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HP E2974A Sub-System Stress Tests



Technical Specifications

HP E2920 Computer Verification Tools, PCI Series

The HP E2974A Sub-System Stress Tests enhances the HP E2925A PCI Exerciser and Analyzer with several dedicated stress tests. Ready-to-run and easily controlled by a graphical user interface, the HP E2974A is designed to be operated by technicians and engineers. This effortless way of increasing stress conditions significantly intensifies system validation tests, increases test coverage and forces the early occurrence of critical system problems.

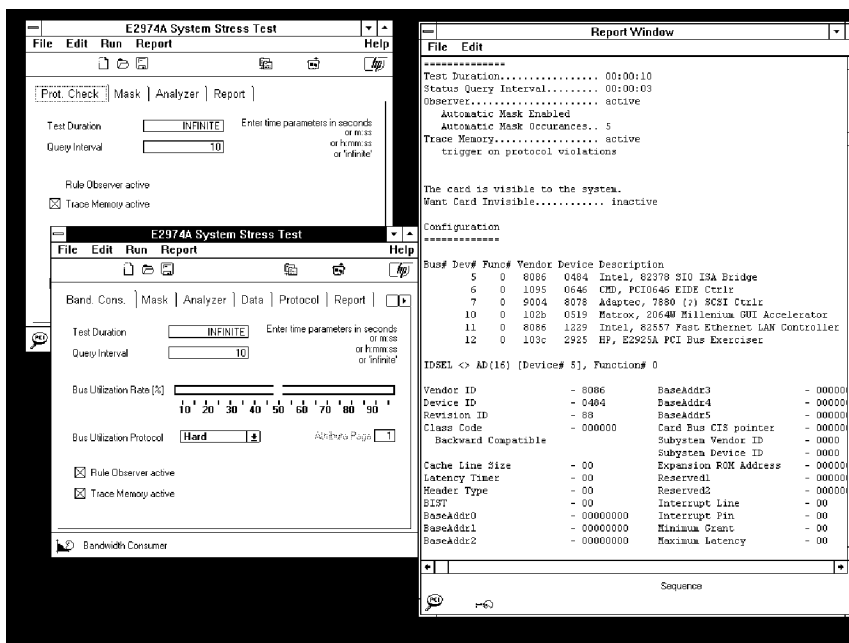
Controllable stress conditions
Using the PCI bus of the system-under-test as a window into the system, the HP E2974A uses the HP E2925A PCI Exerciser and Analyzer Card to add data, traffic and protocol stress to the PCI system during system validation. It is precisely this kind of stress which can bring up hidden design problems more quickly than any user application with randomly-generated stress.

Key Features

- Ready-to-run stress test.
- Real-time PCI protocol checker.
- System memory read stress.
- PCI bus load stress.
- Interrupt system stress test.
- Controlled by GUI or C-API.
- Executable on DUT or controllable from an external host.
- Ongoing test reporting, including protocol errors, bus hang-up.
- Config. space and bus trace dump in error cases.
- Standalone test capabilities.

Direct access to sub-systems

Critical system hardware problems can be detected directly and immediately due to the direct access to the sub-systems on the PCI bus. Application-oriented test approaches face the barriers of software drivers and their error correction mechanisms. Thus, critical system problems can stay undetected or can occur sporadically. By monitoring the sub-systems directly through the PCI bus, such problems can be revealed more quickly and efficiently.



Repeatable test conditions

Besides the fundamental approach of performing verification under controlled stress conditions so that potential system problems can be revealed early in the validation process, the HP E2974A also builds a predictable validation environment with controlled test conditions. These conditions must exist throughout the entire validation process, so that design issues detected in the system validation lab can be easily fed back into the debugging process within R&D.

Ready-to-run functions ...

The HP E2974A is equipped with ready-to-run stress functions which automatically stimulate and check the sub-systems. The factory-recommended stress defaults result in an efficient and advantageous start to system validation.

... simply customized

All test settings can be simply customized from the GUI to meet specific test needs and to reflect previous test experiences in dedicated labs.

GUI intuitively sets up a test sequence

For each individual validation task, the user can set up a single test. Multiple test sheets are combined together in a test sequence to run an entire validation test. The test sequencer also allows customer-written test programs to be started at the same time as the individual tests.

Programmatic interface (C-API)

Each sub-system test can be used in a user-written C program. To make the setup simple, each interactively-prepared test can be called up at a later stage from a user program. This therefore means that the user-written benchmarks can be easily run together with the sub-system tests.

Report Problems and Causes

To locate and analyze problems, the actual system configuration, test time, test settings, and error conditions are reported in error cases. The actual PCI bus status trace can be dumped to file allowing in-depth root cause analysis and reporting.

Standalone test capabilities

The HP E2974A can set up the HP E2925A PCI Exerciser and Analyzer as a standalone test machine. In this mode, the PCI card is simply plugged into a PCI slot, starts immediately after power up and performs the pre-programmed test. In the event of errors, the actual bus status is stored until it is uploaded from an external host for analysis. The standalone test can be set up to perform bandwidth consumption, system memory read and PCI protocol variation tests.

OS independent testing

The protocol checker, bandwidth consumer and system memory read stress tests can all be used on any PCI system completely independently of the operating system of the system-under-test. In this test setup, the HP E2925A is controlled from an external host.

Protocol Checker

The aim of the protocol checker is to detect and report PCI protocol violations in any test performed during system validation. If errors occur, the waveform dump helps identify the responsible bus agent and speeds up root cause analysis. The protocol checker verifies 25 protocol rules and can run concurrently or independently of other sub-system tests.

In addition, the card can also be set up to be completely invisible to the DUT by requiring no configuration space. In this configuration, the protocol check is the easiest way of detecting and analyzing intermittent system misbehaviors during the complete validation cycle.

PCI Bus Load Stress

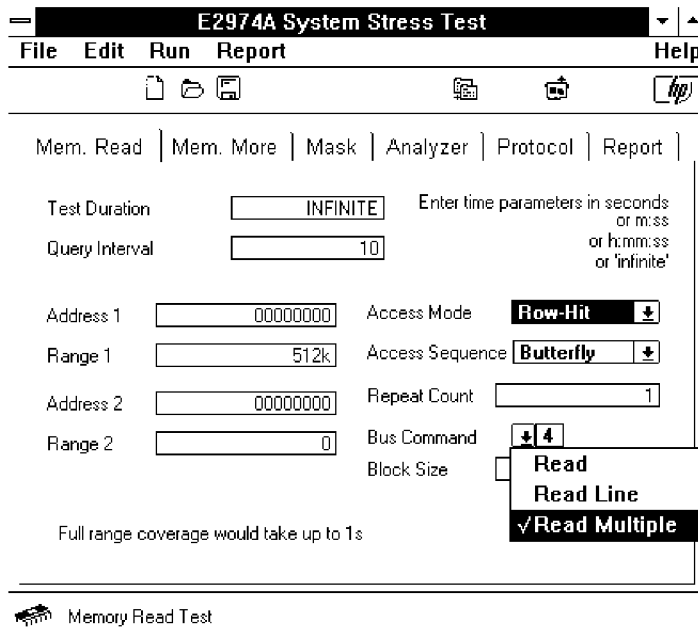
The bandwidth consumer loads the PCI bus with a certain bandwidth, and specific stress conditions for bus arbitration and bus masters requiring bus access will be stimulated. Typical problems detected by this test function are: arbitration problems at different bus loads, FIFO overflow of NICs and the sporadic occurrence of protocol violations. The parallel triggering of missing traffic allows the bus deadlock and lifelock to be detected while acquiring the corresponding trace.

By setting up the HP E2925A to write to its own target, the bus load can then be emulated without accessing any other system component. By editing the used write/read data to the relevant system pattern, additional bus signal switching stress is created, which validates the correct operation of the system under worst case data pattern conditions.

System Memory Read Stress

This test generates several levels of stress on the system memory and memory controller in order to check the data integrity. The HP E2974A therefore automatically performs protocol permutations within customer-defined ranges in order to add a specific protocol stress. The following parameters can be varied:

- Burst length, in any customer-specified order from 1 to 255.
- Waits, in any order specified by the customer from 0 to 31.
- Release request.
- Data PERR and SERR.
- Address PERR.
- Wrong data/address parity; inverts 0 to 100 % of correctly calculated parity bits (write only).
- Address/data stepping.
- Memory command usage; varies memory commands by switching: mem_writeinvalidate, mem_readline, and mem_readmultiple.
- Cacheline shift; varies the start address relatively to the cacheline boundaries.
- Byte enables; various byte enables from 0000\b to 1111\b.



Interrupt Stress Test

This test repetitively generates PCI interrupts in programmed intervals and measures the interrupt latency. The test requires Windows NT 4.0, and is equipped with an interrupt driver for the device-under-test.

Measurement and Resource Requirements

The HP E2974A Sub-System Stress Tests software requires the HP E2925A PCI Exerciser and Analyzer. For the analysis of captured PCI traces and for root cause analysis, the HP E2970A PCI Analyzer GUI is recommended.

In order to operate the HP E2974A from an external host, the HP E2925A option 002 fast host interface is recommended for the convenient upload of bus cycle traces.

System Requirements

To use the HP E2974A Sub-System Stress Tests GUI, a PC with the following specifications is required.

PC: IBM-PC or 100 % compatible, with recommended minimum 90 MHz Pentium CPU and CD-ROM drive.

Graphics: 800 x 600 required, 1024 x 768 SVGA recommended.

Required O/S:

To run the GUI on the DUT:

- Windows NT rev. 3.51, or
- Windows NT rev. 4.0.

To run the GUI on an external host:

- Windows NT rev. 3.51,
- Windows NT rev. 4.0, or
- Windows 95.

To run the system memory test or interrupt system test, Windows NT rev. 4.0 is required on the DUT.

Memory: 16 MB minimum, 24 MB recommended (for the complete HP E2920 Series).

Hard disk: minimum 50 MB available disk space required, 100 MB recommended (for the complete HP E2920 Series).

Interfaces: for the HP E2974A, it is recommended that you use either the HP E2925A option 002 fast host interface of the PCI Exerciser and Analyzer Card, or that you access the card via PCI. Alternatively, an RS232 port can be used. A parallel port is required for the software ID module, supplied with the HP E2925A, to enable the software license.

Expansion slots: for the HP E2925A option 002 fast host interface of the PCI Exerciser and Analyzer Card, one ISA slot is required to host the bi-directional Centronics card.

Ordering Information

The HP E2974A includes:

- single user license to use the sub-system test GUI software for one HP E2925A at a time,
- software media (CD-ROM).

The HP E2974A requires:

- one HP E2925A PCI Exerciser and Analyzer,
- one HP E2925A option 002 fast host interface (recommended if PCI is not being used).

Related HP Literature

- HP E2920 Computer Verification Tools, PCI Series, brochure, p/n 5965-4723E.
- HP E2925A 32 bit, 33 MHz PCI Exerciser and Analyzer, technical specifications, p/n 5965-4724E.
- HP E2970A PCI Analyzer Graphical User Interface for Windows 95/NT, technical specifications, p/n 5965-4726E.
- HP E2971A PCI Exerciser Graphical User Interface for Windows 95/NT, technical specifications, p/n 5965-4725E.
- HP E2972A PCI Performance Analyzer, technical specifications, p/n 5965-8008E.
- HP E2975A PCI Protocol Permutator and Randomizer, technical specifications, p/n 5965-8010E.

For more information:
<http://www-europe.hp.com/dvt>.

A free trial version is also available on the web.

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Printed in U.S.A. 7/97 (VC)
5965-8009E