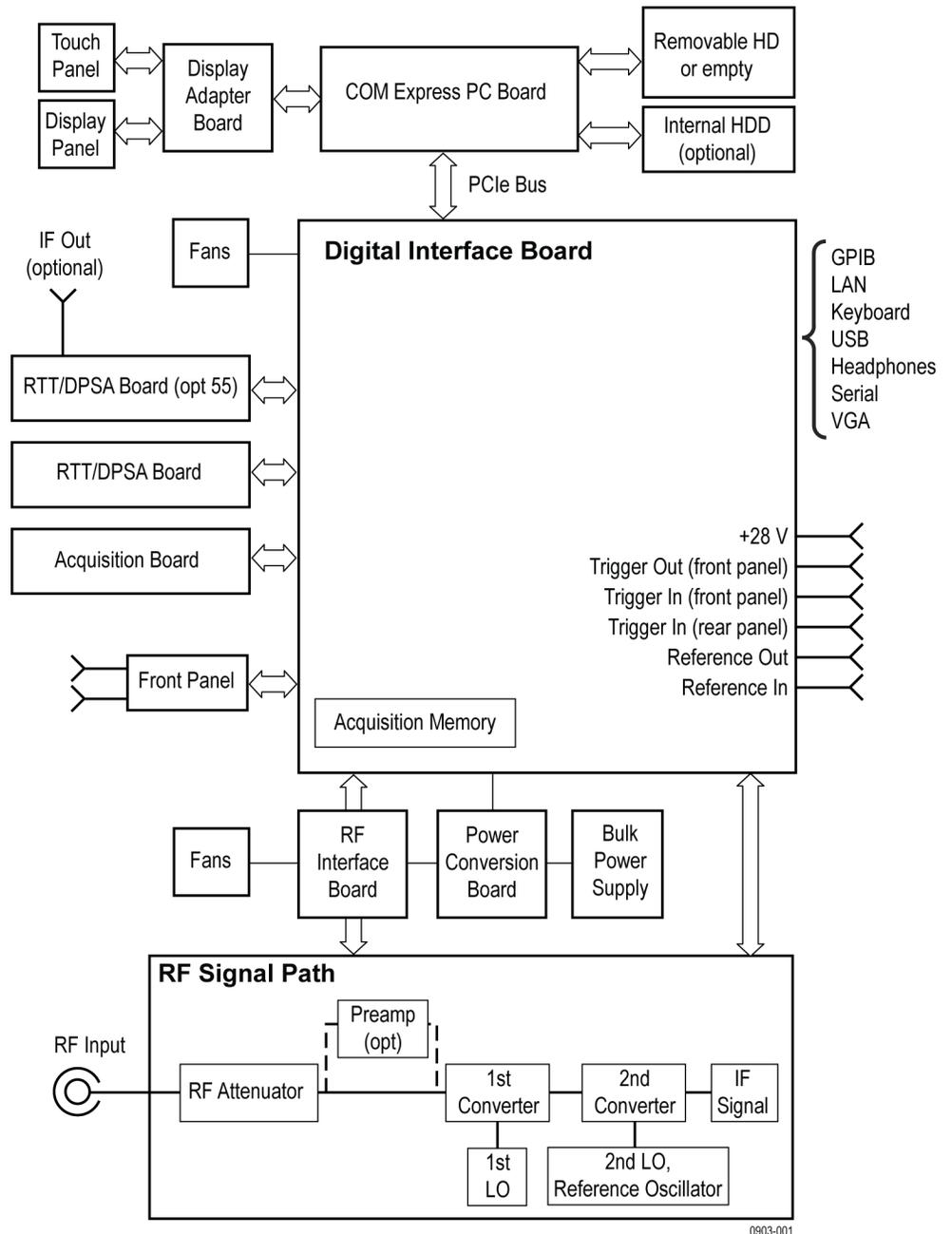
Figure 1-1: Block diagram

General

A processor system controls the instrument. The instrument features an XGA resolution flat-panel display, a transparent touch-screen, and a front-panel with direct access to common features. You can also use the instrument with a mouse or other pointing device, and/or a keyboard.

The instrument uses the Microsoft Windows 7 operating system.

Signal path and processing

RF signal path

An RF signal enters the instrument through a direct N-type coaxial connection.

The RF signal path consists of an attenuator, optional preamplifier, 1st converter, and 2nd converter. The purpose of the RF signal path is to translate a band-limited replica of a portion of the input signal range to an intermediate frequency (IF) which can be sampled by a high-dynamic-range A/D converter.

The processor system controls the RF signal path.

Acquisition system

The acquisition system samples the IF signal and converts it to digital signals. These digital signals are then filtered numerically and processed either for direct display or by measurement applications to provide signal quality metrics to the user. The acquisition data processing is performed by one of several field-programmable gate arrays (FPGAs) under control of the processor. The processor performs measurement applications.

Processor system

The processor system consists of a COM Express PCI-based processor board and a Digital interface board that connects the processor to the acquisition board.

Trigger inputs

There are two coaxial trigger inputs. One is on the front panel below the display and the other is on the rear panel. Both trigger inputs connect directly to the Digital interface board. Trigger signals are processed by an FPGA on the Digital interface board. The information from the trigger system is combined with acquisition data by the processor system.

The Trigger Out signal is a coaxial connection on the front panel below the display. The trigger out signal comes from the Acquisition Control FPGA, through the Digital interface board.

Display panel

Waveforms, spectral traces, measurement results, and control menus are displayed on a 10.4 inch, color, active-matrix LCD display with touch panel.

Display system   The display system consists of a display adapter board. The display adapter board sends text and waveform information to the display panel.

Touch panel   The display adapter board sends information from the touch panel to the processor. The touch panel is listed as a USB HID device in the Window Device Manager tool.

Front panel

The processor system detects changes in the front-panel switches and encoder. The processor also turns the LEDs on and off. Communication between the processor system and the front panel is performed over an internal USB connection.

The ON/STBY switch passes through the display adapter board, the PC carrier board, the digital interface board, and to the PC board.

The removable HDD (hard disk drive) communicates over a SATA connection directly to the processor system.

Rear panel

The following table describes the rear panel connectors.

Table 1-1: Rear panel connectors

Name	Input or Output	Connector type	Description
Reference In	Input	BNC	External time-base reference. See data sheet for signal quality requirements.
Reference Out	Output	BNC	10 MHz output or loop-through of user Reference In signal
LAN	Input/Output	RJ-45	10/100/1000baseT Ethernet connector
USB	Input/Output	USB	Two USB 2.0 connectors
Keyboard	Input	PS/2	Keyboard-only PS/2 connector
VGA	Output	D-Sub	External monitor connector
Serial	Input/Output	D-Sub	Serial communications port (COM1) to processor system
Trigger In	Input	BNC	TTL Gate/trigger input signal

Table 1-1: Rear panel connectors (cont.)

Name	Input or Output	Connector type	Description
Line In (blue)	Input	3.5 mm mono	Audio line input (disabled)
MIC In (pink)	Input	3.5 mm mono	Audio input signal (microphone)
Headphone	Output	3.5 mm stereo	External headphone connection
+28 VDC	Output	BNC	Noise source drive power
GPIB	Input/Output	IEEE-488	General Purpose Interface Bus
Zero-span	Output	BNC	Zero-span output connector

Power supply

The Power conversion board provides instrument power. The Power conversion board consists of several switching supplies that translate and balance the power taken from the power supply module.

Power is distributed from the Power conversion board to both the RF Deck and the Digital interface board.

The ON/STBY switch, located on the front panel, controls all of the power to the instrument except for the part of the circuitry in the standby power supply.

Fans

Several fans provide cooling to the instrument:

- Three fans are located in the RF Deck and are controlled by the RF Interface.

- Two fans provide cooling for the Digital Deck of the instrument.

- The power supply module has an internal fan.

- The COM Express PC board has a fan that is controlled by the COM Express PC board.

- The optional DPSA board contains a fan.

Adjustment procedures

Adjustment procedure

There are no physical user adjustment procedures for the instruments. However, you can run alignments from the product application.

Running alignments

Alignments are adjustment procedures run by the instrument using internal reference signals and measurements, and do not require any external equipment or connections.

There are two settings for Alignments:

- Automatically align as needed (Auto mode)

- Run alignments only when the **Align Now** button is pressed

If **Automatically align as needed** is selected, alignments run whenever the Signal Analyzer detects a sufficient change in ambient conditions to warrant an alignment.

If **Run alignments only when "Align Now" button is pressed** is selected, the Signal Analyzer never runs an alignment unless you manually initiate an alignment using the Align Now button.

NOTE. There are a few critical adjustments that must run occasionally even if Automatically align as needed is not enabled.

Alignment status The instrument displays a message on screen when it needs to run an alignment. If no message is displayed, you can assume that the instrument is properly aligned.

Initiating an alignment To initiate an alignment:

1. Select **Setup > Alignments**.

2. Click the **Align Now** button.

The instrument runs an alignment procedure. It displays status messages as the alignment procedure is running. If the instrument fails the alignment procedure, the it displays an error message. If the instrument fails an alignment, run Diagnostics (Tools > Diagnostics) to determine why the alignment failed.

NOTE. While an alignment is running, both the IF and IQ outputs are disabled.

Alignments during warm-up

Alignments are not run during the 20 minute warm-up period (except for RF oscillator alignments); the instrument uses default alignment values (if Auto mode is selected).

NOTE. Instrument performance is not warranted during the specified 20 minute warm-up period.

Alignments during normal operation

Once the instrument reaches operating temperature, a full alignment is run every two hours (for up to two minutes). Alignments can run more frequently if the operating temperature changes. If an alignment becomes necessary during a measurement cycle (if Auto mode is selected), the measurement is aborted and an alignment procedure is run. Once an alignment procedure is completed, the measurement cycle restarts.

Alignments are not calibrations

Alignments are adjustment procedures run by the instrument using internal reference signals and measurements. Calibrations can only be performed at a Tektronix service center and require the use of traceable test equipment (signal sources and measuring equipment) to verify the performance of the instrument.

Maintenance

Maintenance

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

Preventing ESD

Before servicing this product, read the *Safety summary* at the front of the manual and the ESD information below.

⚠ **CAUTION.** *Static discharge can damage any semiconductor component in this instrument.*

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

- Minimize handling of static-sensitive circuit boards and components.

- Transport and store static-sensitive modules in their static protected containers or on a metal rail. Label any package that contains static-sensitive boards.

- Discharge the static voltage from your body by wearing a grounded antistatic wrist strap while handling these modules. Perform service of static-sensitive modules only at a static-free work station.

- Do not allow anything capable of generating or holding a static charge on the work station surface.

- Handle circuit boards by the edges when possible.

- Do not slide the circuit boards over any surface.

- Avoid handling circuit boards in areas that have a floor or work-surface covering capable of generating a static charge.

Inspection and cleaning

This section describes how to inspect for dirt and damage. It also describes how to clean the exterior and interior of the instrument. Inspection and cleaning are done as preventive maintenance. Preventive maintenance, when done regularly, may prevent instrument malfunction and enhance its reliability.

Preventive maintenance consists of visually inspecting and cleaning the instrument and using general care when operating it.

How often preventive maintenance should be performed depends on the severity of the environment in which you use the instrument. A proper time to perform preventive maintenance is just before instrument adjustment.

General care

The cabinet helps keep dust out of the instrument and should normally be in place when operating the instrument.

Interior Ccleaning

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.

⚠ **WARNING.** *Before performing any procedure that follows, power down the instrument and disconnect it from line voltage. Failure to do so could cause personal injury, or death.*

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 the use of chemical cleaning agents which might damage the plastics used in this instrument. Use only deionized water when cleaning the menu buttons or front-panel buttons. Use a 75% isopropyl alcohol solution as a cleaner and rinse/wipe with deionized water. Before using any other type of cleaner, consult your Tektronix Service Center or representative.*

Inspect the outside of the instrument for damage, wear, and missing parts, using the following table as a guide. Immediately repair defects that could cause personal injury or lead to further damage to the instrument.

Table 3-1: External inspection checklist

Item	Inspect for	Repair action
Cabinet, front panel, and cover	Cracks, scratches, deformations, damaged hardware	Repair or replace defective module
Front-panel knob	Missing, damaged, or loose knob	Repair or replace missing or defective knob

Table 3-1: External inspection checklist (cont.)

Item	Inspect for	Repair action
Connectors	Broken shells, cracked insulation, and deformed contacts; dirt in connectors	Repair or replace defective modules; clear or wash out dirt
Carrying handle, and cabinet feet	Correct operation	Repair or replace defective module
Accessories	Missing items or parts of items, bent pins, broken or frayed cables, and damaged connectors	Repair or replace damaged or missing items, frayed cables, and defective modules

Flat panel display cleaning   The 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 wiping 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 wipe the display surface. Avoid using excess force or you may damage the plastic display surface.

> **CAUTION.** *To prevent moisture from getting inside the instrument during external cleaning, use only enough liquid to dampen the cloth or applicator.*

To access the inside of the instrument for inspection and cleaning, refer to the *Removal and installation procedures* in this section.

Inspect the inside of the instrument for damage and wear, using the following table as a guide. Defects found should be repaired immediately.

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

Table 3-2: Internal inspection check list

Item	Inspect for	Repair action
Circuit boards	Loose, broken, or corroded solder connections. Burned circuit boards. Burned, broken, or cracked circuit-run plating.	Remove and replace damaged circuit board.
Resistors	Burned, cracked, broken, blistered condition.	Remove and replace damaged circuit board.
Solder connections	Cold solder or rosin joints.	Resolder joint and clean with isopropyl alcohol.
Capacitors	Damaged or leaking cases. Corroded solder on leads or terminals.	Remove and replace damaged circuit board.
Wiring and cables	Loose plugs or connectors. Burned, broken, or frayed wiring.	Firmly seat connectors. Repair or replace modules with defective wires or cables.
Chassis	Dents, deformations, and damaged hardware.	Straighten, repair, or replace defective hardware.

To clean the instrument interior, do the following steps:

1. Blow off dust with dry, low-pressure, deionized air (approximately 9 psi).

2. Remove any remaining dust with a lint-free cloth dampened in isopropyl alcohol (75% solution), and a clean lint-free cloth dampened in warm deionized water. (A cotton-tipped applicator is useful for cleaning in narrow spaces and on circuit boards.)

Restoring the instrument software

> ⚠ *CAUTION. The operating system (OS) restore process deletes all existing content on a hard drive, including the instrument application software and saved data and configuration files. Save or back up important data and configuration files to external files or media before restoring the instrument OS.*

Restore the operating system

This procedure restores the instrument operating system from a partition on the instrument hard disk drive. You will need to reload the instrument applications after restoring the operating system.

> ⚠ *CAUTION. Save or back up important data and configuration files to external files or media before restoring the instrument OS.*

> *NOTE. Read through these instructions before you perform the procedure. There is a 5-second time frame in which you must press the F5 key to access the restore program.*

1. Restart the instrument. During the boot-up process you will see the following message at the center of the screen:

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

2. Repeatedly press the **F5** key until the Acronis True Image Tool opens. There is an approximate 5-second time period from when the message appears until the instrument proceeds with the normal instrument startup. If the instrument does not open the Acronis application, power off the instrument, then power on the instrument and try again.

3. Click **Restore**.

4. In the Confirmation dialog box, click **Yes** to restore the instrument operating system, or **No** to exit the restore process. The restore process takes approximately 30 minutes; the actual time depends on the instrument configuration.

5. Reinstall the instrument product software.

Get the latest software

For information on the latest software and critical updates, check the Tektronix Web site (www.tektronix.com/software) and search for virus, patch, or critical updates for your instrument. Follow the on-screen instructions to download the software.

Removal and installation procedures

This subsection contains procedures for the removal and installation of all customer-replaceable mechanical and electrical modules.

Preparation

⚠️ **WARNING.** *Before doing this or any other procedure in this manual, read the Safety Summary found at the beginning of this manual. Also, to prevent possible injury to service personnel or damage to the instrument components, read Installation in the RSA5100B Series Real-Time Signal Analyzers Quick Start User Manual, available on the Web at www.tektronix.com/manuals, and Preventing ESD in this section.*

This subsection contains the following items:

- Preparatory information that you need to properly do the procedures that follow.

- A list of tools required to remove and disassemble all modules.

- Procedures for removal and reinstallation of the electrical and mechanical modules.

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

NOTE. *Read the Equipment Required section for a list of the tools needed to remove and install modules in this instrument. (See Table 3-3 on page 3-8.) Read the cleaning procedure before disassembling the instrument for cleaning.*

Equipment required. Most modules in the instrument can be removed with a size T15 TORX screwdriver. Other tools needed for complete disassembly are listed in the following table.

Table 3-3: Tools required for module removal

Item no.	Name	Description	General tool number
1	Screwdriver handle	Accepts TORX-driver bits	620-440
2	T10 TORX tip	Used for removing instrument. screws TORX-driver bit for T10 size screw heads	640-235
3	T15 TORX tip	Used for removing most instrument screws. TORX-driver bit for T15 size screw heads	640-247
4	1/8 inch flat-bladed screwdriver	Screwdriver for unlocking cable connectors	Standard tool
5	#0 Phillips screwdriver	Screwdriver for removing small phillips screws, CDRW, and hard drive	Standard tool
6	Angle-tip Tweezers	Used to remove front panel knobs	Standard tool
7	3/16 inch open-end wrench	Used to remove nut posts	Standard tool
8	5/16 inch open-end wrench	Used to remove nut posts	Standard tool
9	MA-800G Soldering Aid	Used to remove the front panel trim	Standard tool

Trim, cabinet, and module removal

Use the following two tables to determine items of the instrument that you will need to remove to access replaceable parts. The first table lists items that may need to be removed before you can access a replaceable module. The second table lists customer replaceable modules and which items must be removed to access the replaceable module. The approximate location of the primary customer replaceable modules is shown in the following figure. (See Figure 3-1 on page 3-10.)

Table 3-4: Legend for accessing modules table

A - Front Cover (if installed)	F - Internal Cover, top	K - Front Panel
B - Front panel trim	G - Internal Cover, bottom	L - Internal HDD (if installed)
C - Pouch (if installed)	H- Removable HDD (if installed)	M - Power Conversion board
D - Cabinet, top	I- Removable HDD Frame	N- Power Supply
E - Cabinet, bottom	J - Display Assembly	

Table 3-5: Accessing modules

Modules to replace	Remove these items to access the module													
	A	B	C	D	E	F	G	H	I	J	K	L	M	N
Display Assembly	✔	✔												
Front Panel	✔	✔												
Removable HDD Drive (if installed)	✔	✔												
Removable HDD Frame	✔	✔		✔	✔	✔						✔		
Digital Fan Tray (Upper Deck)	✔	✔		✔	✔	✔								
RF Deck Fan Tray	✔	✔			✔		✔							
Real Time IQ/IF Output Acquisition board (if installed)	✔	✔		✔	✔	✔								
RTT/DPSA board	✔	✔		✔	✔	✔								
COM-Express PC board	✔	✔		✔	✔	✔								
Internal HDD (if installed)	✔	✔		✔	✔	✔								
Power Conversion board	✔	✔		✔	✔	✔								
Power Supply	✔	✔		✔	✔	✔								

Power supply
access cover

Internal hard drive

Removable
drive

Chassis
drive tray

Power
conversion board
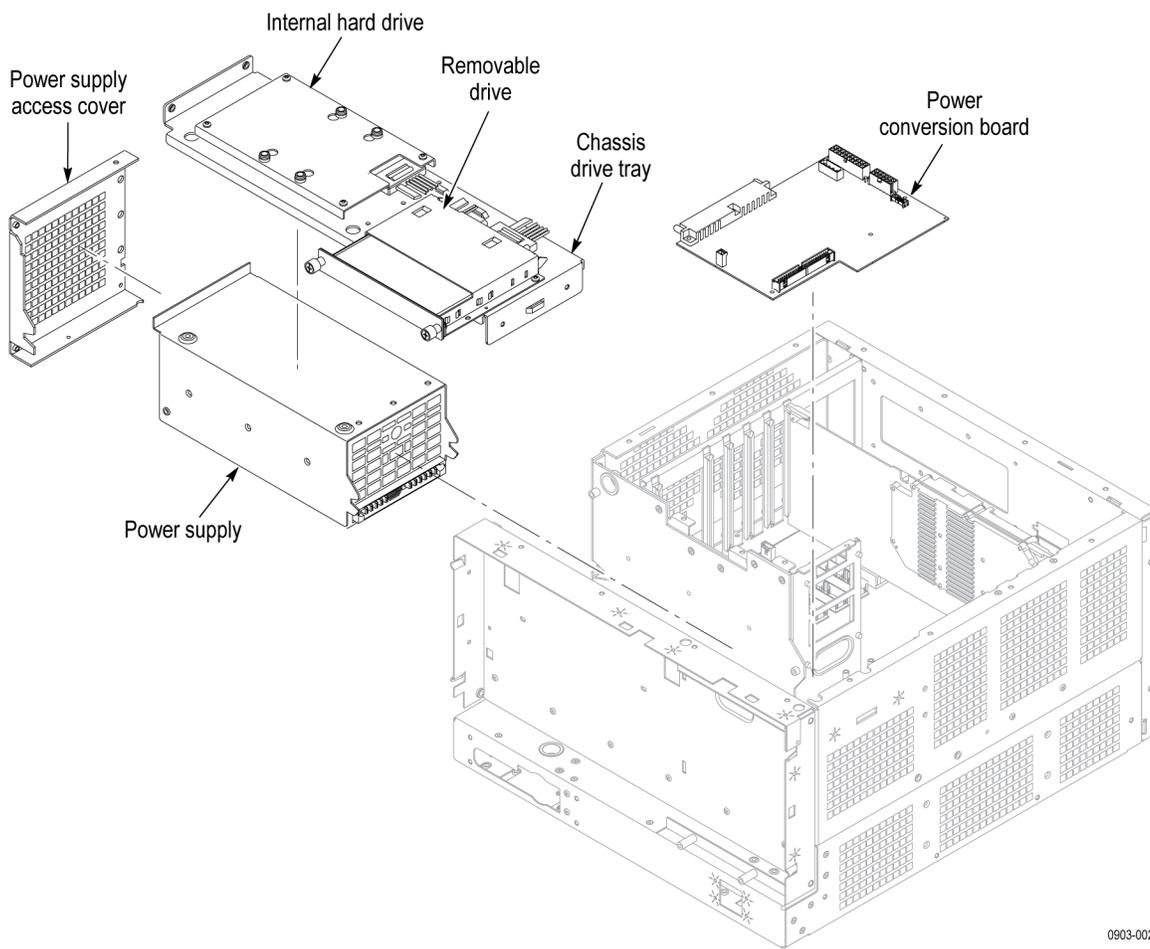
Power supply

0903-002

Figure 3-1: Power supply and HDD drive locations

Opt RT IQ/IF output board

RTT/DSPA board

COM Express PC board

Digital deck fans

Digital interface board
(not replaceable)

Acquisition board
(not replaceable)

RF deck
(not replaceable)

Front panel and display
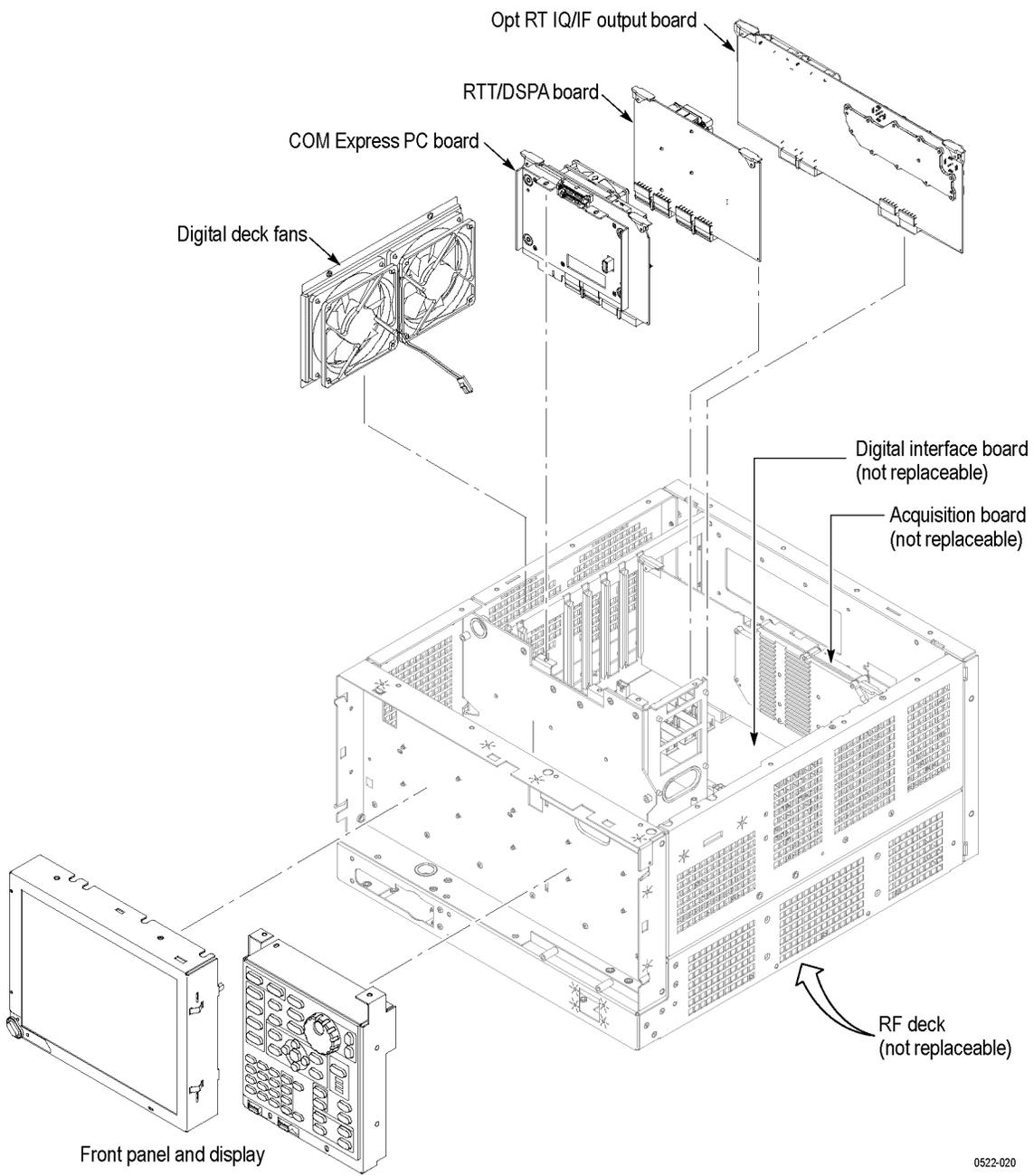
0522-020

Figure 3-2: Main customer replaceable modules

Removal procedures

NOTE. *Unless directed otherwise, installation is the reverse of the removal procedure.*

These procedures assume you have access to the module you are removing. Use the tables to determine which trim and/or modules to remove to gain access. (See Table 3-4 on page 3-9.) (See Table 3-5 on page 3-9.) A figure is also provided as a quick reference for customer replaceable module locations. (See Figure 3-1 on page 3-10.)

⚠ CAUTION. *When removing or installing the keypad, make sure you do not touch the switch contacts with your fingers. The oils in your fingers will degrade or damage the switch contacts. To help prevent damage to the keypad use cotton gloves when removing or installing the keyboard pad.*

⚠ CAUTION. *To avoid damage to the front panel Standby/On switch assembly, do not set the Display module assembly on a work surface. Sliding the instrument over the edge of the work surface could break off the On/Standby switch assembly.*

Display   Perform these steps to remove the Display module:

1. Remove the four screws securing the display to the Main chassis; two on the top and two on the left side.

2. Disconnect the cables from the COM Express PC board and keep the cables connected to the display assembly.

3. Gently remove the Display module from the Main chassis.

⚠ CAUTION. *Be careful when removing and reinstalling the Display module cables. If the connectors have bent pins or are installed incorrectly the Display may be destroyed.*

4. Disconnect the smaller Display cable from J2 on the Display Adapter board.

5. Disconnect the larger Display cable from J3 on the Display Adapter board.

Front panel   Perform these steps to remove the Front panel:

1. Disconnect the Front panel cable from connector 71 on the Digital interface board.

2. Remove the six T15 screws that secure the Front panel to the chassis; two on the top, two on the right side, and two on the bottom front.

3. Pull the Front panel assembly from the chassis.

Digital deck fans   Perform these steps to remove the fan assembly from the digital deck:

1. Unplug the fan control cable from the Digital interface board connector, marked Fan1 and Fan2.

2. Remove the four T15 TORX screws securing the fan assembly, located on the left side of the instrument.

3. Lift the fan assembly up through the narrow slot between the side panel and the card cage.

Removable hard disk drive   Perform these steps to remove the removable hard disk drive (if installed):

1. Loosen the thumbscrews securing the drive to the front panel.

2. Grasp the drive assembly by the thumb screws and pull the assembly straight out of the instrument.

3. Remove the four screws securing the hard drive to the bottom bracket.

Internal hard disk drive   Follow these steps to remove the internal hard disk drive:

NOTE. If you have a removable hard disk drive mounted above the front panel, you will not have an internal hard disk drive.

1. Remove the four T15 screws securing the hard disk drive assembly to the Power Supply shield.

2. Lift up hard disk drive to access and remove the power/data cable from the hard disk drive.

3. Disconnect the video cables from the COM Express PC board.

4. Lift the hard disk drive up and remove it from the instrument.

5. Remove the four screws securing the hard drive to the bracket.

Power supply

NOTE. It is not necessary to remove the installed hard disk drives from the chassis drive tray before removing the power supply. The power supply screws can be accessed through the access holes in the drive tray. However, it might be easier to disconnect the two-pin cable from the power supply to the conversion board with the drive tray removed.

Follow these steps to remove the power supply assembly:

1. Remove the six T15 screws securing the power supply access cover from the end of the Power Supply.

2. Remove the two T15 screws securing the right side of the power supply support bracket.

3. Remove the power supply support bracket.

4. Disconnect the line trigger cable from J7 of the Power conversion board.

5. Disconnect the power supply cable from the line filter cable.

6. Remove the two T15 screws securing the power supply shield tabs to the top front chassis.

7. Pull the power supply assembly from the left side of the chassis. This will take a little effort to pull, as the power supply must disconnect from the power convertor board.

⚠ *CAUTION. To prevent damage to the power convertor board connector, do not lift the left end of the power supply while pulling.*

Power conversion board   Perform these steps to remove the Power conversion board:

> *NOTE. Remove the power supply support bracket and the power supply before removing the Power conversion board.*

1. Remove the cables connected to the Power conversion board:

    ■ ATX POWER 20-pin cable

    ■ ANALOG POWER 12-pin cable

    ■ RF PWR 50-pin ribbon cable

    ■ Flat ribbon cable 10-pin cable

    ■ Line Trigger Sense 2-pin cable

2. Remove the five T15 screws securing the Power converter board to the chassis.

3. Lift the Power converter board from the instrument.

COM Express PC board   Perform these steps to remove the COM Express PC board:

1. Remove the two screws securing the COM Express PC board to the main chassis card guide.

2. Disconnect all cables attached to the COM Express PC board.

3. Lift the latch levers on the top edge of the COM Express PC board assembly to disconnect it from the Digital interface board.

4. Lift the COM Express PC board from the Instrument.

Troubleshooting

⚠️ *WARNING. Before doing this or any other procedure in this manual, read the Safety Summary found at the beginning of this manual. Also, to prevent possible injury to service personnel or damage to the instrument components, read Installation in the RSA5100B Series Real-Time Signal Analyzers Quick Start User Manual, available on the Web at www.tektronix.com/manuals, and Preventing ESD in this section.*

Troubleshooting contains information and procedures designed to help you isolate faults to a module.

This subsection assumes that service personnel have the skills required to work on the instrument, including PC troubleshooting and Windows operating system skills. Details of PC and Windows operation and service are not in this manual.

For assistance, please contact your local Tektronix Service Center.

Service level

This section contains information and procedures designed to help you isolate faulty modules in the instrument. If a module needs to be replaced, follow the *Removal and Installation Procedures*, located in this section.

Check for common problems

Use the following table to quickly isolate possible failures. The table lists problems 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 3-6: Failure symptoms and possible causes

Symptom	Possible cause(s)
Instrument will not power on	■ Power cord not plugged in
	■ Faulty power supply (check Status LEDs)
	■ Faulty power conditioner board
	■ Faulty front panel power switch
	■ Faulty display adapter board
Front panel light comes on (instrument powers on), but one or more fans will not operate	■ Faulty fan cable
	■ Defective fan assembly
	■ Faulty power supply (check Status LEDs)
	■ Faulty COM Express PC board
	■ Faulty CPU
	■ Digital interface board problem
No beeps on startup or multiple beeps on startup (single beep is OK)	■ Faulty COM Express PC board

Table 3-6: Failure symptoms and possible causes (cont.)

Symptom	Possible cause(s)
Flat panel display blank	■ BIOS setting not Advanced Chipset Features > - On Chip VGA > Enabled - Boot Display > CRT + LFP
	■ Defective cable from PC Carrier board to Display adapter board
	■ Defective backlighting display
	■ Faulty display
	■ Faulty digital interface board
	■ Faulty display adapter board
Hard disk drive related symptoms	■ Defective hard disk drive
	■ Incorrect hard disk type selected in the BIOS setup
	■ Replaceable hard disk drive not installed
	■ Power supply failure
	■ Corrupted BIOS module firmware, reinstall firmware
	■ Loose cable
	■ Corrupted OS image

Status indicator LEDs   Check that the Status Indicator LEDs are lit on the Power converter and Digital interface boards to ensure the power supplies are operating. (See Figure 3-3.) (See Table 3-7.) (See Table 3-8.)
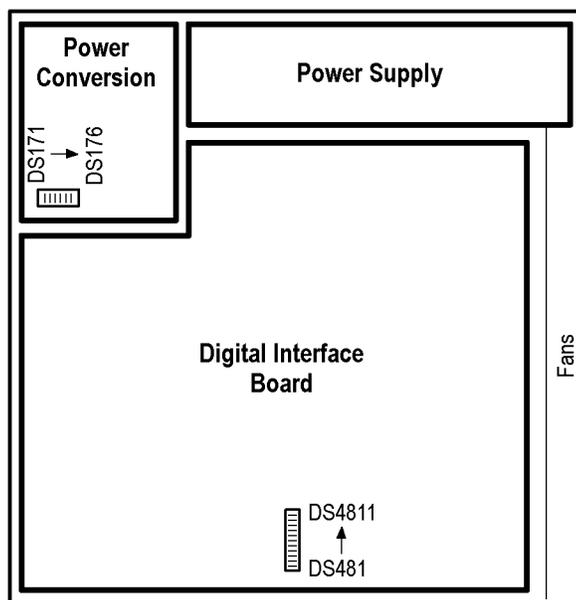
Figure 3-3: Status indicator locations

Table 3-7: Power converter board LED status indicators

LED	Status Indication
DS171	STANDBY
DS172	-15 V OK
DS173	-8 V OK
DS174	+8 V OK
DS175	+15 V OK
DS176	+30 V OK

Table 3-8: Digital interface board LED status indicators

LED	Status Indication
DS481	CLOCK FAIL (normally off)
DS482	+5 VSB OK
DS483	+5 V OK
DS484	+3.3 V OK
DS485	+2.5 V OK
DS486	+1.8 V OK
DS487	+1.5 V OK
DS488	FPGA INIT
DS489	FPGA DONE
DS4810	STATUS 0

Table 3-8: Digital interface board LED status indicators (cont.)

LED	Status Indication
DS4811	STATUS 1 (normally off)
DS911	+1.2 V OK

Diagnostics

This section describes how to use and interpret the embedded diagnostics interface for both the Power on self tests (POST) and the extended diagnostics tests. These tests determine whether there has been a module failure in the instrument.

Power on self tests

The instrument runs Power on self tests automatically every time the instrument is powered up. If a failure is detected during this process, the instrument displays the Power-On Self Tests tab of the Diagnostics window to list which module(s) failed.
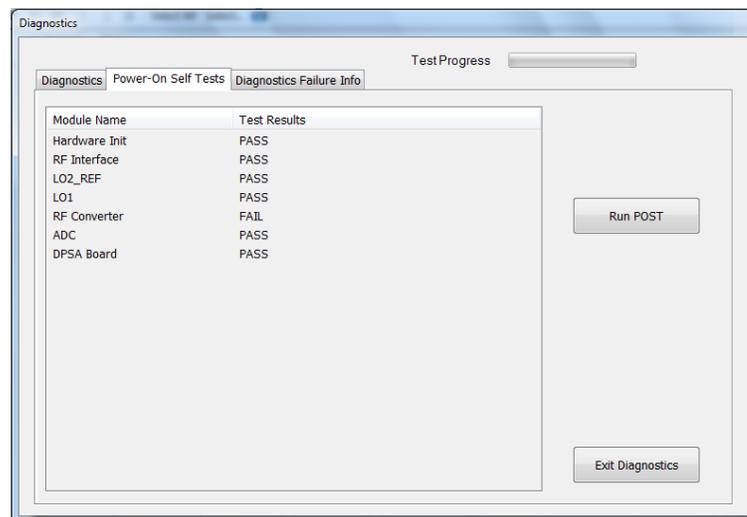
Select the **Diagnostics Failure Info** tab in the Diagnostics window for more information about failures.
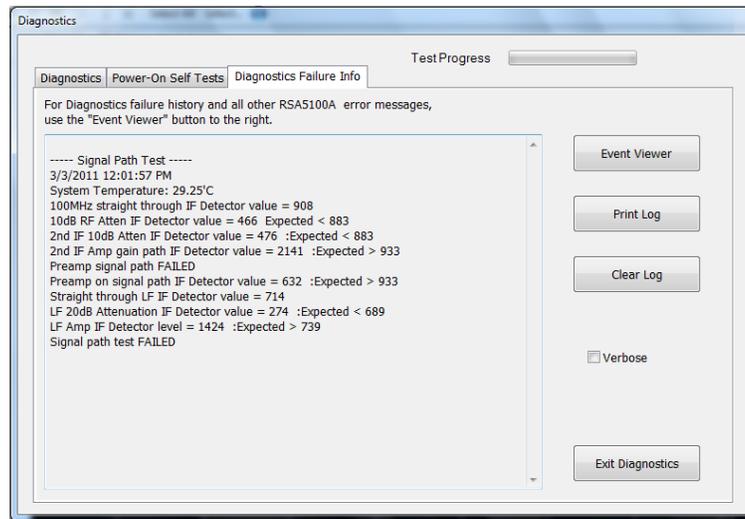
All failure information is logged in the Windows Event Viewer. To access the Windows Event Viewer, click the Event Viewer button on the Diagnostics Failure Info tab. The Windows Event Viewer is also available in the Administrative Tools portion of the Windows Control Panel.

NOTE. Check the timestamp in the Event Viewer, as errors are stored on disk and may be from earlier power cycles.

Diagnostics tests   The Diagnostics tab enables you to run any or all of the diagnostics tests in the instrument, including the POST tests. To run diagnostics:

1. Select **Tools > Diagnostics** in the application menu bar.

2. Select the **Diagnostics** tab and click **All Modules, All Tests**.
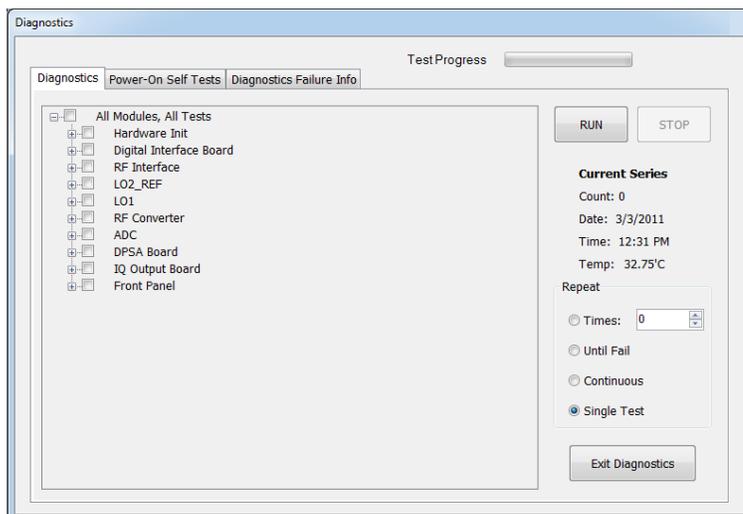
3. Click **Single Test** in the Repeat area.

4. Click **RUN**. The instrument performs the selected tests. For tests that require manual intervention, follow the on-screen instructions to complete the tests. A green dot next to a test means that the marked test is currently running. If the test completes successfully the green dot is replaced by a black check mark. If the test fails, the green dot is replaced by a red X.

5. To run specific tests, select those tests in the list and use the **Repeat** segment of the window to set the test run conditions. The Repeat controls (see the following figure) let you:
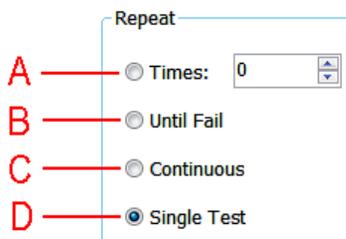
A) Repeat the test(s) a specified number of times,

B) Repeat the test(s) until a failure occurs,

C) Repeat the test(s) continuously even if failures occur, or

D) Run the test(s) only one time.

Microsoft windows event viewer

The Microsoft windows event viewer maintains a permanent record of instrument diagnostics failure information, with other messages regarding the operating system. If there is not a shortcut to the Event Viewer on the desktop you can access it by clicking the Event Viewer button on the Diagnostics Failure Info tab.
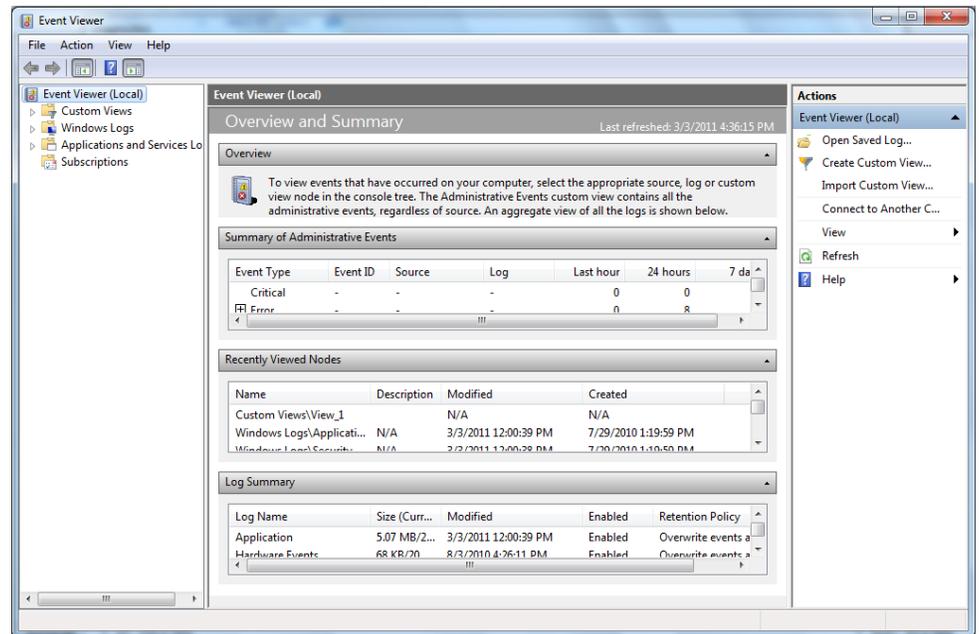
To view the Diagnostics failure information, first click the **Windows Logs** icon in the left frame (under Event Viewer (Local)). Then click the **Applications** icon. The view changes to show the individual error reports, as shown in the following figure.

Scroll through the Event list to locate error events. Pay attention to the date and time stamps, as the information is a permanent record and shows failure information from earlier diagnostic sessions.

Also note that the Signal Analyzer diagnostic errors are labeled as **TekRSA** in the Source column, to differentiate them from operating system messages.
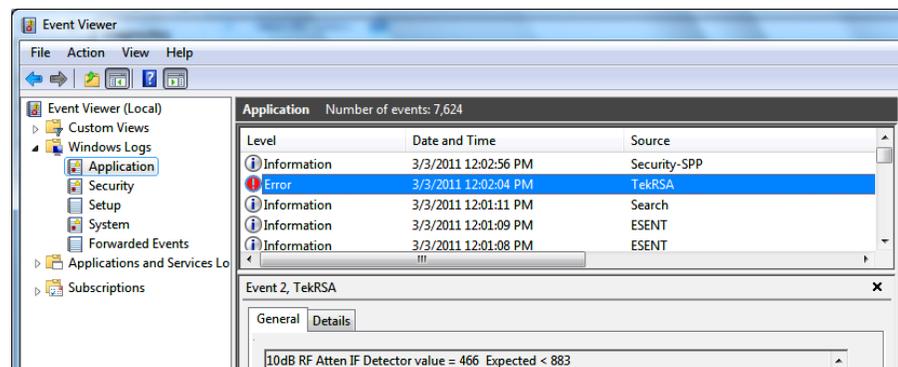
Scroll through the Event list to locate error events. Pay attention to the date and time stamps, as the information is a permanent record and shows failure information from earlier diagnostic sessions.

Also note that the Signal Analyzer diagnostic errors are labeled as **TekRSA** in the Source column, to differentiate them from operating system messages.

Clicking on an error message to display error information in the **General** or **Details** tabs located below the list.
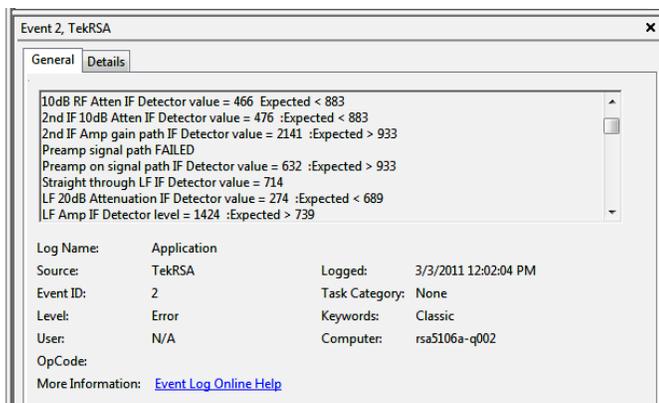
Double-click an error message to open a separate window for that error message. The window shows the date and time the error message was generated and the source of the error message. The text of the error message is shown in the Description area. The three buttons at the upper right let you navigate through the error list (using the up and down arrows), or sends the record to the default printer.

If you scroll down in the error description, the event viewer always adds a line that says "For more information, see Help and Support Center at" and includes a link to Microsoft.com. **Do not use this link,** as Microsoft has no information on Tektronix instrument error messages.

Click **Help** in the Event Viewer Menu bar to open the online help and learn more information on using the Event Viewer.

Diagnostic test error messages

The following tables list the instrument diagnostics error messages, with recommended actions for each message.

- Hardware module (See Table 3-9 on page 3-26.)

- Digital interface board (See Table 3-10 on page 3-26.)

- ADC board (See Table 3-11 on page 3-27.)

- DPSA board (See Table 3-12 on page 3-28.)

- RF interface board (See Table 3-13 on page 3-29.)

- LO1 module (See Table 3-14 on page 3-30.)

- LO2/Reference oscillator (See Table 3-15 on page 3-31.)

- Front panel (See Table 3-16 on page 3-34.)

Table 3-9: Hardware module diagnostic error messages

Test	Error message	Recommended action
Hardware Init	Uninitialized See Event Viewer for more information	The COM Express PC is not communicating with the Digital Interface board. Restart the instrument and check the Event Viewer. If the problem persists, send the instrument to Tektronix Service Center for repair.
	The Digital Interface Board was not found.	Send the instrument to a Tektronix Service Center for repair.
	Acquisition Board not found.	Send the instrument to a Tektronix Service Center for repair.
	The DPSA Board was not found.	Replace RTT/DPSA board.
	Load Acquisition Board Failed.	Send the instrument to a Tektronix Service Center for repair.
	RF Interface Board not found or FPGA Load failed.	Replace RF Interface board.
	LO1 not found or FPGA Load failed.	Send the instrument to a Tektronix Service Center for repair.
	L02/Reference Oscillator not found or FPGA Load failed.	Send the instrument to a Tektronix Service Center for repair.
	The RF Converter board was not found or the FPGA was not loaded.	Send the instrument to a Tektronix Service Center for repair.
	Unable to communicate with Digital interface board.	Possible Digital interface board problem. Restart the instrument. If problem persists, return to Tektronix Service Center for repair.
Read Programmable Part Versions	Error reading ID's.	Send the instrument to a Tektronix Service Center for repair.
	Unable to communicate with PPC.	Send the instrument to a Tektronix Service Center for repair.

Table 3-10: Digital interface Board diagnostic error messages

Test	Error message	Recommended action
Digital Board ID Verification	Digital Interface Board ID Verification Failed.	Send the instrument to a Tektronix Service Center for repair.
Digital Board FPGA Load Test	Bad FPGA file path.	Reinstall the product software.
	Exception in Digital Interface FPGA Load. Done bit not returned high.	Send the instrument to a Tektronix Service Center for repair.
Digital Board Register R/W Test	Digital Interface alternating 1's and 0's R/W test failed. Digital Interface reg R/W Walking 1's test failed.	Send the instrument to a Tektronix Service Center for repair.
	Unable to communicate with Digital Interface Board.	Send the instrument to a Tektronix Service Center for repair.
Digital Board SRAM Test	SRAM memory failure at "memory address".	Send the instrument to a Tektronix Service Center for repair.
	Write value was "xxx" Read Value was "xxx"	Send the instrument to a Tektronix Service Center for repair.

Table 3-10: Digital interface Board diagnostic error messages (cont.)

Test	Error message	Recommended action
Digital FIFO Test	Invalid number of return words.	Send the instrument to a Tektronix Service Center for repair.
	Bad value in returned buffer.	Send the instrument to a Tektronix Service Center for repair.
PPC POST Results	PPC returned unknown status.	Send the instrument to a Tektronix Service Center for repair.
	PPC did not return POST status.	Send the instrument to a Tektronix Service Center for repair.
Digital Board Acquisition Test	Acquisition data at "offset xxx" was not correct.	Send the instrument to a Tektronix Service Center for repair.
Digital Board SDRAM Test	Write failure. SDRAM addr: 0xXXXX Read failure. SDRAM addr: 0xXXXX	Reseat the DIMM Acquisition memory module in the socket. If the problem persists, send the instrument to a Tektronix Service Center for repair.
Digital Board FLASH Test	Failed bit exclusion Test with pattern XXXX. Validation failed at offset XXXX. Blocks XXXX and XXXX are mirrored.	Send the instrument to a Tektronix Service Center for repair.
Digital Board 28 Volt Supply Test	Verification of this supply is done by the operator.	If 28 V is not present at the rear-panel BNC connector, check the +28 V at the test point on the power conversion board. If the 28 V is not present, replace the power conversion board. If the +28 V is present on the power conversion board, send the instrument to a Tektronix Service Center for repair.
Digital Board Audio Test	No audio was heard.	Verify that audio is not muted and level is set properly using Windows Volume control. If this does not correct the problem, send the instrument to a Tektronix Service Center for repair.

Table 3-11: ADC board diagnostic error messages

Test	Error message	Recommended action
ADC board ID Verification	ADC Board Not Found in slot 1.	Send the instrument to a Tektronix Service Center for repair.
ADC board FPGA Load Test	Bad FPGA file path. The file was not found in the directory.	Send the instrument to a Tektronix Service Center for repair.
	The Main FPGA load failed.	Send the instrument to a Tektronix Service Center for repair.
	The Buffer FPGA load failed.	Send the instrument to a Tektronix Service Center for repair.
	DCM Not locked.	Send the instrument to a Tektronix Service Center for repair.
ADC board Register R/W Test	ADC R/W test FAILED.	Send the instrument to a Tektronix Service Center for repair.
ADC board LVDS Test	ADC LVDS test FAILED.	Send the instrument to a Tektronix Service Center for repair.
ADC Free Run Trigger Test	ADC Free Run Trigger Test FAILED.	Send the instrument to a Tektronix Service Center for repair.
ADC board Acq Pattern Test	Unexpected data at offset X.	Send the instrument to a Tektronix Service Center for repair.
	Trigger timeout occurred.	Send the instrument to a Tektronix Service Center for repair.

Table 3-11: ADC board diagnostic error messages (cont.)

Test	Error message	Recommended action
ADC board Dither Test	Dither amplitude test - Failed	Send the instrument to a Tektronix Service Center for repair.
	Dither frequency test - Failed	
ADC board Narrow Band CW Acquisition Test	ADC Over range.	Signal too strong. Run signal path test. If the signal path test passes and this test fails, send the instrument to a Tektronix Service Center for repair.
	Signal below -50 dBm.	Verify that the IF cable from the RF deck to the ADC board IF connector is firmly connected. Repeat the test, if the problem persists, send the instrument to a Tektronix Service Center for repair.
	No signal found in acquired spectrum.	Verify Normalization source is functional by running the Signal Path test. If that test passes and this test still fails, send the instrument to a Tektronix Service Center for repair.
ADC board LF Acquisition Test	ADC Overrange	Signal too strong. Run signal path test. If the signal path test passes and this test fails, send the instrument to a Tektronix Service Center for repair.
	Signal below -50 dBm.	Verify that the IF cable from the RF deck to the ADC board IF connector is firmly connected. Repeat the test, if the problem persists, send the instrument to a Tektronix Service Center for repair.
	No signal found in acquired spectrum.	Verify Normalization source is functional by running the Signal Path test. If that test passes and this test still fails, send the instrument to a Tektronix Service Center for repair.
ADC board WB IF Acquisition Tes	ADC Overrange	Signal too strong. Run signal path test. If the signal path test passes and this test fails, send the instrument to a Tektronix Service Center for repair.
	Signal below -50 dBm.	Verify that the IF cable from the RF deck to the ADC board IF connector is firmly connected. Repeat the test, if the problem persists, send the instrument to a Tektronix Service Center for repair.
	No signal found in acquired spectrum.	Verify Normalization source is functional by running the Signal Path test. If that test passes and this test still fails, send the instrument to a Tektronix Service Center for repair.

Table 3-12: DPSA board diagnostic error messages

Test	Error message	Recommended action
DPSA ID Verification	DPSA Board ID Verification Failed.	If ID was not found or a board other than the DPSA Board was found, Version/ID is nonfunctional. Replace the RTT/DPSA Board.
DPSA FPGA Load Test	Bad DPSA FPGA file path. The file was not found in the directory.	Reinstall the product software.
	DPSA FPGA Load Failed.	Replace the RTT/DPSA board. If the problem persists, send the instrument to a Tektronix Service Center for repair.
	DCM Not locked.	Replace the RTT/DPSA board. If the problem persists, send the instrument to a Tektronix Service Center for repair.

Table 3-12: DPSA board diagnostic error messages (cont.)

Test	Error message	Recommended action
DPSA Register R/W Test	Read/Write test failed (returns read and write values).	Replace the RTT/DPSA board. If the problem persists, send the instrument to a Tektronix Service Center for repair.
	CT Board QDR Control Failure.	Replace the RTT/DPSA board. If the problem persists, send the instrument to a Tektronix Service Center for repair.
DPSA Frame Transfer Test	FPGA File not found.	Reinstall the product software.
	FPGA Load Failed.	Replace the RTT/DPSA board. If the problem persists, send the instrument to a Tektronix Service Center for repair.
	Frame data test failed when looking for incrementing pattern.	Replace the RTT/DPSA board. If the problem persists, send the instrument to a Tektronix Service Center for repair.
DPSA LVDS Test	The DPSA LVDS test failed.	Replace the RTT/DPSA board. If the problem persists, send the instrument to a Tektronix Service Center for repair.
DPSA board FM/AM Audio Test	No audio was heard.	Replace the RTT/DPSA board. If the problem persists, send the instrument to a Tektronix Service Center for repair.

Table 3-13: RF Interface board diagnostic error messages

Test	Error message	Recommended action
RF Interface ID Test	RF Interface Board not found.	Run the PPC load test. This will rerun hardware discovery. If error persists, replace the RF interface board.
RF Interface FPGA Load Test	FPGA Load failed.	Replace the RF interface board.

Table 3-13: RF Interface board diagnostic error messages (cont.)

Test	Error message	Recommended action
RF Interface Voltage/Current test	The 30 Volt supply is over voltage. The 30 Volt supply is under voltage.	Replace the Power Conversion board. If the problem persists, replace the RF Interface board. If the problem persists, replace the power supply. If the problem persists, send the instrument to a Tektronix Service Center for repair.
	The 8 Volt supply is over voltage. The 8 Volt supply is under voltage.	Replace the Power Conversion board. If the problem persists, replace the RF Interface board. If the problem persists, replace the power supply. If the problem persists, send the instrument to a Tektronix Service Center for repair.
	The 2.5 Volt supply is over voltage. The 2.5 Volt supply is under voltage.	Replace the Power Conversion board. If the problem persists, replace the RF Interface board. If the problem persists, replace the power supply. If the problem persists, send the instrument to a Tektronix Service Center for repair.
	The 1.2 Volt supply is over voltage. The 1.2 Volt supply is under voltage.	Replace the Power Conversion board. If the problem persists, replace the RF Interface board. If the problem persists, replace the power supply. If the problem persists, send the instrument to a Tektronix Service Center for repair.
	The –8 Volt supply is over voltage. The –8 Volt supply is under voltage.	Replace the Power Conversion board. If the problem persists, replace the RF Interface board. If the problem persists, replace the power supply. If the problem persists, send the instrument to a Tektronix Service Center for repair.
	The 8VSB supply is over voltage. The 8VSB supply is under voltage.	Replace the Power Conversion board. If the problem persists, replace the RF Interface board. If the problem persists, replace the power supply. If the problem persists, send the instrument to a Tektronix Service Center for repair.

Table 3-14: LO1 module diagnostic error messages

Test	Error message	Recommended action
L01 ID Test	Board not found.	Run the PPC load test. This will rerun hardware discovery. If error persists, send the instrument to a Tektronix Service Center for repair.
L01 FPGA Load Test	FPGA Load failed.	Send the instrument to a Tektronix Service Center for repair.
L01 Register R/W Test	Read /Write test failed.	Send the instrument to a Tektronix Service Center for repair.

Table 3-14: LO1 module diagnostic error messages (cont.)

Test	Error message	Recommended action
L01 Voltage/Current Test	Sum Loop Error voltage exceeds High threshold	Warning only.
	Sum Loop Error voltage exceeds Low threshold	
	YTO Loop Error voltage exceeds High threshold	Warning only.
	YTO Loop Error voltage exceeds Low threshold	
	Yig loop is unlocked.	Send the instrument to a Tektronix Service Center for repair.
	Sum loop is unlocked.	Send the instrument to a Tektronix Service Center for repair.
	15 V supply voltage is over/under voltage.	Run the RF Interface ADC test to verify a power supply problem. Check the Digital interface board power supply status LEDs. (See Table 3-8.)
	12 V supply voltage is over/under voltage.	Run the RF Interface ADC test to verify a power supply problem. Check the Digital interface board power supply status LEDs. (See Table 3-8.)
	8 V supply voltage is over/under voltage.	Run the RF Interface ADC test to verify a power supply problem. Check the Digital interface board power supply status LEDs. (See Table 3-8.)
	5 V supply voltage is over/under voltage.	Run the RF Interface ADC test to verify a power supply problem. Check the Digital interface board power supply status LEDs. (See Table 3-8.)
	3.3 V supply voltage is over/under voltage.	Run the RF Interface ADC test to verify a power supply problem. Check the Digital interface board power supply status LEDs. (See Table 3-8.)
	L01 is over temp.	Warning only.

Table 3-15: LO2/Reference oscillator diagnostic error messages

Test	Error message	Recommended action
LO2 ID Test	Board not found.	Run the PPC load test. This will rerun hardware discovery. If error persists, send the instrument to a Tektronix Service Center for repair.
LO2 FPGA Load Test	FPGA Load failed.	Send the instrument to a Tektronix Service Center for repair.
L02 Register R/W Test	Read /Write test failed.	Send the instrument to a Tektronix Service Center for repair.

Table 3-15: LO2/Reference oscillator diagnostic error messages (cont.)

Test	Error message	Recommended action
L02 Voltage/Current Test	26 V supply voltage is over/under voltage	Replace the Power conversion board. If the problem persists, replace the RF interface board. If the problem persists, replace the power supply. If the problem persists, send the instrument to a Tektronix Service Center for repair.
	9 V supply voltage is over/under voltage	Replace the Power conversion board. If the problem persists, replace the RF interface board. If the problem persists, replace the power supply. If the problem persists, send the instrument to a Tektronix Service Center for repair.
	6 V supply voltage is over/under voltage	Replace the Power conversion board. If the problem persists, replace the RF interface board. If the problem persists, replace the power supply. If the problem persists, send the instrument to a Tektronix Service Center for repair.
	5 V supply voltage is over/under voltage	Replace the Power conversion board. If the problem persists, replace the RF interface board. If the problem persists, replace the power supply. If the problem persists, send the instrument to a Tektronix Service Center for repair.
	3.3 V supply voltage is over/under voltage	Replace the Power conversion board. If the problem persists, replace the RF interface board. If the problem persists, replace the power supply. If the problem persists, send the instrument to a Tektronix Service Center for repair.
	–9 V supply voltage is over/under voltage	Replace the Power conversion board. If the problem persists, replace the RF interface board. If the problem persists, replace the power supply. If the problem persists, send the instrument to a Tektronix Service Center for repair.
	L02 is over temp	Warning only.
LO2 Phaselock check	LO2 will not phase locked	Send the instrument to a Tektronix Service Center for repair.
RF Converter ID Test	Board not found.	Run the PPC load test. This will rerun hardware discovery. If error persists, send the instrument to a Tektronix Service Center for repair.
RF Converter FPGA Load Test	FPGA Load failed.	Send the instrument to a Tektronix Service Center for repair.

Table 3-15: LO2/Reference oscillator diagnostic error messages (cont.)

Test	Error message	Recommended action
RF Converter Voltage/Current test	15 V Supply Over/Under Voltage.	Replace the Power conversion board. If the problem persists, replace the RF interface board. If the problem persists, replace the power supply. If the problem persists, send the instrument to a Tektronix Service Center for repair.
	8 V Supply Over/Under Voltage.	Replace the Power conversion board. If the problem persists, replace the RF interface board. If the problem persists, replace the power supply. If the problem persists, send the instrument to a Tektronix Service Center for repair.
	2.5 V Supply Over/Under Voltage.	Replace the Power conversion board. If the problem persists, replace the RF interface board. If the problem persists, replace the power supply. If the problem persists, send the instrument to a Tektronix Service Center for repair.
	1.2 V Supply Over/Under Voltage.	Replace the Power conversion board. If the problem persists, replace the RF interface board. If the problem persists, replace the power supply. If the problem persists, send the instrument to a Tektronix Service Center for repair.
	–8 V Supply Over/Under Voltage.	Replace the Power conversion board. If the problem persists, replace the RF interface board. If the problem persists, replace the power supply. If the problem persists, send the instrument to a Tektronix Service Center for repair.
Signal Path Test	RF Atten test 10dB RF Atten signal path test Failed.	Send the instrument to a Tektronix Service Center for repair.
	2nd IF Atten test 2nd IF 10dB Atten signal path Failed.	Send the instrument to a Tektronix Service Center for repair.
	2nd IF Amp test 2nd IF Amp gain path Failed.	Send the instrument to a Tektronix Service Center for repair.
	Preamp test Preamp signal path FAILED	Send the instrument to a Tektronix Service Center for repair.
	LF Attenuator test LF 20dB LF Attenuator Failed.	Send the instrument to a Tektronix Service Center for repair.
	LF Amp test LF Amp signal path test Failed.	Send the instrument to a Tektronix Service Center for repair.
	LF ADC test RF Converter to LF ADC path Failed.	Send the instrument to a Tektronix Service Center for repair.
	NB ADC test RF Converter to NB ADC path Failed.	Send the instrument to a Tektronix Service Center for repair.
	SAW filter test 1MHz saw filter test Failed.	Send the instrument to a Tektronix Service Center for repair.

Table 3-15: LO2/Reference oscillator diagnostic error messages (cont.)

Test	Error message	Recommended action
Step Attenuator test	Step Attenuator Failed.	Send the instrument to a Tektronix Service Center for repair.
IF Attenuator Test	The IF attenuator Failed.	Send the instrument to a Tektronix Service Center for repair.
Preamp TestTest	The Preamp Failed	Send the instrument to a Tektronix Service Center for repair.

Table 3-16: Front panel diagnostic error messages

Test	Error message	Recommended action
Front Panel Test	Front Panel LCD test failed.	Replace the LCD display.
	Front Panel Button test failed.	Replace the front panel keypad.

Replaceable parts

Replaceable parts

This section contains a list of the replaceable modules for the instrument. Use this list to identify and order replacement parts.

Parts ordering information

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

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

- Part number
- Instrument type or model number
- Instrument serial number
- Instrument modification number, if applicable

If you order a part that has been replaced with a different or improved part, your local Tektronix field office or representative will contact you concerning any change in part number.

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

Module exchange.   In some cases you may exchange your module for a remanufactured module. These modules cost significantly less than new modules and meet the same factory specifications. For more information about the module exchange program, call 1-800-833-9200. Outside North America, contact a Tektronix sales office or distributor; see the Tektronix Web site (www.tektronix.com) for a list of offices.

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

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

Using the Replaceable parts list

This section contains a list of the mechanical and/or electrical components that are replaceable for the instrument. Use this list to identify and order replacement parts. The following table describes each column in the parts list.

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

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

Table 4-1: External parts

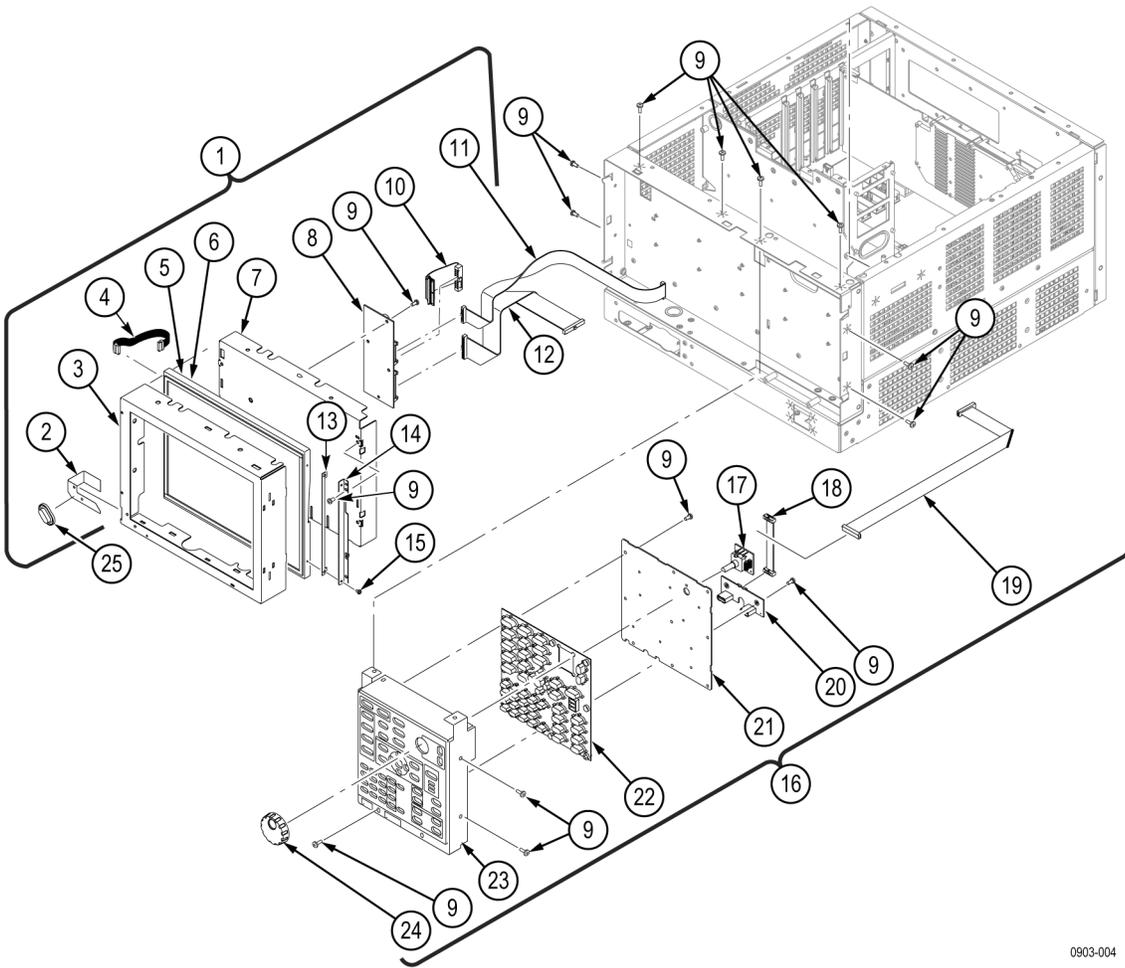| Fig. & index number	Tektronix part number	Serial no. effective	Serial no. discont'd	Qty	Name & description
4-1--1	200-5163-02			1	COVER; TOP COSMETIC, ALUM (See cover attached parts below.)
-2	367-0528-00			1	HANDLE, CARRYING; DUAL DUROMETER MOLDED
-3	407-4887-00			1	BRACKET; HANDLE BASE, PC/ABS ALLOY
-4	211-1265-00			2	SCREW, MACHINE, 8-32 X 1.000L PNH, BLACK OXIDE, T20, NYLOK, STEEL
					** COVER ATTACHED PARTS**
-5	367-0542-00			2	HANDLE ASSY, CARRYING; AL, SS, BLACK
-6	407-5530-02			2	BRACKET, MOUNTING; CARRYING HANDLE
-7	212-0650-00			4	SCREW, MACHINE; 10-32 X 0.437, FLH, 100 DEG, SST PSVT, POZ
-8	211-1230-00			4	SCREW; 10-32X.500 SOC CAP,18-8 ZINC PLATED STEEL
					** END COVER ATTACHED PARTS**
-9	348-1648-00			4	FOOT; REAR W/CORD WRAP, THERMO PLASTIC; SAFETY CONTROLLED
-10	211-0720-00			4	SCR, ASSEM WSHR; 6-32 X 0.500, PNH, STEEL, ZINC FINISH, T15 TORX DR, MACHINE RSA5103B, RSA5106B
-11	211-1050-00			34	SCREW, MACHINE; 6-32 X 0.312 L, PNH, STEEL, ZINC FINISH, T15
-12	200-5149-00			1	COVER; TOP, INTERNAL; SAFETY CONTROLLED
-13	200-5173-00			1	COVER; BOTTOM, INTERNAL; SAFETY CONTROLLED
-14	200-5196-01			1	COVER; BOTTOM COSMETIC; SAFETY CONTROLLED
-15	211-1224-00			14	SCREW, 6-32 X 0.375L, PNH, BLACK, T15, NYLOC
-16	101-0152-00			1	TRIM, FRONT; TRIM ACQUISITION
-17	333-4619-01			1	COSMETIC FRONT ASSY; FRONT PANEL AND ACQUISITION TRIM RSA5103B, RSA5106B
	333-4677-00			1	COSMETIC FRONT ASSY; FRONT PANEL AND ACQUISITION TRIM RSA5115B, RSA5126B
-18	200-4519-00			1	COVER, FRONT; PC ABS,17.420L X 8.670W X 2.000TH,TEK BLUE
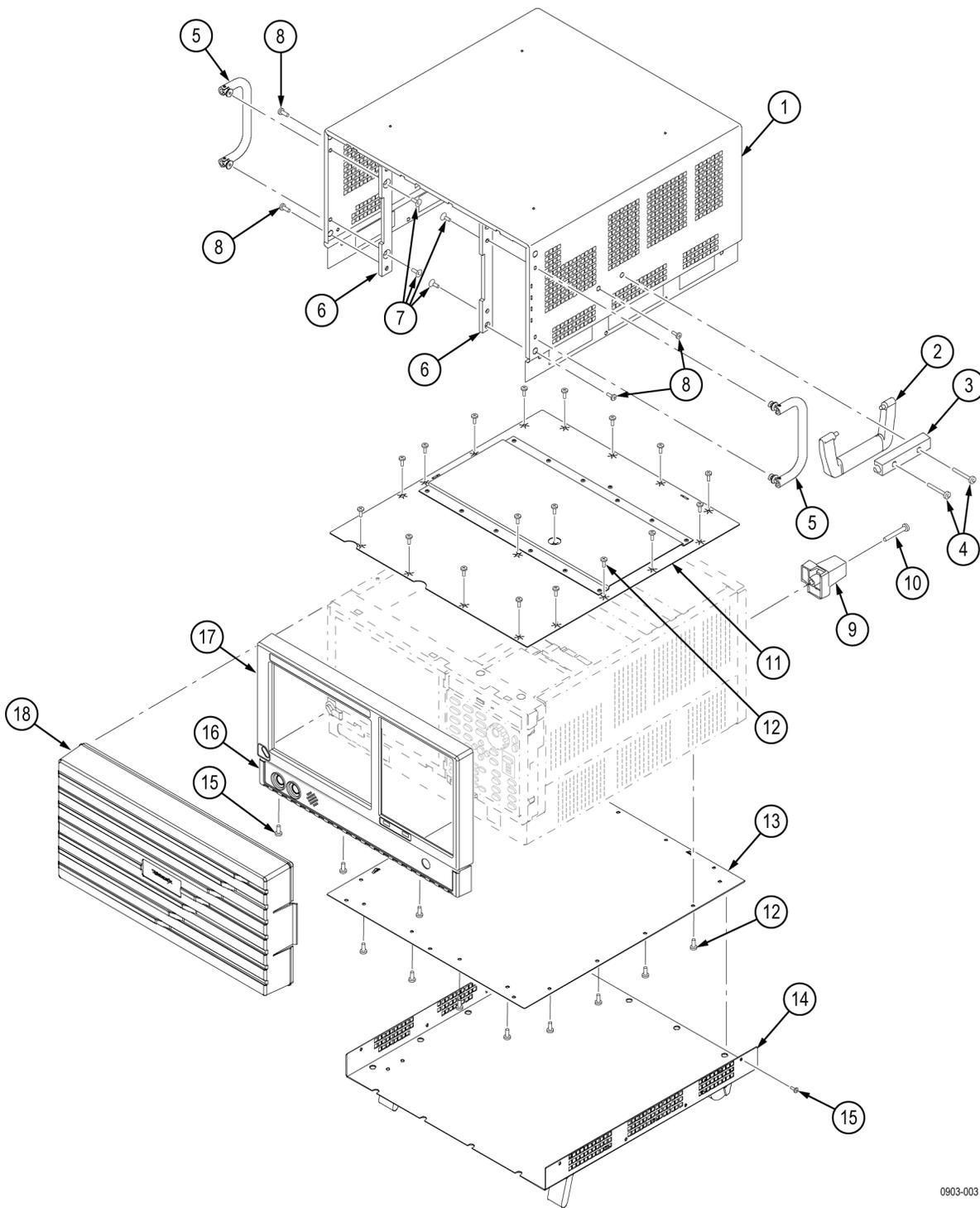
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Figure 4-1: External parts

Table 4-2: Display and front panel

Fig. & index number	Tektronix part number	Serial no. effective	Serial no. discont'd	Qty	Name & description
4-2--1	650-5583-xx			1	MODULE ASSY; DISPLAY WITH 119755000 LCD
-2	259-0155-01			1	FLEX CIRCUIT; POWER SWITCH, W/LED
-3	407-5504-00			1	BRACKET, DISPLAY FRONT; SAFETY CONTROLLED
-4	174-5807-00			1	CABLE, ASSEMBLY (DISPLAY BACKLIGHT)
-5	119-7537-00			1	TOUCH SCREEN ASSEMBLY, 10.4 IN, RESISTIVE, 5-WIRE, W/GASKETS
-6	119-7550-00			1	DISPLAY MODULE; LCD; 1024 X 768; 10.4 INCHES DIAGONAL, TFT, LED BACK LIGHT
-7	407-5548-xx			1	BRACKET, DISPLAY
-8	878-0414-00			1	CIRCUIT BD ASSY; INTERCONNECT DISPLAY ADAPTER BRD
-9	211-1050-00			16	SCREW, MACHINE; 6-32 X 0.312 L, PNH, STEEL, ZINC FINISH, T15
-10	174-5014-00			1	CABLE ASSY,SP;DISPLAY DATA,FLAT FLEX
-11	174-5086-00			1	CA ASSY, SP; IDC, RIBBON, DISP ADAPT TO DIG INTERF, 2MM, 2X10 RSA5103B, RSA5106B
-12	174-5087-00			1	CA ASSY, SP; IDC, RIBBON, DISP ADAPT TO DIG INTERF, 2MM, 2X15 RSA5103B, RSA5106B
-13	348-1979-00			1	GASKET, SET DISPLAY
-14	407-5549-00			2	BRACKET; DISPLAY, MOUNTING
-15	211-0950-00			4	SCREW; 6-32 X 0.25,TORX,STL
-16	814-0207-00			1	PANEL ASSEMBLY; FRONT, RSA5XXX SERIES
-17	878-0814-00			1	CIRCUIT BRD ASSY; RSA ENCODER RSA5115B, RSA5126B
-18	174-5101-00			1	CA ASSY, SP; IDC, RIBBON, AUDIO COM Express PC TO DIG INTERF, 2X5
-19	174-5080-00			1	CA ASSY, SP; IDC, RIBBON, FRT PANEL TO DIG INTF, 2X10
-20	878-0417-00			1	CIRCUIT BD ASSY; USB I/O
-21	878-0749-00			1	CIRCUIT BD ASSY; FRONT PANEL CONTROL
-22	260-2903-00			1	SWITCH, KEYPAD FRONT PANEL
-23	333-4618-00			1	FRONT SUBPANEL ASSEMBLY
-24	366-A056-01			1	KNOB; GENERAL PURPOSE
-25	260-2719-00			1	SWITCH, KEYPAD; POWER BUTTON

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Figure 4-2: Display and front panel

Table 4-3: Modules

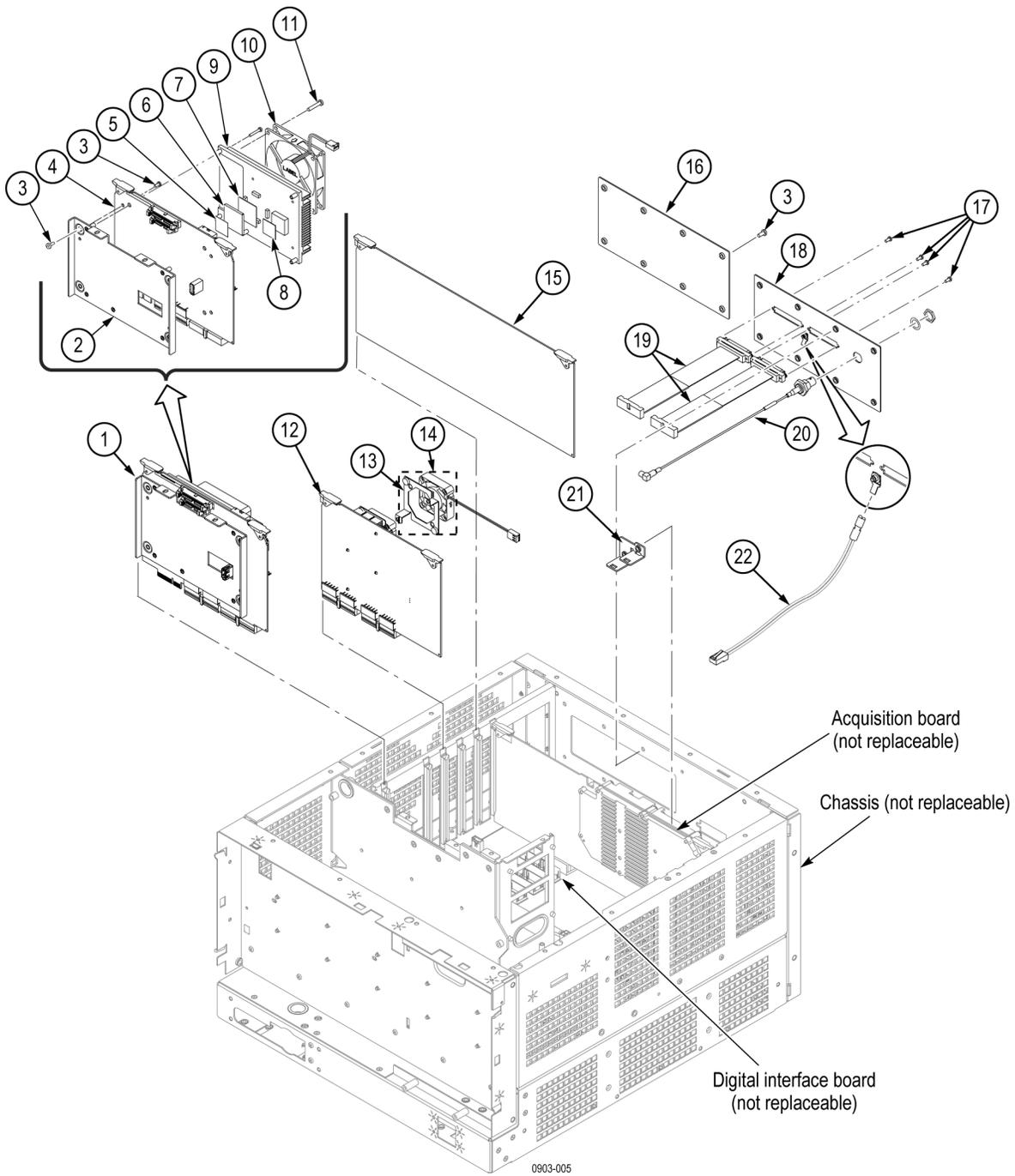| Fig. & index number	Tektronix part number	Serial no. effective	Serial no. discont'd	Qty	Name & description
4-3-1	850-0253-xx			1	SUBASSY; CARRIER BRD ASSY,8780949XX WITH COM-E (ESM-QM77),BCM,MODULE ONLY
					RSA5105B, RSA5106B
	878-0949-xx			1	CIRCUIT BOARD; PC CARRIER
					RSA5115B, RSA5126B
-2	407-5770-xx			1	BRACKET, COM EXPRESS CARRIER
-3	211-1050-00			10	SCREW, MACHINE; 6-32 X 0.312 L, PNH, STEEL, ZINC FINISH, T15
-4	039-0210-xx			1	PROCESSOR MODULE; PCIE, COM-E, TYPE 6, 1 SODIMM SOCKET, PGA988 PROCESSOR SOCKET, MODULE ONLY
-5	253-0515–xx			1	THERMAL INTERFACE MATERIAL PHASE CHANGE, 20MM SQ.
-6	214-5257-xx			1	SPACER, COPPER
-7	253-0514–xx			1	THERMAL INTERFACE MATERIAL GAP PAD, 0.5MM THICK, 30MMSQ
-8	253-0513–xx			1	THERMAL INTERFACE MATERIAL GAP PAD, 0.5MM, 20MM SQ
-9	214-5355-xx			1	HEATSINK, ACTIVE, COM-EXPRESS BCM EMS-QM77
-10	119-7683-00			1	FAN, 70MM X 70MM X 15MM, 12V
-11	211-1346-00			4	SCREW, MACHINE, PANHEAD M3 X 0.5 X 26MM, PHILLIPS
-12	863-0891-00			1	CIRCUIT BD SUBASSY; ENHANCED RTT/DPSA BOARD,PB-FREE
-13	407-5358-00			1	BRACKET, HEATSINK FAN
-14	436-0435-00			1	FAN ASSEMBLY
-15	863-0955-00			1	CKT BD SUBASSY; REAL TIME IQ AND LOG VIDEO OUTPUT
-16	200-4961-00			1	COVER; REAR PANEL, OPTION (BLANK)
-17	211-0450-00			4	SCREW, MACHINE; 2.5MM X 0.45 X 6MM, PNH, STEEL, ZINC PLATED, T8 TORX
-18	200-5317-00			1	COVER, REAR PANEL, OPTION (REAL TIME I AND Q)
-19	174-5106-01			2	CA ASSY, SP;IDC, TW FLAT, I&Q OUTPUT TO REAR PANEL
-20	174-6418-00			1	CABLE, COAX BNC-ST TO SMB-RA
-21	407-5181-00			1	BRACKET, GROUNDING (LAN AND PS/2)
-22	174-5213-xx			1	CABLE ASSY,RIBBON; STATIC GROUND,1X2,RT I/Q TO REAR PANEL

Figure 4-3: Modules

Table 4-4: Power supply and hard drives

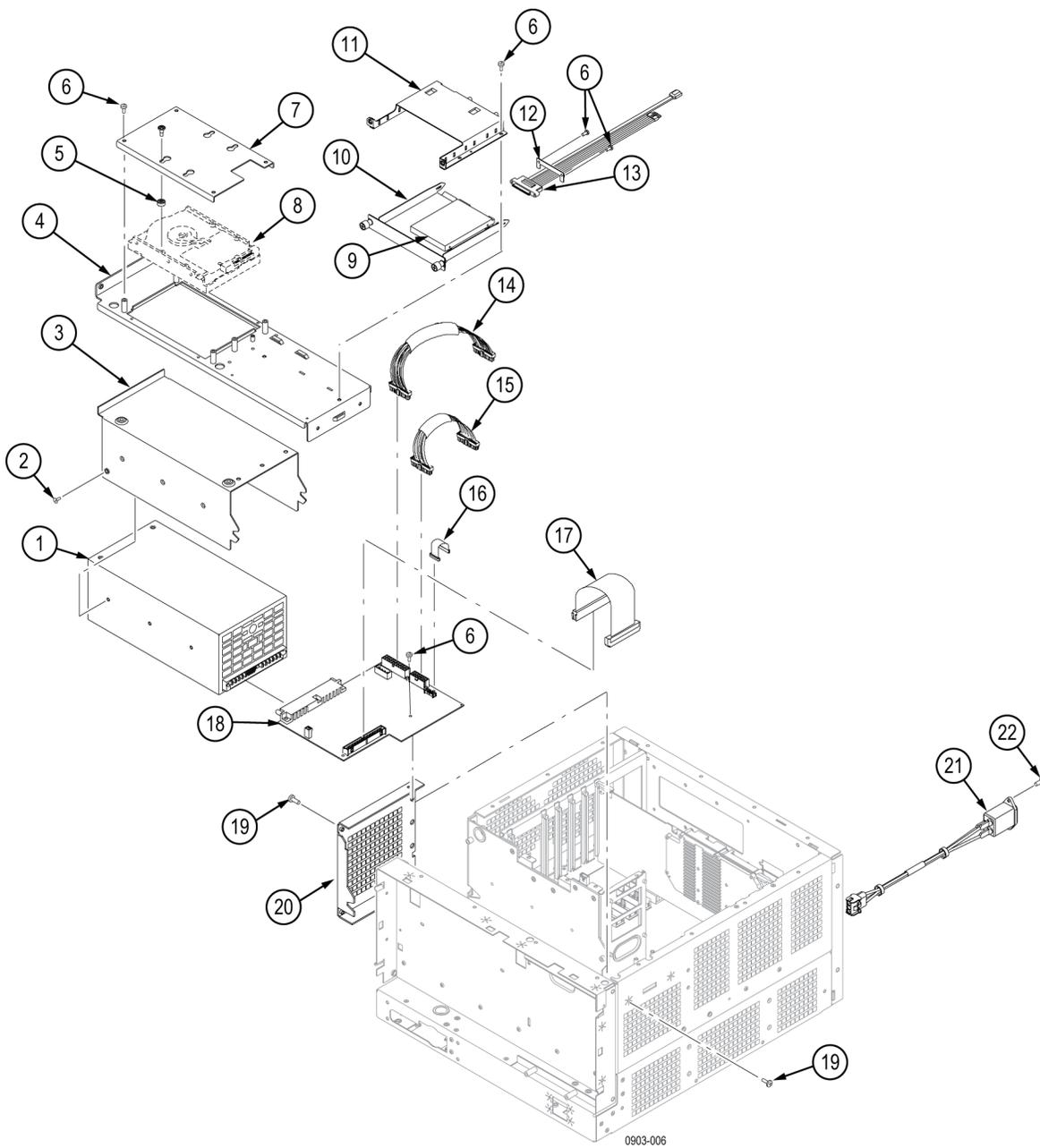| Fig. & index number	Tektronix part number	Serial no. effective	Serial no. discont'd	Qty	Name & description
4-4-1	119-6986-06			1	POWER SUPPLY; AC-DC;460W;+3.3V 40A, +5V 34A, +12V 25A, -12V 1A, +5VSB 2A;90-264VAC, 47-440HZ
-2	211-0718-00			6	SCREW, MACHINE; 6-32 X 0.312, FLH100, STEEL, ZINC FINISH, T-10 TORX
-3	407-5477-00			1	BRACKET; POWER SUPPLY; SAFETY CONTROLLED
-4	441-2619-00			1	CHASSIS; DRIVE TRAY
-5	348-1835-00			4	GROMMET; VIBRATION ISOLATION
-6	211-1050-00			9	SCREW, MACHINE; 6-32 X 0.312 L, PNH, STEEL, ZINC FINISH, T15
-7	407-5472-00			1	BRACKET; HARD DRIVE, 3.5 INCH HARD DRIVE
-8	850-0264-00			1	DRIVE ASSEMBLY; INTERNAL FIXED DRIVE,PROGRAMMED 1197524XX;RSA5103B/5106B/5115B/5126B, OPTION 59
-9	850-0263-00			1	DISK DRIVE ASSY; PROGM 119825000,SS REMOVEABLE HARD DRIVE,RSA5103B/5106B/5115B/5126B, OPTION 56 *NOTE.* *This is a replacement drive. To order a spare drive order: RSA5BUP SSD.*
-10	407-5473-00			1	BRACKET; HARD DRIVE, 2.5 INCH REMOVABLE
-11	441-2620-01			1	CHASSIS; DRIVE BAY FRAME TOP
-12	407-5337-00			1	HDD CABLE BRACKET
-13	174-5349-00			1	CABLE ASSY; SATA COMBO, HARD DRIVE CABLE WITH LATCH
-14	174-5089-00			1	CA ASSY, PWR; DISCRETE, DIG INTERFACE, 2X10, 18AWG; SAFETY CONTROLLED
-15	174-5090-00			1	CA ASSY, PWR; DISCRETE, DIG INTERFACE, 2X6, 20AWG; SAFETY CONTROLLED
-16	174-5101-00			1	CA ASSY, SP; IDC, RIBBON, AUDIO COM Express PC TO DIG INTERF, 2X5, 2MM; SAFETY CONTROLLED
-17	174-5100-00			1	CA ASSY, PWR; IDC, RIBBON, PWR CONV TO BULKHEAD, 2X25, 0.100 CTR; SAFETY CONTROLLED
-18	863-0592-xx			1	CIRCUIT BD ASSY; POWER CONVERSION
-19	211-0510-00			8	SCREW, MACHINE; 6-32 X 0.375, PNH, ZINC PLATED STEEL, T15
-20	200-5135-00			1	COVER, POWER SUPPLY
-21	174-5227-00			1	CABLE ASSY;LINE FILTER; SAFETY CONTROLLED
-22	211-0380-00			2	SCREW, MACHINE; 4-40 X 0.375, FLH, STEEL, ZINC FINISH, T8

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Figure 4-4: Power supply and hard drives

Table 4-5: Upper deck fans, misc. cables

Fig. & index number	Tektronix part number	Serial no. effective	Serial no. discont'd	Qty	Name & description
4-5-1	211-1050-00			16	SCREW,MACHINE; 6-32 X 0.312 L,PNH, STEEL, ZINC FINISH, T10, TORX
-2	436-0424-00			1	ASSY,FAN TRAY; WITH FANS MOUNTED (UPPER DECK); SAFETY CONTROLLED
	119-7182-00			2	FAN, TUBEAXIAL; 12VDC, 0.40A, 4.80W, 2500RPM, 100.6CFM, 120MM, LEADS W/CONN; SAFETY CONTROLLED (SUBPARTS OF 436-0424-00)
	407-5062-00			1	BRACKET; FAN MOUNTING,UPPER DECK; SAFETY CONTROLLED (SUBPART OF 436-0424-00)
-3	174-5212-00			1	CA ASSY,SP; IDC, RIBBON, CONTROL LINES, BULKHEAD TO RF INTERFACE, 2X7,0.100 CTR SAFETY CONTROLLED
-4	174-5201-00			1	CA ASSY,SP; IDC, RIBBON, GPIB, DIG INTF TO REAR PANEL; SAFETY CONTROLLED
-5	213-1061-00			2	JACKSCREW; 6-32 EXT THD, M3.5 X 0.6-6 INT THD, 410 SS
-6	407-5055-00			1	BRACKET ASSY; SPEAKER
-7	119-7172-00			1	SPEAKER; DYNAMIC; 28MM DIA, 8 OHM, 600-7KHZ, MYLAR CONE, MG ELECT 288BB20 WITH 28 INCH CABLE
-8	407-5480-00			1	BRACKET; BNC ADAPTER
-9	174-5066-00			2	CA ASSY,RF,FLEX-COAX; FRONT PANEL ACQ
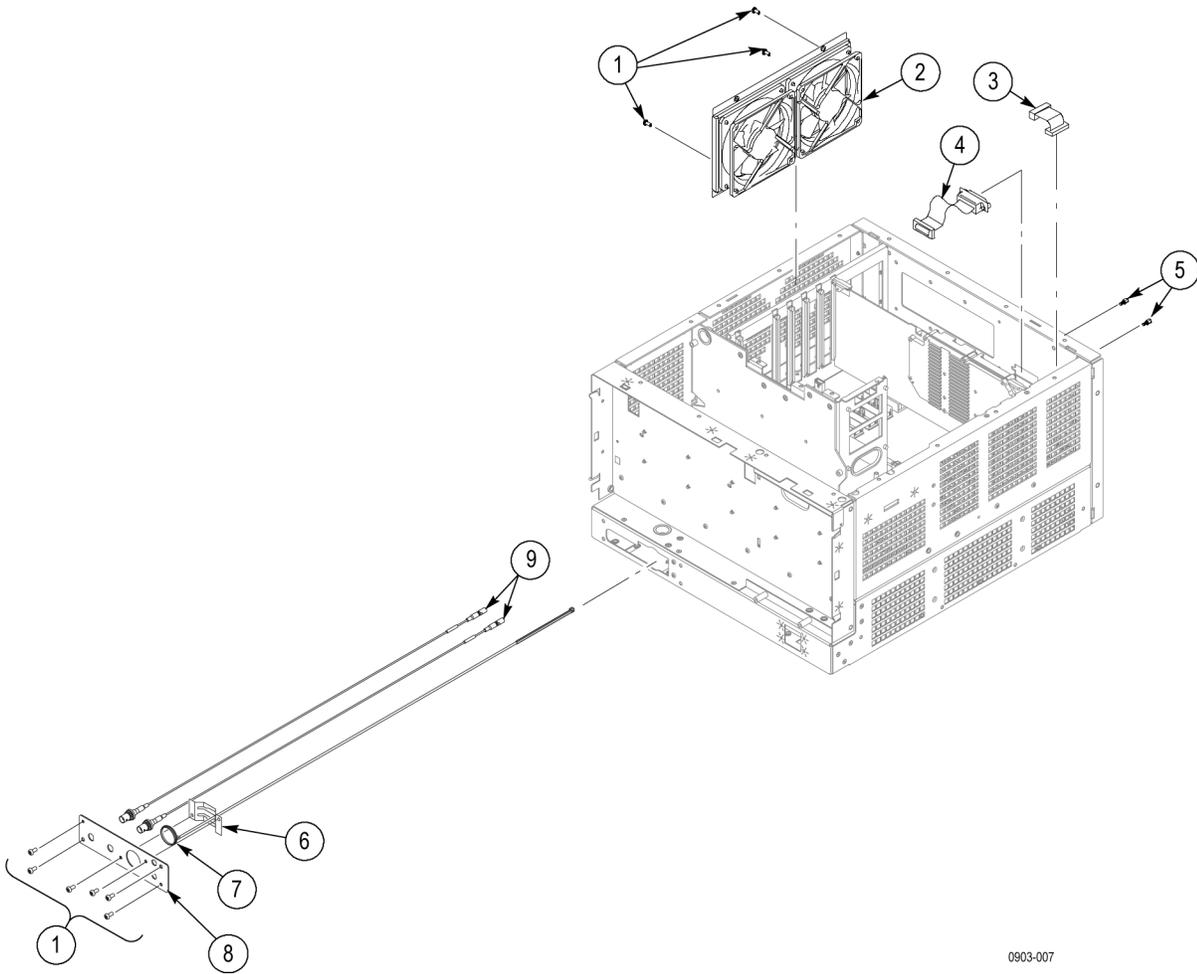
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Figure 4-5: Upper deck fans, misc. cables