

# What Price Protection

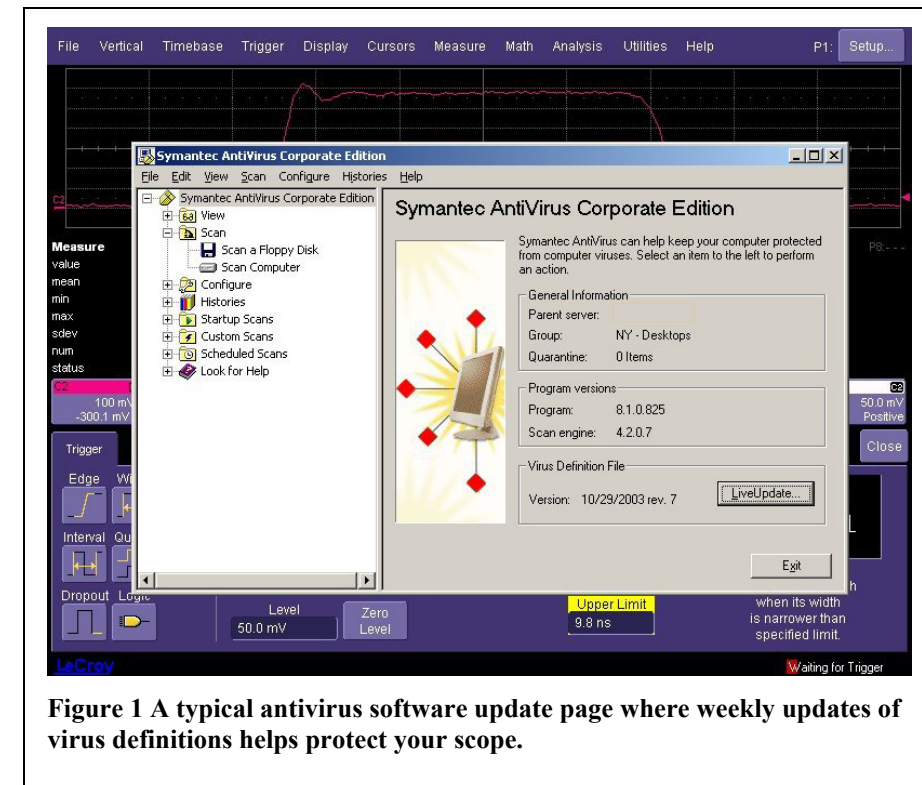
## Performance Impact of Anti-Virus Programs on DSOs

Most of the mid to high range digital oscilloscopes, available from all digital storage oscilloscope (DSO) manufacturers, have over the last few years started to be based upon versions of Microsoft's Windows Operating System. This brings huge benefits to DSO users, including connectivity that wasn't imaginable using the proprietary embedded operating systems on which DSOs used to be based. It does come with a downside, that with a reasonable level of care can be easily managed, the threat of virus infection.

Microsoft's hugely successful Windows OS has attracted a community of 'hackers' who continuously challenge MS, and create chaos in large organizations, by detecting, and exploiting, vulnerabilities in the O/S. The most common form of exploit is a Worm, or Virus, which if successful can spread throughout the Internet and infect hundreds of thousands of PCs in a matter of hours.

DSOs, in the same way as PCs, can easily be protected against Worms and Viruses using any of the currently available Anti-Virus tools.

Some users have been reluctant to install Anti-Virus tools for fear of degrading the instrument's per-



**Figure 1** A typical antivirus software update page where weekly updates of virus definitions helps protect your scope.

formance. This document attempts to address some of these fears, by presenting benchmarks of various aspects of the DSO's performance, with, and without Anti-Virus Installed.

We tested a LeCroy WaveRunner 6050 DSO connected to network. Symantec Anti-Virus (SAV), Corporate Edition, (version 8.1.0.825) was installed on the DSO operating in unmanaged mode. The scopes operating system, Windows 2000 was updated to Service Pack 4, with all critical updates through the date of installation.

Most Anti-Virus tools work in two basic modes, 'Real-Time protection', and a 'full scan', or 'scheduled scan' mode. Of these two modes this document is concerned primarily with the first, 'Real-Time protection'.

Real-Time protection works by scanning files as they are opened, or otherwise manipulated by applications running on a PC. Files are scanned for telltale signatures of all known viruses. By default, anti-virus tools are generally configured to scan all files, including those that don't typically contain executable code. For example, with the default options of SAV,

saving a bitmap file from Microsoft Paint will cause the bitmap to be virus-scanned. Even though this is extremely fast, it can have a slight impact upon performance.

Anti-Virus tools generally provide a mode that allows only executable files to be scanned; these include files with extensions .exe, .dll, .sys, etc. This mode is ideal for use in a DSO where disk performance is critical, especially when streaming waveforms (.trc files) to disk.

The ‘Full Scan’ or ‘Scheduled Scan’ modes scan all files on a PC’s hard disk. This mode is not usually enabled in anti virus tools by default, and when it is, it’s usually scheduled to run overnight when a system is not being used. During a full scan of a DSOs hard disk, depending upon its contents, a slow-down in operation may be noticeable.

Three areas of the DSO’s performance were tested. These were:

- Startup (boot time)
- Acquisition/Processing/Display
- Streaming to Disk

Measurements were taken 3 times, once without Symantec

	No Anti-Virus installed	Anti-Virus in ‘Scan all files’ mode	Anti-Virus in ‘Scan program files only’ mode
<b>Time to Splash Screen</b>	70.4s	87s	93.2s
<b>Time to DSO Graticule</b>	111s	138s	142.2s

**Table 1 - The values presented are the mean of 5 measurements.**

Anti-Virus installed, once with it installed with default options, and again with it installed with optimized options (scan executable files only).

One area where it was expected that anti-virus tools would affect performance is during startup. The X-Stream DSO firmware consists of hundreds of .dll files (executable files) that require scanning as the application loads.

In order to measure startup time a stopwatch was used, this was started at the moment that the power-switch was pressed, and two times were noted, the time for the application’s splash screen to appear (indicating that the DSO application started to load), and the time taken for the waveform graticules to appear (indicating that the DSO application had loaded). The results are shown in Table 1.

This is one place that Anti-Virus does affect performance, adding

approx. **24%** to the DSO startup time. One unexpected effect here is that with Anti-Virus configured in ‘Scan Program Files Only’ mode, the boot time was slightly longer than with Anti-Virus configured in ‘Scan all files’ mode.

The next performance benchmark involved basic scope acquisition and measurements. The specific operations used are summarized in the first column of table 2.

During acquisition, processing, and display, the X-Stream DSOs do not access the file system; therefore no performance impact was expected. The results of these measurements are shown in table 2 below.

As expected, there is no significant impact of Anti-Virus on these basic DSO tasks. This is an important measurement, since DSOs spend most of their time doing these three operations.

Scope Operations	No Anti-Virus installed	Anti-Virus in ‘Scan all files’ mode	Anti-Virus in ‘Scan program files only’ mode
<b>1MS, 500MS/s, Std. Vertical Parameters</b>	10.5 Hz	10.5 Hz	10.5 Hz
<b>1MS, 500MS/s, 1Mpt. FFT (Power 2)</b>	0.66 Hz	0.66 Hz	0.66 Hz
<b>50k Averaging</b>	739.44 Hz	740.02 Hz	739.54 Hz

**Table 2 - The values presented are the mean of 5 measurements**



The third benchmark involved streaming waveforms to disk. Since disk access is involved, this is one place that anti-virus was expected to affect performance. The test was performed by setting up a DSO to stream Channel 1's waveform data to disk using the **Auto-Store** feature found in the **Save Waveform** menu. Before each test the waveform directory was deleted to minimize the effect of file-system performance. The results are summarized in Table 3.

These benchmarks show three very important points:

Anti-Virus in 'Scan Program Files Only' mode has negligible effect upon DSO performance

Anti-Virus in 'Scan All Files' mode degrades short-record performance by approx. 15%, but has no measurable effect on large records.

Short records are affected more than long records.

During typical use there are only two areas in which Anti-Virus adversely affects DSO performance. The first of these is boot time, which increases by approx. 25%. This is due to the scanning of the hundreds of executable files that Windows and the X-Stream DSO software is composed of.

The second is the speed at which waveforms can be streamed to disk, which degrades by approx. 15%, but only when short (500pt) records are used. This effect diminishes rapidly as the record length increases, even with records of 100kpts the effect starts to become insignificant.

The most important result is that when a DSO is used in its typical operating mode, which involves data acquisition, processing (analysis), and display, the anti-virus protection is completely transparent, and does not affect performance in any way.

Based upon these results, and taking into consideration the time and effort wasted if a DSO becomes infected with a Worm/Virus, it is clear that the advantages of Anti-Virus on DSOs greatly outweigh the disadvantages.

advantages.

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File Operation	No Anti-Virus installed	Anti-Virus in 'Scan all files' mode	Anti-Virus in 'Scan program files only' mode
Stream 500pt. Records to Disk	109.25 Hz	92.39 Hz	124.77 Hz
Stream 100kpt. Records to Disk	26.86 Hz	25.32 Hz	27.11 Hz
Stream 10Mpt. Records to Disk	1.32 Hz	1.41 Hz	1.39 Hz

Table 3 - The values presented are the mean of 5 measurements.

