



The science behind the report:

In several stress tests, the Dell Precision 5820 Desktop Tower Workstation ran at a lower volume than desktops from HP and Lenovo

This document describes what we tested, how we tested, and what we found. To learn how these facts translate into real-world benefits, read the report [In several stress tests, the Dell Precision 5820 Desktop Tower Workstation ran at a lower volume than desktops from HP and Lenovo](#).

We concluded our hands-on testing on April 10, 2019. During testing, we determined the appropriate hardware and software configurations and applied updates as they became available. The results in this report reflect configurations that we finalized on February 4, 2019 or earlier. Unavoidably, these configurations may not represent the latest versions available when this report appears.

Our results: Average workstation noise level

The tables below present our findings in detail. All results are in sones, and lower results are better. Due to rounding, some of the averages we report may seem identical to non-rounded results.

Acoustic tests	Dell Precision 5820 Desktop Tower Workstation	HP Z4 G4 Workstation	Lenovo ThinkStation P520
Idle			
Left microphone	0.92	0.83	1.21
Right microphone	0.92	0.83	1.19
Microphone average	0.92	0.83	1.20
CPU stress (80%)			
Left microphone	1.16	2.14	2.00
Right microphone	1.15	2.02	1.91
Microphone average	1.16	2.08	1.96
CPU stress (100%)			
Left microphone	1.15	2.32	2.26
Right microphone	1.14	2.14	2.14
Microphone average	1.15	2.23	2.20

Acoustic tests	Dell Precision 5820 Desktop Tower Workstation	HP Z4 G4 Workstation	Lenovo ThinkStation P520
Graphics stress			
Left microphone	1.27	1.15	2.35
Right microphone	1.25	1.20	2.35
Microphone average	1.26	1.18	2.35
Disk stress			
Left microphone	1.05	1.71	1.36
Right microphone	1.04	1.51	1.35
Microphone average	1.05	1.61	1.36

System configuration information

The tables below present detailed information on the systems we tested.

System configuration information	Dell Precision 5820 Desktop Tower Workstation	HP Z4 G4 Workstation	Lenovo ThinkStation P520
Processor			
Number of processors	1	1	1
Vendor	Intel®	Intel	Intel
Name	Xeon™	Xeon	Xeon
Model number	W-2155	W-2155	W-2155
Core frequency (GHz)	3.30 – 4.50	3.30 – 4.50	3.30 – 4.50
Number of cores	10	10	10
Number of threads	20	20	20
Cache	13.75 MB	13.75 MB	13.75 MB
Memory			
Amount (GB)	32	32	32
Type	DDR4	DDR4	DDR4
Speed (MHz)	2666	2666	2666
Graphics			
Vendor	NVIDIA	NVIDIA	NVIDIA
Model number	Quadro P4000	Quadro P4000	Quadro P4000
Storage			
Vendor / Model	2 x Toshiba DT01ACA100	1 x Western Digital WD5000AAKX-75U6AA0 1 x Toshiba DT01ACA100	2 x Western Digital WD10EZEX-08WN4A0
Amount	1 TB	500 GB 1 TB	1 TB
Type	SATA 6 Gb/s 7200 rpm	SATA 6 Gb/s 7200 rpm	SATA 6 Gb/s 7200 rpm
Display			
Model	Dell 27 Ultra HD 4k Monitor: P2715Q	Dell 27 Ultra HD 4k Monitor: P2715Q	Dell 27 Ultra HD 4k Monitor: P2715Q
Size (in.)	27	27	27
Resolution	3840 x 2160	3840 x 2160	3840 x 2160
Operating system			
Vendor	Microsoft	Microsoft	Microsoft
Name	Windows® 10 Pro for Workstations	Windows 10 Pro for Workstations	Windows 10 Pro for Workstations
Build number or version	10.0.17763	10.0.17763	10.0.17763
BIOS			
BIOS name and version	Dell 1.8.3	HP P61 v01.72	Lenovo S03KT24A

How we tested

The tools we used

- Binaural Head Microphone: Neumann KU 100 Dummy Head Microphone
- Interface: Focusrite Saffire Pro 40
- Software: ArtemiS SUITE Acoustics software
- Soundproof chamber
- PassMark BurnInTest Professional 7.0
- FurMark
- Iometer

General setup

Setting up the room and placing the microphone

1. In a noise-isolated chamber, place a table measuring 0.73 meters for the test systems to rest on.
2. Place the head microphone on a tripod. The ears should rest at a height of 1.2 meters.
3. Place the tripod with the head microphone 0.5 meters from the front of the test system.

Setting up the ArtemiS SUITE v10.1 Acoustics software

1. Launch ArtemiS SUITE.
2. Click Pool Project.
3. In the Analyses section, right-click Analysis Folder and click Insert.
4. Add the following analyses with the following settings:
 - a. Specific Loudness:
 - i. Specific Loudness Section
 - Loudness Method: ISO 532-1
 - Frequency Scale: Hz
 - ii. Representation Settings Section
 - Abscissa: Min/Max/Log
 - Ordinate: 0/4/Lin

Measuring acoustics while idle

Running the test

1. Boot the system and bring up an elevated command prompt:
 - a. Select Windows Start.
 - b. Type `cmd` and press Ctrl-Shift-Enter.
2. Type `cmd.exe /c start /wait Rundll32.exe advapi32.dll,ProcessIdleTasks`
 - a. Do not interact with the system until the command completes.
3. After the command completes, wait 5 minutes before running the test.
4. On the monitoring system, prepare the ArtemiS SUITE HEAD Recorder software.
5. Allow the system under test to sit idle for one hour.
6. After one hour, using the ArtemiS SUITE HEAD Recorder software, capture three 10-second acoustic readings, and record the results.
7. Go directly to one of the stress tests outlined below.
8. Repeat steps 1 through 7 twice more for a total of three test runs.

Measuring acoustics while under 80% load using PassMark BurnInTest Professional v7.0

Setting up the test

1. Download PassMark BurnInTest Professional from the following URL: https://www.passmark.com/download/bit_download.htm.
2. Install PassMark BurnInTest Professional using the default settings.
3. Launch BurnInTest.
4. At the Purchasing information screen, copy and paste the Username and key, and click Continue.

5. At the Key accepted screen, click OK.
6. From the Configuration menu item, select Test selection and duty cycles.
7. Change the Auto Stop After field to 90 minutes.
8. Select CPU and deselect all other subsystems.
9. Set load to 85 or 90 and click OK. Note: PT found 85 to 90 corresponded roughly to 80% load according to CPUID HWMonitor, depending on the system under test. This may vary system to system.
10. From the Configuration menu item, select Test Preferences, and select the CPU tab.
11. Uncheck all options except for Prime number test, and click OK.

Running the test

1. Boot the system and launch PassMark BurnInTest.
2. Launch CPUID HWMonitor.
3. Bring up an elevated command prompt:
 - a. Select Windows Start.
 - b. Type `cmd` and press Control-Shift-Enter.
4. Type `cmd.exe /c start /wait Rundll32.exe advapi32.dll,ProcessIdleTasks`
 - a. Do not interact with the system until the command completes.
5. After the command completes, wait 5 minutes before running the test.
6. On the monitoring system prepare the ArtemiS SUITE HEAD Recorder software.
7. On the test system click the green play button to start the CPU 80% load test.
8. After 1 hour, using the ArtemiS SUITE HEAD Recorder software, capture three 10 second acoustic readings and record the results.
9. Power the system under test off for 1 hour and allow it to return to room temperature.
10. Repeat the steps 1 through 9 two more times.

Measuring acoustics while under 100% load using PassMark BurnInTest Professional v7.0

Setting up the test

1. Download PassMark BurnInTest Professional from the following URL: https://www.passmark.com/download/bit_download.htm.
2. Install PassMark BurnInTest Professional using the default settings.
3. Launch BurnInTest.
4. At the Purchasing information screen, copy and paste the Username and key, and click Continue.
5. At the Key accepted screen, click OK.
6. From the Configuration menu item, select Test selection and duty cycles.
7. Change the Auto Stop After field to 90 minutes.
8. Select CPU, and deselect all other subsystems.
9. Set load to 100, and click OK.
10. From the Configuration menu item, select Test Preferences, and select the CPU tab.
11. Uncheck all options except for Prime number test, and click OK.

Running the test

1. Boot the system and launch PassMark BurnInTest.
2. Launch CPUID HWMonitor.
3. Bring up an elevated command prompt:
 - a. Select Windows Start.
 - b. Type `cmd` and press Control-Shift-Enter.
4. Type `cmd.exe /c start /wait Rundll32.exe advapi32.dll,ProcessIdleTasks`
 - a. Do not interact with the system until the command completes.
5. After the command completes, wait 5 minutes before running the test.
6. On the monitoring system prepare the ArtemiS SUITE HEAD Recorder software.
7. On the test system click the green play button to start the CPU 100% load test.
8. After 1 hour, using the ArtemiS SUITE HEAD Recorder software, capture three 10 second acoustic readings and record the results.
9. Power the system under test off for 1 hour and allow it to return to room temperature.
10. Repeat the steps 1 through 9 two more times.

Measuring acoustics while under Graphics load using FurMark v1.18.2.0

Setting up the test

1. Download and install using default options FurMark from <https://geeks3d.com/furmark/downloads/>.
2. Launch FurMark.
 - a. Check the box next to Fullscreen.
 - b. For the resolution, select 1280x720.

Running the test

1. Boot the system, and launch FurMark.
2. Bring up an elevated command prompt:
 - a. Select Windows Start.
 - b. Type `cmd` and press Control-Shift-Enter.
3. Type `cmd.exe /c start /wait Rundll32.exe advapi32.dll,ProcessIdleTasks`
4. Do not interact with the system until the command completes.
5. After the command completes, wait 5 minutes before running the test.
6. On the monitoring system prepare the ArtemiS SUITE HEAD Recorder software.
7. On the test system click GPU stress test.
8. At the pop-up warning, click OK. The test will begin.
9. After 1 hour, using the ArtemiS SUITE HEAD Recorder software, capture three 10-second acoustic readings, and record the results.
10. Power the system under test off for 1 hour and allow it to return to room temperature.
11. Repeat the steps 1 through 8 two more times.

Measuring acoustics while under disk stress using Iometer v2006.07.27

Setting up the test

1. Download Iometer from the following URL: <http://www.iometer.org/doc/downloads.html>.
2. Install Iometer using the default options.
3. Copy the test `jobw.tst` file and paste it to each hard drive's root directory.
4. Place the file `HDD Thermal IOmeter Script 3-6-06.icf` onto your desktop. This script file utilizes an 80% read/20% write, 50% sequential/50% random, and a variety of files sizes.
5. Launch Iometer, and click I Agree to the EULA.
6. Add a Worker for each hard drive in the Topology section. To add a new worker, click Start a New Disk Worker on Selected Manager, with the manager highlighted.
7. In each worker, select the hard drive under test.
8. For each Worker set the # of Outstanding I/Os to 100 per target.
9. Click the Results Display tab, and change the Update Frequency (seconds) to 5.
10. To overwrite the `HDD Thermal IOmeter Script 3-6-06.icf` with the specific test system settings, click Save.
11. Close Iometer.

Running the test

1. Boot the system, and launch the IOmeter program by double-clicking the `HDD Thermal IOmeter Script 3-6-06.icf` script file.
2. Bring up an elevated command prompt:
 - a. Select Windows Start.
 - b. Type `cmd` and press Control-Shift-Enter.
3. Type `cmd.exe /c start /wait Rundll32.exe advapi32.dll,ProcessIdleTasks`
 - a. Do not interact with the system until the command completes.
4. After the command completes, wait 5 minutes before running the test.
5. On the monitoring system prepare the ArtemiS SUITE HEAD Recorder software.
6. On the test system, click the Start Tests button. The Save Results window will open. Click Save to start the test.
7. After 1 hour, using the ArtemiS SUITE HEAD Recorder software, capture three 10-second acoustic readings, and record the results.
8. Power the system under test off for 1 hour, and allow it to return to room temperature.
9. Repeat the steps 1 through 8 two more times.

Read the report at <http://facts.pt/a22gsga> ►

This project was commissioned by Dell Technologies.



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