Spectrum™-9100

Functional Test Platform for Factory, Depot and Intermediate-level Test Facilities

KEY FEATURES

- *Highest performance functional tester for analog, digital, mixed-signal and serial bus testing*
- *Performance and flexibility to test products all the way from board level to completed assembly level*
- *Future ready, open standards-compliant platform, adaptable to changing requirements*
- *Proven Teradyne compatibility maintains TPS investment*
- *Proven highly effective in replacing non-Teradyne legacy ATE*
- *Multiple parallel digital functional solutions supporting speeds up to 50 MHz (100 MHz interleaved)*
- *Concurrent serial bus test supports MIL-STD-1553, RS-232, RS-422, RS-485, ARINC 429 and many more*
- *Cost-effective, reliable system accommodates modular expansion*
- *Supports a multitude of adapters, software products and TPS development tools in the TestStudio™-based ATE operating environment*
- *Backed by Teradyne's global service and support network*
- *Standard maintenance classes offered at Teradyne, or in your facility*

The Spectrum-9100 meets the industry's most demanding test requirements and supports expansion to fulfill the changing needs of high-performance functional test.

It's one thing to satisfy today's demanding functional test requirements; it's quite another to meet future, often unknown requirements. The Spectrum-9100 provides both.

The Spectrum-9100 is a fully integrated functional test system, ready to deliver high-performance digital, analog, mixed-signal and serial bus testing. For factory, depot and intermediate test applications that require custom hardware and software integration, the Spectrum-9100 provides a fully developed, fully documented set of core building blocks. It's equipped for easy interface to computer workstations and ready for integration with application-specific instruments and software tools. The Spectrum-9100's advanced engineering and quality workmanship make operation, test development and maintenance simple and cost-efficient.

The Spectrum-9100 combines advanced functionality, switching, software, self-test and calibration capabilities to provide users with the best hardware/software platform possible. It incorporates industry standards that support multiple Application Development Environments (ADEs), a host of TPS development processes and a multitude of adapters. Running under the Windows operating system it uses standard test system bus protocols including GPIB, LXI, PXI, and VXI and employs a variety of programming languages and ADEs, including Visual Studio, Agilent VEE Pro, Measurement Studio, LabWindows, as well as specialized, in-house programming tools. No other test platform offers such a comprehensive suite of user-friendly hardware and software tools.

THE INDUSTRY STANDARD FOR HIGH-PERFORMANCE FUNCTIONAL TEST

The Spectrum-9100 eliminates many problems associated with compliance issues, time consuming validation tests and multiple resource switching errors.

Its base configuration is a single-frame, 19-inch system that accommodates VXI and PXI chassis for housing digital and analog VXI/PXI instrumentation, GPIB and LXI instrumentation and user power. The system comes complete with power distribution and thermal management. The system's PC is host to Teradyne's TestStudio, a feature-rich web-based ATE operating environment.

Optional instrumentation is available for constructing a customized test environment, including Teradyne's Di-Series of Digital Test Instruments with fault dictionary and guided probe diagnostics. Other options include the Bi4-Series of Synthetic Serial Bus Test Instruments and the highly parallel Ai7-Series of Analog Test Instruments. The Ai7-Series includes a digital multimeter, arbitrary waveform generator, digitizer, counter timer and digital oscilloscope capability. The Spectrum-9100 can also be configured with other commercially available instrumentation to meet user-specific needs.

- Expansion area for VXI, PXI and 19" rack-mount instruments
- Accommodates multiple user power supplies
- Includes single-, double- or triple-tier Virginia Panel receiver or spring probe receiver
- TestStudio: a user-friendly, intuitive and feature-rich programming suite
- Spectrum cross-point matrix switch providing up to 768 hybrid pins
- Modular power and cooling unit for problem-free system operation

Modular, Standards-based Design Means Cost-effective System Configuration and Future Expansion

With the Spectrum-9100, you're not locked in to a single, proprietary system configuration. The open, standards-based architecture of the Spectrum-9100 sets the standard for flexibility and scalability.

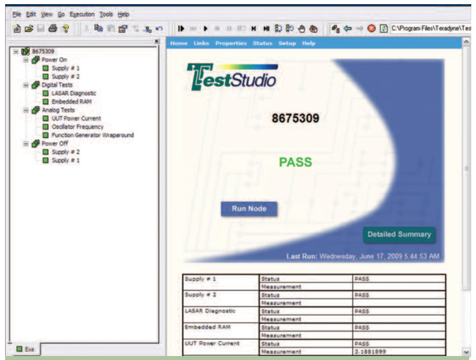
Choose the component software capabilities you need. Scale up the features to meet your changing needs. Buy exactly what you need, when you need it—with confidence. When your product or application requirements change and new test strategies and tools become available, your Spectrum-9100 Series test platform can be easily reconfigured to meet your needs.

TESTSTUDIO WEB-BASED ATE OPERATING ENVIRONMENT SUPPORTS MULTIPLE ADES AND TPS DEVELOPMENT PROCESS

TestStudio is the industry's first open-architecture, web-based ATE operating environment. It provides the flexible and powerful tools needed to manage the entire test process—from development and documentation through debug and execution.

TestStudio's browser integration allows users to share TPS-related documentation in native formats, such as HTML, PostScript and Microsoft Office, making data easy to access and store. Using web-based technologies, TestStudio provides a single, intuitive user interface across all Spectrum-9100 activities — reducing the costs of development, operation, training, documentation and system maintenance.

TestStudio supports common ADEs, including Visual Studio, Agilent VEE, LabWindows/CVI and LabView. It also supports object-oriented add-in technology based on the Microsoft COM standard and provides the means to encapsulate software environments and tools. TestStudio includes Spectrum-9100 test add-ins to control common test instrumentation, such as power supplies and digital test instruments, as well as a Spectrum Cross-Point Matrix add-in that permits users to configure commonly used functions without having to write code. Optional add-ins can extend TestStudio's capabilities to perform specific tasks, such as charting, database management and enterprise-wide data integration. It can also manage background tasks for use by in-house test executives. Teradyne's LASAR and VICTORY™ test-generation tools can further extend the TestStudio environment and its many capabilities.



- Open architecture and web-based operating environment
- Supports standard ADEs and object-oriented add-in technology
- Browser integration makes data easy to access, store and share

The complementary iStudio tools for the Ai-760-Series and Di-Series instruments allow the TPS developer to focus on their test requirements, rather than focusing on writing code. iStudio graphical tools can be used for developing test steps, interactively debugging test steps, and then to save the test steps so they can then be tied together using TestStudio. Using TestStudio and iStudio together, major portions of Test Program Sets can be created and debugged with a minimal amount of time writing code.

WORLDWIDE CUSTOMER SERVICE AND TECHNICAL SUPPORT

Teradyne employs an international staff of highly trained sales, service and technical support professionals who dedicate themselves to customer satisfaction worldwide. They leverage the company's technical expertise and problem-solving skills to help customers develop test applications, maintain up-time, expedite repairs and migrate to newer technologies as needs evolve. We are committed to extending the life and productivity of every Teradyne tester and protecting every customer's capital equipment investment. For more information, please visit http://www.teradyne.com/atd/support.

Teradyne offers customers a range of hardware and software service and support programs from which to choose. Technical training classes are available (at customer sites or Teradyne locations) throughout North America, Europe and Asia. For more information, please visit http://www.teradyne.com/atd/support/training.html or call 1-800-837-2396.

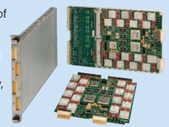
U.S. Air Force photo by Staff Sgt. Randy Mallard

PROGRAMS UTILIZING TERADYNE TEST EQUIPMENT

- U.S. Army standard ATE: IFTE
- U.S. Navy standard ATE: CASS
- USMC standard ATE: TETS
- A-10 FCC TEMS
- A-10 avionics
- AC-103U
- AWACS radar
- B-1B avionics
- B-1B power controls
- B-1B ADTS
- B-2 avionics
- C-5 avionics
- C-17 avionics
- C-130 avionics
- E-8 joint stars
- F-111 avionics
- F-15 avionics
- F-16 avionics
- F-16 radar
- F-18 avionics
- F-22 avionics
- Advanced cruise missile
- AMRAMM missile
- Minuteman missile
- EKV – exo-atmospheric kill vehicle
- Javelin missile
- Patriot launcher and missile
- Maverick missile
- Tomahawk missile
- Stinger missile
- NESP satellite
- Trident BSY-1, BSY-2
- Mark 48, 50, 54
- Standard GP date
- Tornado EW-ECM
- Harrier EW-ECM
- Indian Air Force – radar
- Japan Air Force – F-15 avionics
- Korean Air Force – F-15 avionics
- Pakistan Air Force – JF17 avionics
- Taiwan IDF fighter
- Boeing 737-787 avionics
- USPS support equipment

DIGITAL AND ANALOG INSTRUMENT OPTIONS

Industry-standard architecture, superior performance, Di-Series instruments are comprised of one optional Utility Card and up to 12 Channel Cards. The Di Utility Board supplies guided probe capability, utility bits and system resources to provide compatibility with previous generation digital instruments, including Teradyne's M9-Series and L-Series. Each Di Channel Card can operate as an independent instrument, or when populated in contiguous backplane slots, can act as a single instrument providing up to 768 channels of synchronous parallel digital test capability. If a full 768 channels are not needed today, smaller configurations can be ordered, and additional channels can be added in the field while maintaining TPS compatibility.



- **The Di-Series instruments** offer proven compatibility with Teradyne's M9-Series and L-Series digital instrumentation, guided probe, and fault dictional diagnostics, while offering increased test capability. The Di's flexible design is ideally suited for handling the asynchronous and differential signals often required to properly test many LRUs. Voltage ranges from -30 volts to +30 volts, and data and clock rates to 100 MHz using channel pairing provide digital test capability to meet the most demanding voltage and frequency requirements.

Off-line TPS development using industry-standard LASAR™. Integration with Teradyne's LASAR simulation software enables off-line test development with minimal time required for test program integration.

- **Ai7-Series of VXI Analog Test Instruments** provide superior performance with highly parallel test capability.

Tester-Per-Pin Analog Test Architecture. Teradyne's Ai7-Series of analog test instruments are the first mixed-signal subsystems on a card, designed specifically to address the requirement for real-time signal simulation and functional test.

The single Slot Ai-760 family of analog test instruments start with 8 MFA (Multi-Function Analog) channels, with each MFA channel offering 200 MS/s Timer Couter, 200 MS/s 14-bit ARB, and 50 MS/s 12-bit digitizer functionality. The configuration can be enhanced by adding 8 additional MFA Channels, a 6.5 digit digital multimeter (DMM) and a 1 GS/s digital oscilloscope (DSO).

The single Slot Ai-710 family of analog test instruments start with 8 MFA channels, with each channel offering Function Generator, Arbitrary Waveform Generator, Digitizer, DMM, Limit Detector, and Timer Counter capability. Options include adding 24 additional channels, offering 32 MFA channels in a single instrument slot. The Ai-710 architecture provides flexible inter-channel triggering to handle the most complex parallel analog applications.

- **Bi4-Series of Serial Bus Test** Instruments provide the ultimate Tester-Per-Pin Bus Test Architecture.

Flexible Serial Bus Test Capability. Teradyne's Bi4-Series instrument is the industry's first instrument designed specifically for real-time bus test and emulation. The Bi4-Series supports the most common serial bus standards in one instrument slot. It features Teradyne's latest bus testing technology to provide the ultimate in flexibility for both Board and Box level testing. Using the Bi4-Series architecture ensures complete communications bus access without the need to reconfigure the test system for each application. Each Bi4 has four independent bus modules that support MIL-STD-1553, MIL-STD-1773, TIA/EIA-RS-232, TIA-EIA-RS-422, TIA-EIA-RS-485, ARINC 429 and more.

With an innovative load-and-forget programming environment, native support for popular buses and flexibility to emulate custom buses or variations of standard buses, the 2 and 4 module Bi4-Series instruments provide the option to emulate any bus at any time. No need for external electronics. No need for custom circuitry and no need for compromises.

SPECTRUM CROSS-POINT MATRIX

Provides full cross-point instrument scanning. The optional cross-point matrix is a dedicated high-bandwidth subsystem that can be configured with switch modules and is located in a dedicated chassis for efficient resource distribution. Users can configure the matrix to match immediate needs and reconfigure it as requirements change, while maintaining TPS compatibility. The Spectrum Cross-Point Matrix may be configured with up to 13 modules, combining as many instrument port or matrix channel modules as required.

The high-bandwidth 50 MHz matrix accepts instrument port modules with up to 12 coaxial instrument connections per module, while matrix channel modules have up to 64 UUT I/O connections per module. This matrix incorporates separate analog and digital ground planes and separate chassis ground for an extremely quiet switching environment with enhanced signal integrity.

Spectrum Cross-Point Matrix

Matrix modules may be directly connected to Teradyne's digital test instruments for hybrid-pin capability (analog and digital resources) at the UUT interface. The combination of hybrid pins and cross-point capability provides flexible and efficient utilization of the tester interface, resulting in reduced hardware costs, reduced program development costs and reduced integration costs.

UUT POWER SUPPLIES

The Spectrum-9100 uses Agilent 66000 UUT power supply modules. Each Agilent 66000 can accommodate up to eight modules. Multiple Agilent 66000 chassis can be added to meet application needs or other COTS power supplies can be incorporated.

EXPANDABLE FRAME, MODULAR POWER AND COOLING

The Spectrum-9100 system can be expanded to two, three or more frames. Each frame can have its own power distribution unit (PDU), or draw power from the main frame PDU, but always with the safety of being controlled from a single cut-off point. Within each frame, there is UUT cooling, cable routing areas, and ample room to integrate industry-standard instrumentation, instrument Chassis and user power.

The system accepts any of three power distribution units (PDUs) or a combination of the three up to 60 KVA. PDU selection is optimized based on system configuration and load requirements.

Specifications:

COMPUTER SYSTEM/INTERFACES

- Industrial rack mount, or personal workstation running Windows XP Professional
- Single or dual flat panel displays
- Choice of integrated or stand-alone PC
- Ethernet interface
- GPIB interface
- MXI-2 interface

INFRASTRUCTURE

- Single, or multiple PDUs in 10 kVA, 20 kVA, or 30 kVA sizes
- Expandable 1, 2, 3 or more frames
- High-performance 5700-Watt VXI chassis
- Choice of single-, double- or triple-tier VPC 90 Series receiver
- Choice of single-tier or double-tier Spectrum-9100 spring probe receiver

INSTRUMENTATION:

Di-Series Digital Test Instruments

General Specifications	
Date and clock Rate	25 MHz (Di-025) and 50 MHz (Di-050 models)
Channels/VXI Slot	64 single-ended or 32 differential pairs
Dynamic Pattern Memory	256K patterns
Timing sets	256
Pattern Branching	Loops, Branches, Conditionals, Subroutines, Event handlers
Algorithmic Capabilities	CRC generation, Keep & toggle, Teradyne L-Series compatible MemTest
Synchronization and Debugging Capabilities	Programmable handshake, External trigger-in, External trigger-out, External clock in & out, VXI TTL trigger bus, Dynamic breakpoints
External clock Synchronization	DC to 50 MHz
Drive Phases/ Test Windows	Independent phase & window per channel
Minimum Pulse Width	10 ns (5 ns for 100 MHz clock)
Channels Per Cage	768
Virtual Instruments/Cage	24 max
Drive Current	Up to 80 mA with programmable limits
Drive & Detect Levels	± 30 V, 30 V max swing
Over-voltage Protection	Automatic relay disconnect within 50 µs
Data Formats	Seven (NR, R0, R1, RZ, RC, RM, SC)
Driver Slew Rate Control	100: 1 adjust range per channel, 1 V/ns maximum
Guided Probe	Optional
Operating Range	0 – 50°C ambient

Ai-760 Series Analog Test Instruments

ARB Specification

General Specifications	
Number of Channels	8 single-ended, 4 differential
Standard Waveforms	Arbitrary, DC, Sine, Square, Triangle, Ramp, Pulse, Double-pulse, FSK, AM, FM
Max Sample Rate	200 MSa/s
Input Trigger Sources	Any MFA channel, Front panel triggers, Software or VXI triggers
Trigger Modes	Start, Advance Sample, Advance Segment, Retrigger

Timer/Counter Specification

General Specifications	
Number of Channels	8 single-ended, 4 differential
Measure Modes	Count Events, Duty Cycle, Frequency, Frequency Ratio, Period, Period Averaging, Pulse Width, Time Interval
Input Trigger Sources	Any MFA channel input, Front panel triggers, Software, or VXI triggers
Trigger Modes	Arm, Gate, Trigger

Digitizer Specification

General Specifications	
Number of Channels	8 single-ended, 4 differential
Sample Rate	85 s to 20 ns per sample (11.8 mHz to 50 MHz)
Resolution	14-bits
Acquisition Memory	2 Million samples per channel
Input Trigger Sources	Any MFA channel input, Front panel triggers, Software, or VXI triggers

Digital Sampling Oscilloscope Specification

General Specifications	
Number of Channels	4 inputs multiplexed to 2 channels
Input Channel Specifications	
Bandwidth	DC to 500 MHz (50 Ω) DC to 100 MHz (1 MΩ)

DMM Specification

General Specifications	
Measurement Modes	DCV, ACV_{RMS} (HI, LO)(Inputs) DCI, ACI_{RMS} (I+, LO) 2-wire Resistance Frequency/Period (HI, LO) 4-wire Resistance (HI, LO, Sense HI, Sense LO)
Voltage Measurements	Up to ±300 volts DC or AC
Current Measurements	Up to 3 Amps
Resistance Measurements	Up to 30 MΩ (full scale)
Trigger Modes	Start or Arm measurement

INSTRUMENTATION:

Ai7-Series Analog Test Instruments

Model Specific	Ai-705	Ai-710
Number of Instruments	48	192
Number of Channels	8	32
Instruments Per Channel	6	6
Instrument Types	DMM Digitizer T/C Limit Detector Function Gen Arb	DMM Digitizer T/C Limit Detector Function Gen Arb
Matrix Pins	8	32
Number of Central DVM	1	1

Bi4-Series Analog Test Instruments

General Specifications	
Number Concurrent Bus Types	2 or 4 depending on which Bi4 instrument selected
API Function Support for	MIL-STD-1553 A/B, ARINC 429, ARINC 573, RS-232, RS-422, RS-423, RS-485, MIC, CAN II
Programmable Bit Encoding	Manchester, NRZ, RZ, More
Maximum Data Transfer Rate	10 MHz
Slew Rate	0.5 to 500 V/ms
Voltage Range	non-1553 -12 V to +12 V
Voltage Range	1553 18 V to 37 V
Output Impedance (selectable)	-5 V to 100 V
Termination (selectable)	25 V to 100 V

Spectrum Cross-Point Matrix (SCPM)

General Specifications	
Maximum Switching Current	1 A
Maximum Switching Voltage	200 V
Maximum Switching Power	30 W
Initial Series Path Resistance,	1.8 Ω + (0.3 Ω x number of 64-Channel Matrix Modules in path), typical port-to-channel
Bandwidth, Channel-to-Channel (-3dB)	300 MHz
Bandwidth, Port-to-Channel with one instrument module (-3 dB)	38 MHz with 3 channel matrix module 32 MHz with 5 channel matrix modules
Maximum Number of Modules	13 (chassis slots)

Teradyne's Worldwide Service and Support

A dedicated, worldwide network of customer service and support professionals stands behind every Teradyne product. Teradyne offers an extensive network of regional support and training centers around the world. A full spectrum of services and software support programs also extend beyond the expiration of your original warranty. Visit our web site at: www.teradyne.com/atd

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