



SATA ADVANCED TEST TOOL FOR NCQ: DRIVE MASTER PROFESSIONAL 2004

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Drive Master Professional is a SATA interface test tool for QA and development engineers to test and verify the SATA interface protocol compliance and performance measurement. The tool supports SATA 1.0a and SATA II extension 1.1 specifications. This paper describes the advanced functions supported by the professional version for SATA testing.

Major Function Supported

Drive Master Professional 2004 supports many new SATA functions. In addition to the commands supported in the standard version, it also supports Native Command queuing (NCQ) commands. (Standard version supports complete TCQ commands.) The professional version is suitable for advanced device and host development and testing. It can be used for the system builder to verify the system compliance of the SATA specification. It can also be used for the out going QA and incoming QA to test the advanced SATA II features. The following is a list of major functions supported:

- Testing regular NCQ commands
- Testing abnormal non-queued command when queued commands outstanding
- Testing abnormal queued command issued with duplicate queue tag
- Testing response for R_ERR on Data FIS
- Testing response for R_ERR on non-Data FIS
- Verifying data integrity on R_ERR tests
- Testing overlapped data integrity
- Testing random write/read compare
- Testing original queued command error is preserved
- Testing queued performance (IOPS) on small block transfer
- Testing queued performance (IOPS) on large block transfer
- Testing queued performance (IOPS) on a given queue depth
- Testing queued performance (IOPS) for multi-thread data access
- SATA Reset Creator
- SATA OOB Controller

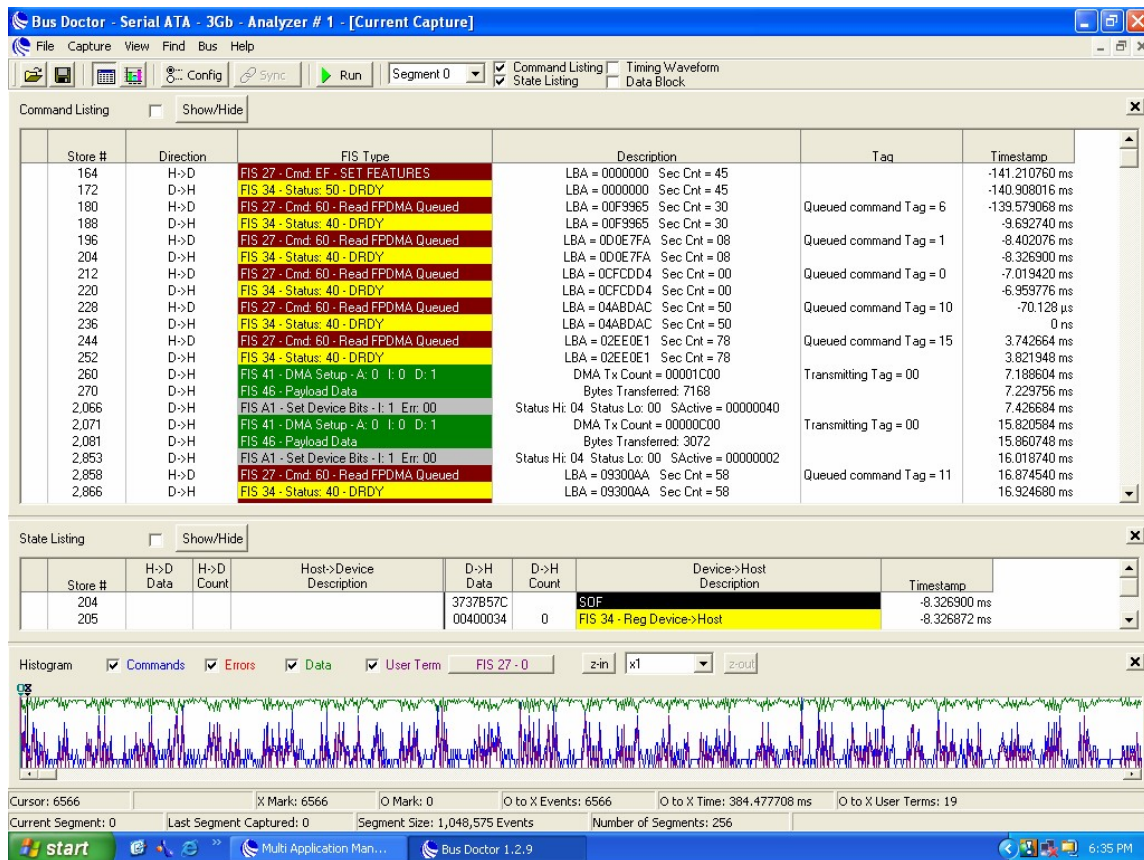
SATA PM Controller
SATA FIS Builder
SATA BIST Creator
SATA Error Logger
SATA PMP Controller

Error Logging Status Window

The Drive Master Professional 2004 provides a detailed logging window for the SATA Registers. It displays the SStatus, SError, SControl, SActive, and SNotification in real-time. In addition, the DM 2004 Pro logs the error and counts number of occurrences of each error. The accumulated error count can be used for further validation.

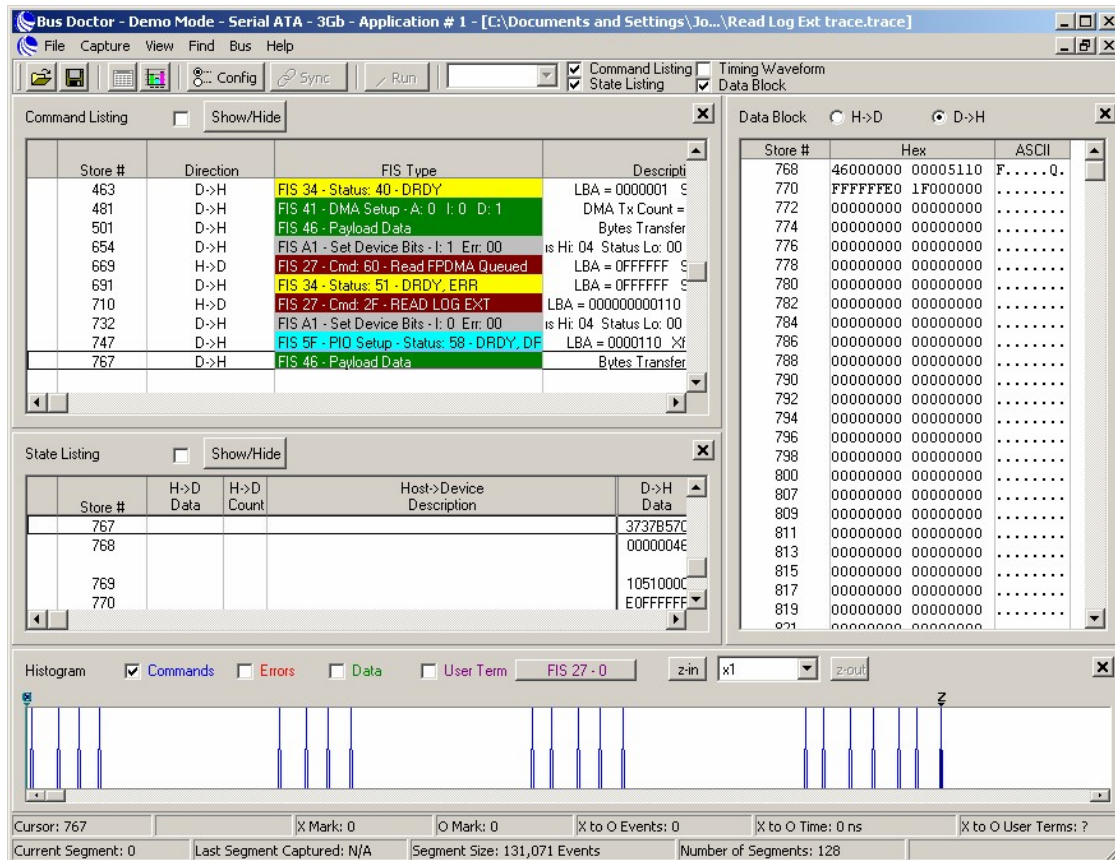
NCQ Screen Capture

The following picture is captured from the DM 2004 Pro test script. The DM 2004 Pro is sending a group of NCQ read commands to the device. Because the NCQ protocol is FIS based, the disk data is sending back to the host after several read commands are queued. When the data transfer is completed, the device notifies the host with Set Device Bits FIS with the SActive indication the completed command(s). In this picture, it shows tag sequence of 6, 1, 0, 10, 15 followed by a completion of tag 6 and 1. Drive Master is able to issue any combination of tag sequences or commands, and repeatedly generate the sequence over and over again for debugging and fine tuning its implementation.



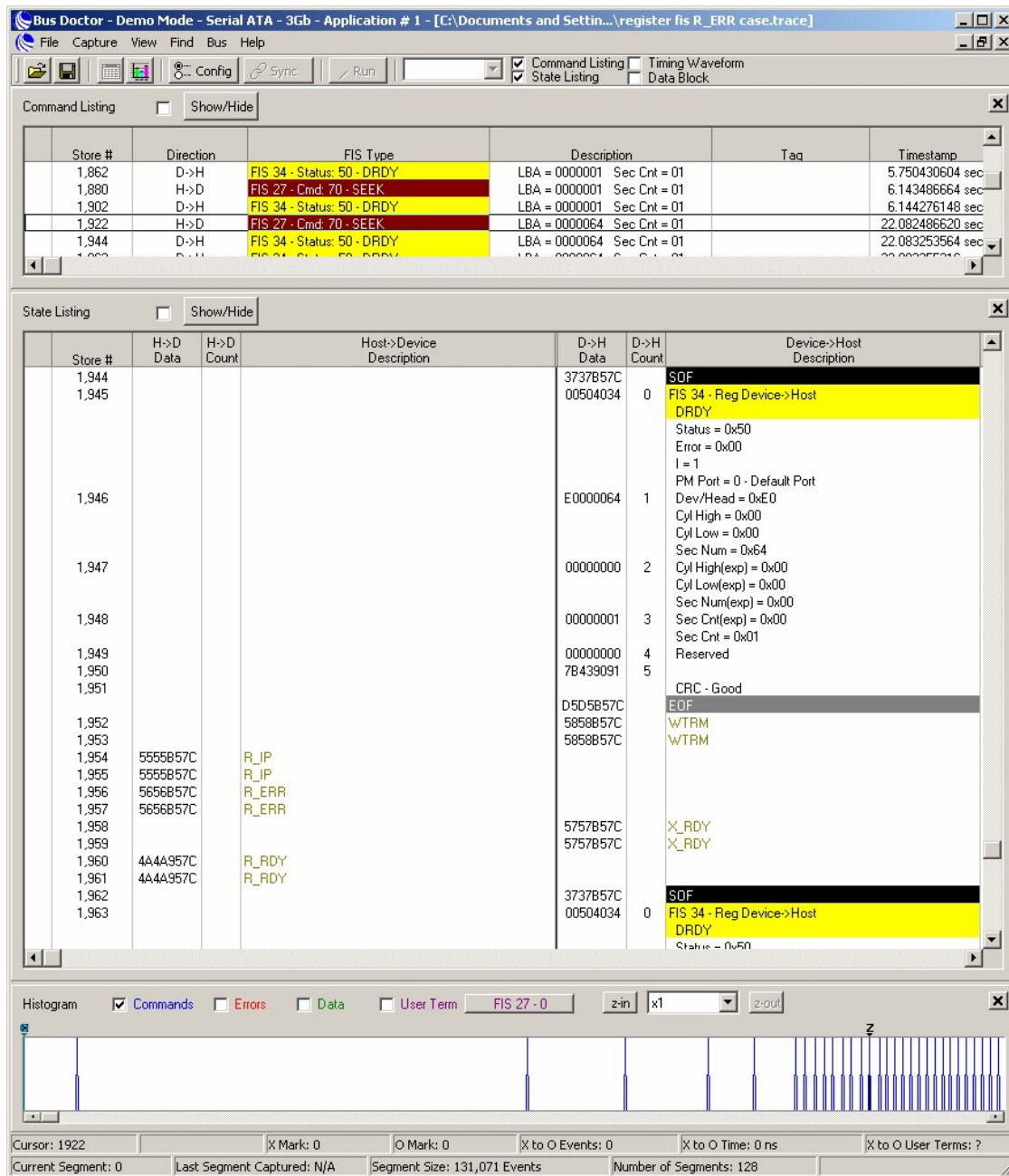
NCQ Error Capture

The following picture is captured from the DM 2004 Pro test script. The DM 2004 Pro is sending a NCQ command with a very big LBA number. The error is displayed with a Read Log Ext command. The log data shows status 0x51, error code 0x10 for ID Not Found error.



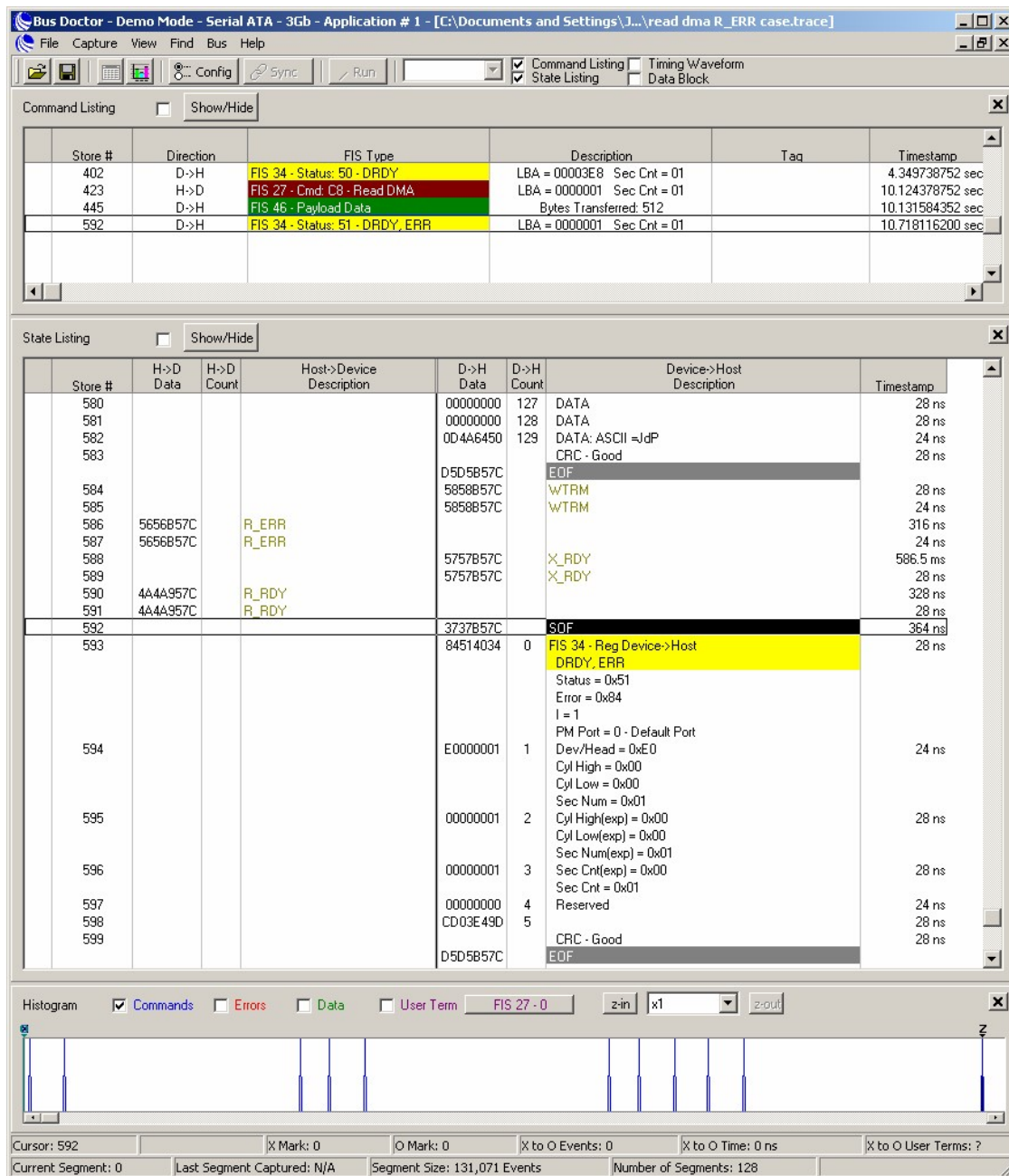
R_ERR on Register FIS Handling

The following picture shows the handling of the R_ERR for the D2H Register FIS 34. This example shows the host R_ERR on the Register FIS of a SEEK command; the device retransmits the same FIS.



R_ERR on Data FIS Handling

The following picture shows the handling of the R_ERR response on Data FIS. Drive Master is sending the Read DMA command. After the host receives the read data it responds with R_ERR. The device detects the R_ERR and responds with 0x51 0x84 for the UDMA CRC error. This R_ERR is generated by the DM 2004 Pro test script.



R_ERR NCQ Handling

The following picture shows the handling of the R_ERR response. On the NCQ command, the R_ERR should be taken care of by the host. On the Set Device Bits FIS, the R_ERR should be retried by the device.

