APPLIED TECHNICAL SERVICES, INCORPORATED ISO 9001

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SHOCK AND VIBRATION TESTING OF LCD MONITORS

ATS JOB # D157097 – Rev1

PURCHASE ORDER # 59955

Prepared for

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MATERIALS TEST REPORT

Subject

Shock and Vibration testing of LCD monitors

Materials

Three (3) monitors: 15″, 20″ and 22″

Objective and Background

Applied Technical Services, Inc. was requested by Hope Industrial Systems, Inc. to perform a shock and vibration test on the supplied monitors using document "HIS Monitor Testing, version 0.92, July 2008" as a guide.
The testing was conducted according the following sections of the document:

Test 6: Mechanical Shock (operating)
Test 7: Free-Fall (non-operating)
Test 10: Random Vibration (non-operating)
Test 11: Sinusoidal Vibration (operating)

Procedure

Test 6: Mechanical Shock (operating)
Figure 1 shows the setup used for this test.
A video signal was applied to the monitors during the exposure.
100 shocks per axis per direction were applied. The first set of shocks had an amplitude of 15G, a pulse duration of 6ms and ½-sine time waveform. The second set of shocks had an amplitude of 30G (6ms, ½-sine waveform). Figure 2 shows a representative 15G shock while Figure 3 shows a representative 30G shock.

Test 7: Free-Fall (non-operating)
The displays were tested in a packaged configuration.
Each package was dropped onto a concrete floor from a height of 80cm on various faces, edges and corners.

Test 10: RandomVibration (non-operating)
The displays were tested in a packaged configuration.
The packages were placed into a fixture to simulate a shipping environment (see Figure 4).
A random vibration was applied for a duration of 30 minutes per axis over three mutually perpendicular axes. Figure 5 shows the random vibration profile used (PSD vs. frequency).

***** Added a figure for a representative 30G shock and included the 30G shock test to the scope of testing
Original report dated 09/21/2010

Test 11: Sinusoidal Vibration (operating)

The setup was identical to the setup used for Test 6 (mechanical shock).
A sinusoidal sweep (shown in Figure 6) was applied to the displays along three mutually perpendicular axes.
A total of 10 sweeps per axis were performed.

Equipment used

Unholtz-Dickie shaker table: ATS-2259 (12/01/2010), Model R16C
Accelerometer: PCB 320C34, S/N: 8498 (12/15/2010)

Conclusion

The displays provided by Hope Industrial Systems, Inc. were subjected to the shock and vibration tests described in ″HIS Monitor Testing, version 0.92, July 2008″ for Tests 6, 7, 10 and 11.

The samples were returned to HIS for a functional evaluation.

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MATERIALS TEST REPORT

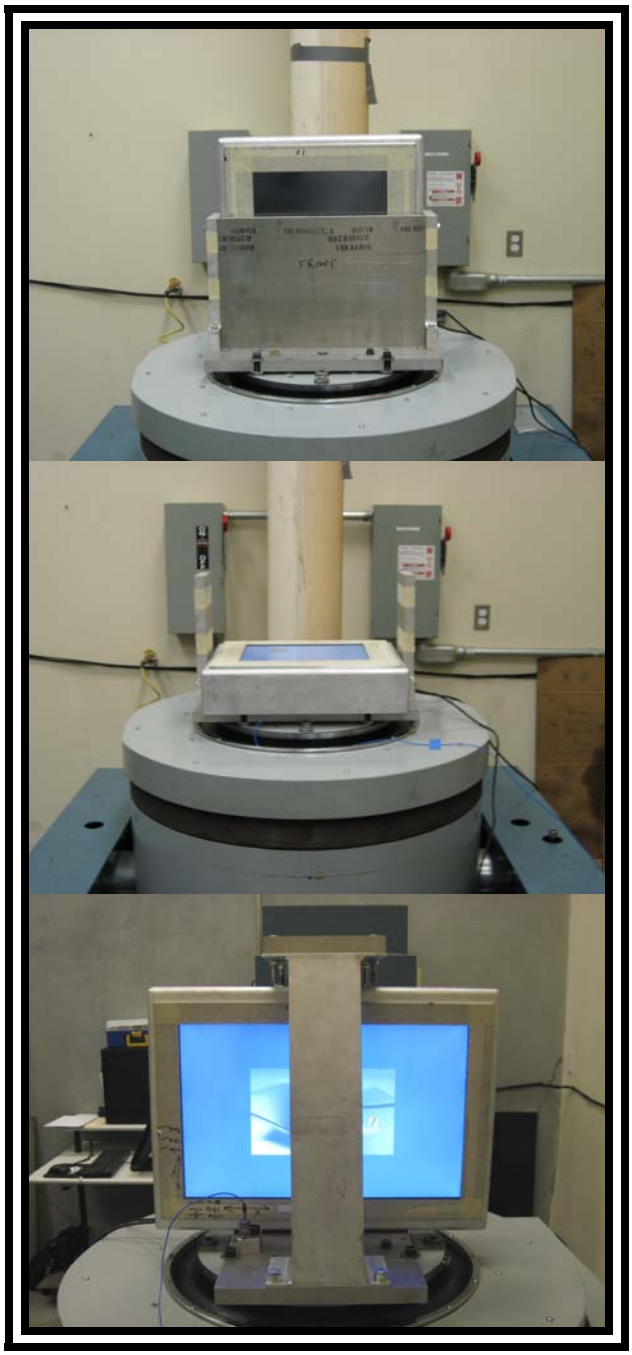

Figure 1: View of the test setup for Test 6 (Shocks) and Test 11 (Sinusoidal Vibration)

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MATERIALS TEST REPORT

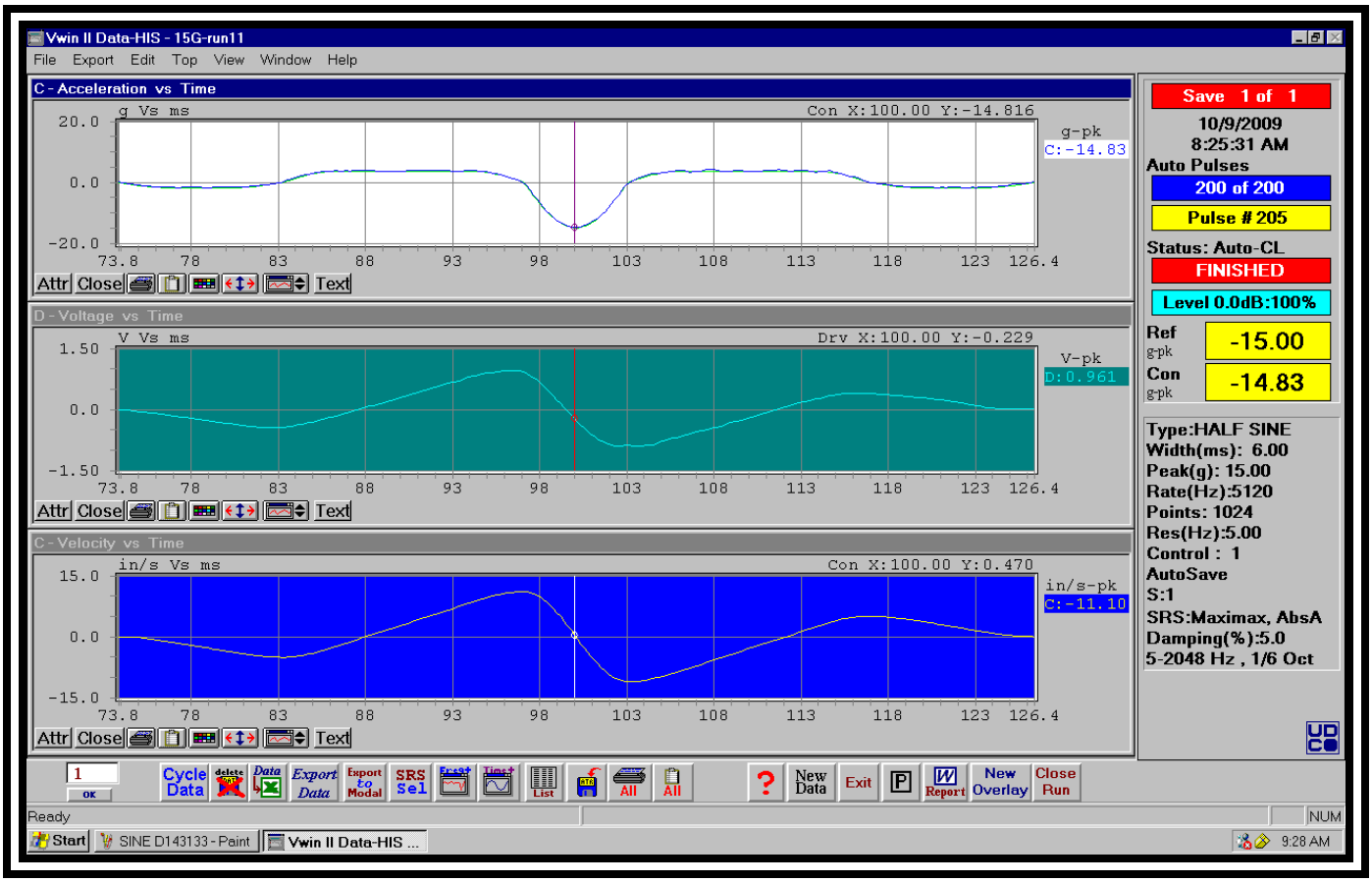

Figure 2: Time history of a representative shock pulse (15G, 6ms, ½-sine)

***** Added a figure for a representative 30G shock and included the 30G shock test to the scope of testing
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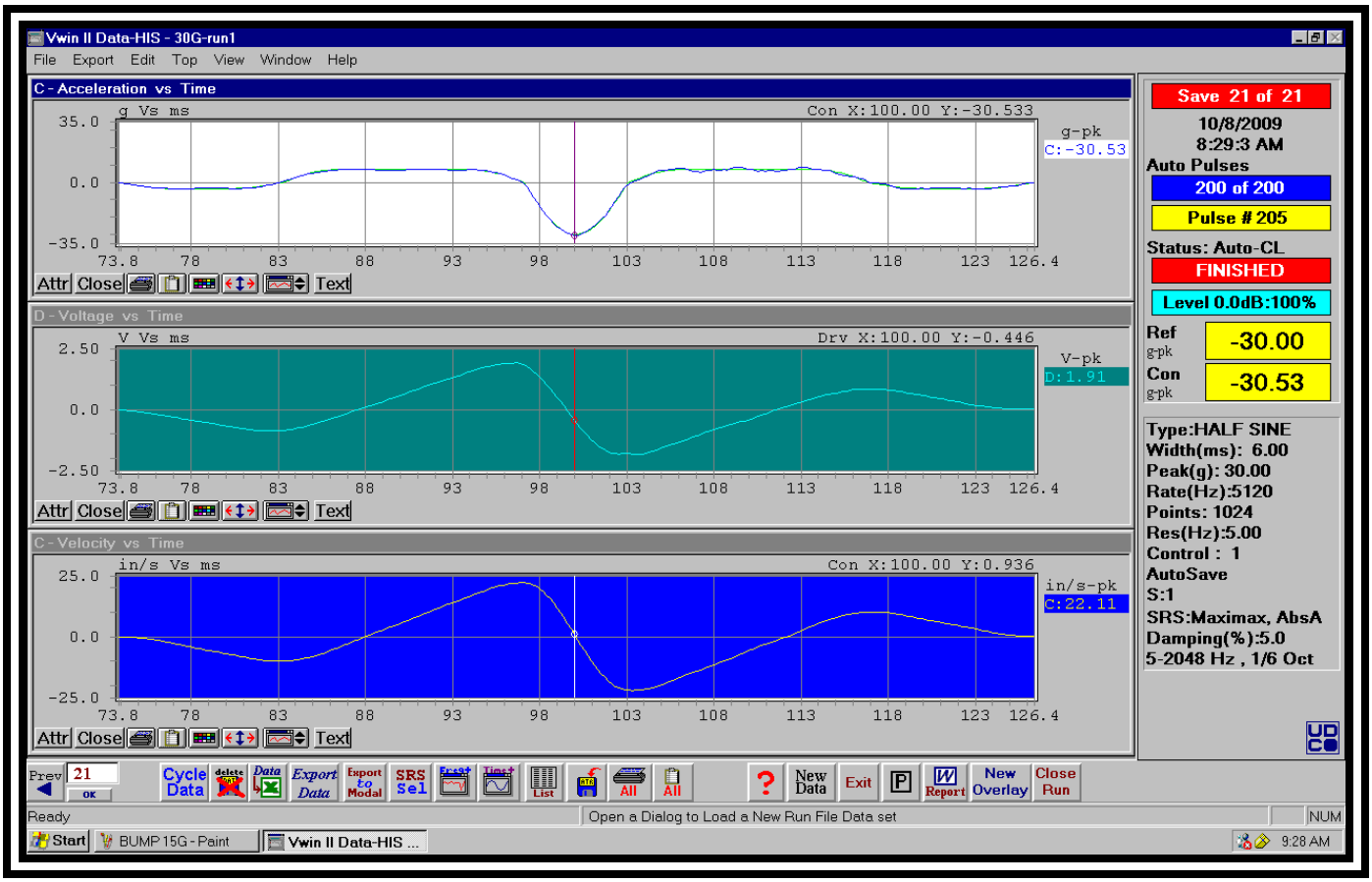

Figure 3: Time history of a representative shock pulse (30G, 6ms, ½-sine)

***** Added a figure for a representative 30G shock and included the 30G shock test to the scope of testing
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Figure 4: View of the test setup for Test 10 (random vibration)

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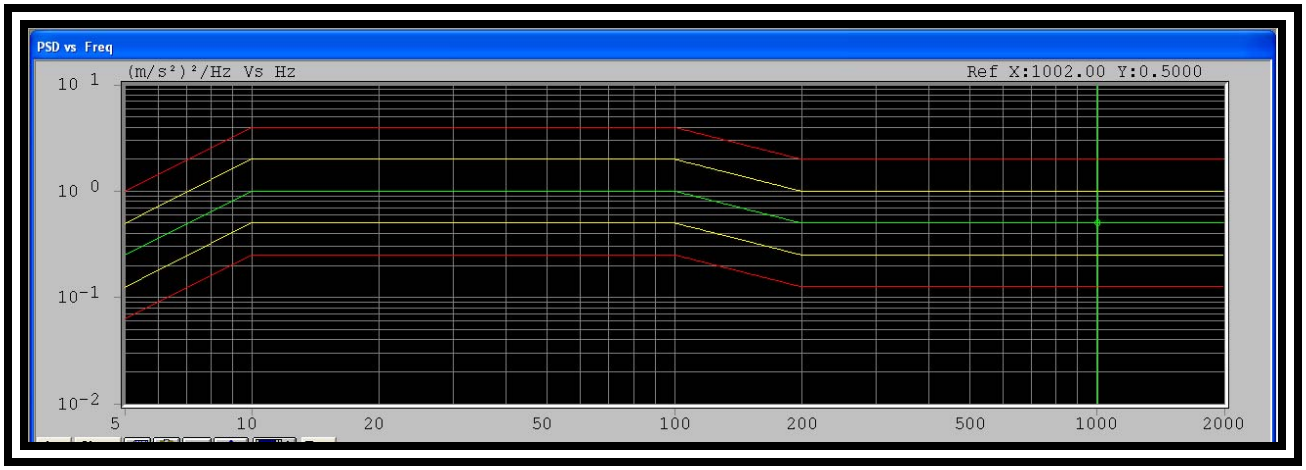

Figure 5: Random vibration profile used for Test 10

***** Added a figure for a representative 30G shock and included the 30G shock test to the scope of testing
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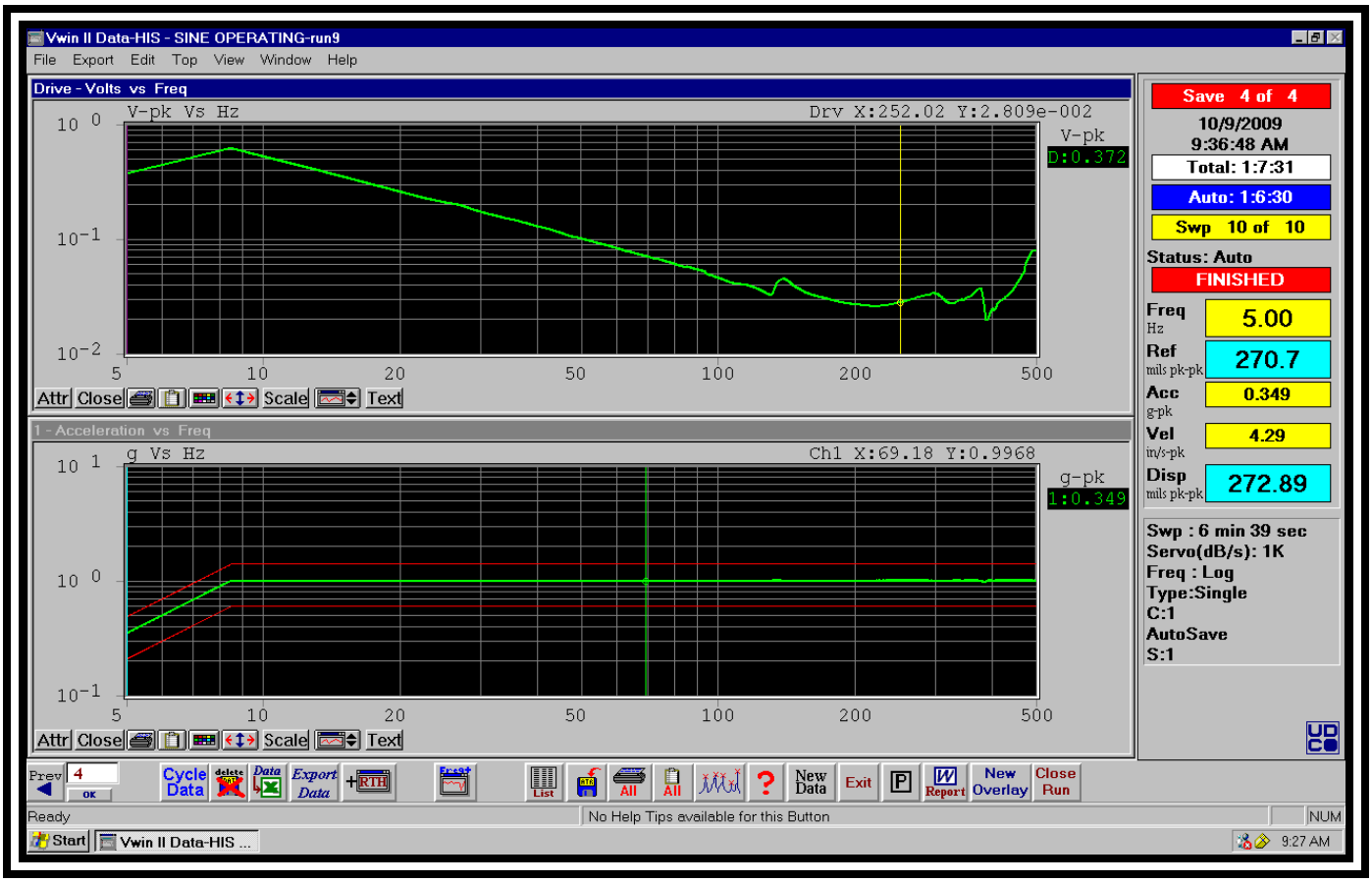

Figure 6: Sinusoidal sweep profile used for Test 11

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