

# Firefox Workstation Diagnostics

## Revision 0.1

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**Revision History**

<b>Date</b>	<b>Version</b>	<b>Content/Changes</b>
23 Dec 87	0.1	Change from two to three tier diagnostic strategy List Firefox supported Q-bus options
01 May 87	0.0	Preliminary draft

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## 14. Diagnostic Strategy

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Prepared By: Mary Ann Gallagher

Diagnostic strategy for the Firefox system consists of three tiers of testing with a major objective of isolating to a field replaceable unit (FRU) on failure.

The first testing tier is a power-up self-test that covers all testable functions of the system, including all M-bus options and a defined set of Q-bus options. This test is a fast, efficient check for stuck-at faults, and it provides a high level of confidence that the system can boot. The PST runs automatically on system powerup; alternatively, it can be activated from the system console program.

The second testing tier is a system test that covers all testable functions of the system, including all M-bus options and a defined set of Q-bus options. It extends the test coverage of the PST by providing coverage of intermittent faults and faults caused by module interactions. The system test differs from the PST in that it tests modules concurrently rather than one by one and is, therefore, a closer approximation of a real user environment. The system test is started from the system console program.

The PST and system test will have three modes: customer, field service, and manufacturing, with different levels of test coverage and capabilities for each. The third testing tier is for utilities. Required utilities currently include NI loopback, DSSI utilities, and monitor patterns. These diagnostics will include detailed tests using loopback connectors, visual tests, and selective and continuous execution of tests.

### 14.1. Description of Diagnostic Product

The diagnostics product consists of the following components:

- Power-up self-test
- System test
- System utilities

Together, these components will provide a thorough check of the Firefox system. The primary purpose of the product will be to provide the end user, CSSE, Manufacturing, and Design Engineering with a set of comprehensive diagnostic tools. These tools will incorporate quality, low maintenance costs, and high reliability into the Firefox system.

**Table 14-1: Location of EPROM Code in Modules**

<b>Module</b>	<b>Code in EPROM</b>
Dual-CVAX Processor	CPU PST, console code, primary processor determination, memory PST
I/O	PST, VMB, utilities, system test kernel, monitor and test modules
Graphics	PST, system test, utilities, console support code
Q-Bus Adapter	PST, system test, selected Q-bus option tests*

\* The assumption here is that a defined set of five Q-bus options will be tested under the Firefox system diagnostic strategy. The EPROM architecture allows for integration of add-ons to the diagnostics and can be used by the Laboratory Development Product Group for "DEC specials" or sold to OEMs who want to add their own Q-bus options.

#### 14.1.1. Power-Up Self-test

The power-up self-test will reside in EPROM and be invoked on powerup, on reset, or by console command. It will isolate the fault to the failing FRU, excluding unsupported Q-bus options. Errors will be reported via LEDs on the modules and via the console using numeric error codes. The PST for the CPU module will test each CVAX, CFPA, cache, and FBIC in parallel. When the CPUs are tested, a primary CPU will be determined, and it will test the other modules. Although the memory module has built-in self-test capabilities, the testing must be started, completed, and evaluated by the primary CPU. Workstation I/O-module testing performed by the primary CPU will include tests for the FBIC, SSC, serial lines, disk/tape interfaces and network interface (NI). Tests for the Q-bus-adapter module will include FBIC, CQBIC, and the Firefox-supported Q-bus options, including the TKQ70, DRQ3B-AA, DRV11-SA, DZQ11-SA, and RRD50.

#### 14.1.2. System Test

The system test will be used to provide the user with a high level of confidence that the Firefox system is functioning correctly. It is designed to detect stuck-at faults, intermittent faults, and system-related faults in the modules. The system test differs from the PST in that it tests modules concurrently rather than one by one. As a result, it is a closer approximation of a real user environment. It also allows for testing that would be inappropriate in the PST because of time limitations or other constraints. The system test is based on VAXELN, which provides a multitasking environment. The goal of this test is to migrate all customer and CSSE diagnostics into EPROM when they are stable.

#### 14.1.3. System Utilities

System utilities complement the PST and system test by providing a mechanism for the user to use to detect and isolate faults that cannot be captured through software intervention. These utilities will be stored in EPROM on the I/O module and on the graphics module. Sample utilities in the I/O EPROM include the disk formatter and verifier and an Ethernet loopback responder. The graphics-option EPROM will contain monitor test-pattern utilities.



#### 14.1.4. Network Management Interface

To meet the diagnostic requirements of a distributed system, the Firefox diagnostics will be designed to interface to the Network Management layer of the Management Control Center (MCC), which is being developed by the Network and Communications group. The functions provided are expected to be network reporting of configuration and self-test results, but this is dependent on the availability of specifications from the MCC developers.

#### 14.2. Goals

The following have been earmarked as diagnostic goals:

- To develop a concise, thorough PST with 97 percent failure isolation to the FRU
- To exercise the system concurrently to detect system-related faults, stuck-at faults, intermittent faults, and reliability failures with system test, with 97 percent failure isolation to the FRU
- To provide CSSE with a set of diagnostic tools that are effective enough to give 97 percent isolation of faults to the failing FRU and to ensure that FRUs need never be swapped at random
- To work with NAC to integrate the Product Diagnostic System with the Network Fault Management tools (that is, to provide the ability to report configuration and status through the NI)

The different diagnostics should complement each other to provide maximum coverage and fault isolation. Table 14-2 summarizes the fault coverage goals for the different modes and tests.

**Table 14-2: Fault Coverage Goals**

Test	Mode		
	Manufacturing	CSSE	Customer
PST	90%	90%	80%
PST + System test	95%	95%	85%
PST + System test + Utilities	97%	97%	90%

#### 14.3. Nongoals

- PST will not provide intermittent-fault detection, although loop-on test capabilities will be included.
- Fault isolation to the chip level is not a goal, although fault-isolation information will be as detailed as possible.
- Extensive fault insertion to evaluate product quality is a nongoal for diagnostics. However, diagnostics will help system test engineers and product assurance develop a fault-insertion test plan as part of the DVT.

#### 14.4. Operating Environments

The PST is run automatically at powerup, or when a TEST command and parameters are entered in console mode. In CSSE or manufacturing mode, parameters specified allow the user to execute a specific functional test, to execute the entire PST, loop-on test, and/or loop-on error. Errors are reported on the designated console device and through LEDs.

The system test is run when a TEST command and parameters are entered in console mode. In CSSE or manufacturing mode, parameters specified allow the user to execute a specific functional test, to execute the entire system test, and/or loop-on test. Errors are reported on the designated console device and through LEDs.

#### **14.5. Related Documents**

For a more detailed description of the Firefox diagnostics, see the *Firefox Diagnostic Project Plan*.

For a more detailed description of the Firefox graphics option diagnostics, see the *LEGSS Diagnostic Project Plan*.