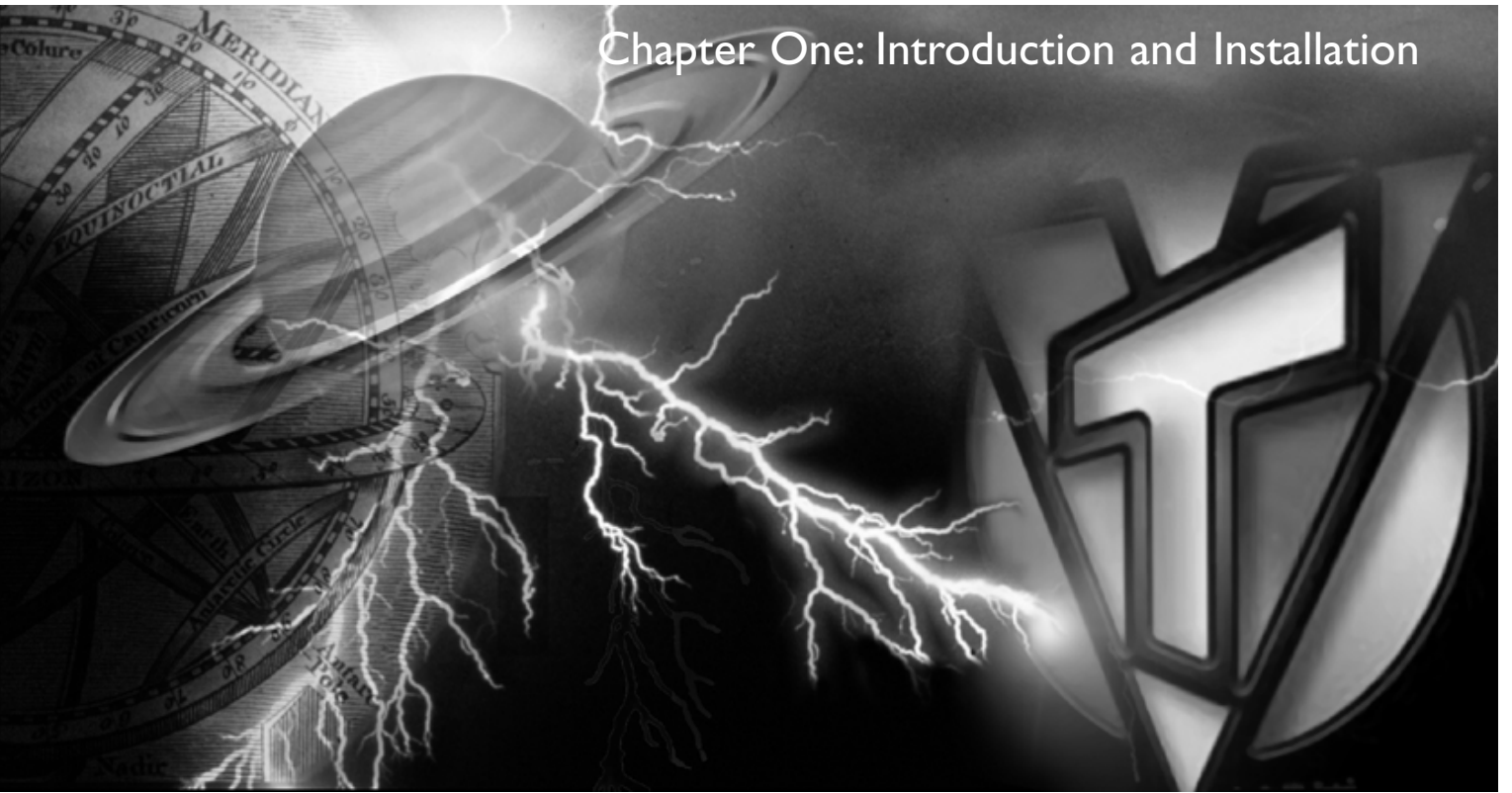


Chapter One: Introduction and Installation



Dear NewTek Customer,

First of all, let me congratulate you on your purchase of the Video Toaster [2]. This product culminates over ten years of work by NewTek to build the ultimate video product: a true 'TV Studio in a Box.' The Video Toaster has every tool that you need to perform pre, post and post production; it follows in our long history of bundling all capabilities in a single product at an unbelievable price.

The moment you install and launch the software you will see that we duplicated the look and feel of real-world video equipment (we call it virtual equipment). All modules and components that have real-world counterparts will look, feel and operate as you would expect. Therefore you can get up and running, and understand how all the video components work more quickly. The Video Toaster gives a more tactile and real-world experience than the typical computer-based solution.

Owning a NewTek product is much more than simply installing the hardware and software—we consider our customers part of our family. You are clearly as important to our success as any of our staff, and in keeping with this principal, we actively encourage all NewTek staff, whether a customer service representative, an engineer or a product manager, to communicate honestly and often with our users. Indeed, this has built an unrivaled sense of community for Video Toaster that is truly awe-inspiring: our community boasts at least three online discussion groups, two newsgroups, two mailing lists, a huge third party community, numerous personal web sites and even user meetings at major trade shows.

Ten years have passed since Tim Jenison, the founder of NewTek, conceived of the "Video Toaster," with the basic premise of bringing video production to the masses. When the Amiga Video Toaster was launched, it was a seminal product that revolutionized the TV industry and inaugurated the entire desktop video industry. Video Toaster [2] is a complete re-write of the original Amiga Video Toaster, but it follows closely in its ideological footsteps. We have used those many years of user input to shape and expand the product into a package that is nothing less than the "Revolution [2]".

When we started Video Toaster for the PC, we made a fundamental decision that shaped the entire product and resulted in Video Toaster [2]'s drastic departure from other video products on the market. We observed that computer speeds were increasing at a staggering rate (as hypothesized by Moore's law) and recognized that eventually the general purpose CPU at the heart of any modern computer would have sufficient power to perform all the

real-time processing for video production without dedicated hardware and DSP circuitry. We could now concentrate on developing unrivaled video quality instead of complex image-processing hardware that would be made obsolete.

Arguably the most important consequence of our 'host processor' design philosophy is that we are not locked into any particular architecture or algorithm that would need a new hardware design each time it changed. The benefits of this approach are illustrated by an example from the development of ToasterEdit. After we implemented the picture-in-picture code (PiP) that places, moves and fades images and overlays in the editor, we realized that we could make high-level assumptions about the typical alpha channel topologies of video images. We were then able to increase the quality of our PiP and increase performance. If we had been tied to a hardware architecture, this improvement would not have been possible. To highlight this benefit in a different way, consider that the next release of Video Toaster will be available to you as nothing more than a software upgrade; we can add as many new features as we want without needing new hardware. As computers get faster, we will be able to perform more and more complex manipulations without requiring you to purchase a new solution!

Video Toaster offers so much more that I could mention, but the true fun is in letting you work and discover it yourself. So, take your time to explore Video Toaster. We look forward to hearing your suggestions and comments, as well as your problems and triumphs with Video Toaster [2].

In the meantime, let me welcome you to the NewTek family,

Andrew Cross, Ph.D
Vice President of Video Software Engineering,
NewTek

Chapter One: Introduction and Installation

The Video Toaster [2] delivers a video production suite with real-time switcher, exceptional 3D-animated digital video effects, real-time nonlinear editor supporting multiple formats, character generator, video paint, 3D animation, and real-time chroma key all for uncompressed and compressed video.

NewTek has crafted a software package that directly mirrors the devices video professionals commonly use. Artists worked with award-winning producers to design the user interface and workflow; they made the world within the Video Toaster [2] comfortable and familiar. By using artists, we created the user interface separately from the actual programming.

VIDEO TOASTER [2] FEATURES

SX-8 Breakout Box

The SX-8 breakout box gives you 8-input, 4-output Component, Y/C, and Composite options. If you need more inputs, the Composite mode allows up to 24. The rack-mount unit includes balanced and unbalanced stereo inputs and machine control with three RS-422 ports for either playback or record decks.

File Bin

The File Bin lets you jump quickly and easily between scenes, directories, and file types. Animated icons let you preview files that are saved in industry-standard formats.

Switcher

The Switcher places the Main, Preview, Key bus, and T-bar where you expect to find them. The Key function lets you overlay text or graphics on your video transitions. You can capture the Switcher's output in real-time to your video drives.

ToasterEdit

The ToasterEdit interface makes nonlinear editing faster and easier than ever. Icons represent each video clip, which you can drag and drop in-line. The dual-mode Storyboard and Timeline views dynamically update when you change either; you can save real-time, multi-format editing and layering as a project, or cue ToasterEdit to the Switcher for live production.

Audio Mixer

The Audio Mixer lets you work with microphone inputs and line-level inputs; you can patch audio to fourteen channels and equalize your input. You can build audio presets that maximize your interaction with the Switcher.

DVEs

Hundreds of digital video effects (DVEs) give you transitions that range from the simple push, pull, and squeeze to dynamic 3D effects.

Character Generator

The Character Generator is built to keep your productions running efficiently. You can add titles, scrolls, and crawls, and while you design, you can place your still or moving video in the background of the CG window. You can see exactly where you place text or graphic elements in relation to video.

The CG supports TrueType fonts and provides glow, shadowing, variable transparency, and gradients. You also work with real-time sizing, kerning, and rotation. You can incorporate any logo or other graphic element into your CG pages as a bitmap with a transparent matte.

Keyers

Luma and chroma keying work with an intuitive user interface to expand your key color choices beyond green and blue. You can slide your cursor across the image to select the colors you wish to key; you can even select multiple colors for your key. The keyers also use edge softening so you can blend away the hard edges that often occur when you create live keys.

ToasterScope

ToasterScope verifies your video in and out of the system with a digital waveform/vectorscope. ToasterScope displays the full-frame displays in 60 fields-per-second NTSC (50 fps PAL) on your computer screen. This tool helps you establish video that follows industry standards.

Streaming Media

The Video Toaster [2] helps you broadcast your message to the world. You can choose Video Toaster as a Video for Windows device, which lets you use it as a video source for third-party streaming media and even webcam applications. You can stream a finished production or switch live with digital video effects and real-time keying.

UNCOMPRESSED VIDEO

High-end post production facilities rely on uncompressed video for multi-layered, quality imagery. You can store and manipulate video in the ITU-R601 4:2:2 component video standard. You can composite and layer infinitely with no loss of quality.

Video compression generally produces a loss in quality every time the video goes through a compress/decompress cycle. This is similar in concept to tape generation loss that occurs every time a conventional videotape is dubbed. With uncompressed digital video, the tenth copy is identical to the first copy.

Compressed Video

Video Toaster [2] supports the full spectrum of video, from broadcast-quality, uncompressed 601 video, to DV and MJPEG, and highly compressed half-resolution captures.

ABOUT THE MANUAL

The manual for Video Toaster [2] describes the settings in Video Toaster [2] and explains how to work with them. It has been set up so that you can take two different approaches to learning Video Toaster [2].

Tasks for a Quick Tour of the Software

If you want to quickly familiarize yourself with panels and their functions, you can jump right to the Tasks at the end of most chapters. You get a basic tour of the panel features and shortcuts by walking through typical tasks.

Chapters for Panel Specifics

To get specifics about the panel and its features, you should read the entire chapter dedicated to the panel. Each chapter focuses on a specific Video Toaster panel, so finding a feature on a panel is just a matter of finding the chapter for that panel.

MANUAL ORGANIZATION

The manual is organized so that you progress through Video Toaster [2] in the order you might need to use the panels. You begin by installing the hardware and software, then you learn the desktop interface. After you learn the traits of Video Toaster [2] panels, you move into the core components of the software: capturing video, editing, and switching. Special effects, titling and graphics, and other amenities follow. The last section before the Appendices describes how to monitor and test your video signals. The Appendices include advanced and background information.

Video 101

Throughout the manual, you will see shaded areas labeled “Video 101.” These sidebars contain information about video and video processes that are not essential to using Video Toaster [2], but may help you understand why some features work the way they do. “Video 101” sidebars give you supplementary information, to help you increase your knowledge about the world of video.

Other Applications and Documentation

The AuraVT, LightWaveVT, and Speed Razor SE applications ship with independent manuals. Check the documentation for each of these applications for information and instruction.



NOTE

Speed Razor 4.5 SE and 4.8 SE do not support FireWire capture. Contact in-sync for Speed Razor 2000X, which supports FireWire capture.

MANUAL CONVENTIONS

ATTENTICONS

The Warning, Note, Hint, and Tidbit attenticons draw your attention to special information about tools or features.



WARNING

Pay close attention to Warning icons; the information in a Warning is critical to working correctly with the software.



NOTE

You get useful information in a Note that may help you work more efficiently or help you understand the tool better.



HINT

Hints give you shortcuts or other approaches to working quickly with tools.



TIDBIT

Tidbits give you some fun information, some historical information, or both.

TEXT FORMATTING

Throughout the manual, formatting indicates how a tool or shortcut is relates to the software and your computer:

Bold	Items in bold are options, buttons, or fields in the software interface, such as the Font option.
SMALL CAPS:	Items in small capitals are keys on the keyboard, such as TAB and SHIFT.

You will also notice that you are often directed to click, double-click or right-click the mouse button. Click and double-click refer exclusively to the left mouse button, which you commonly use for actions in most programs; double-clicking means to click that left mouse button twice. Right-click refers to the right button on your mouse; right-clicking usually brings up a menu of options or offers a special action.

SYSTEM REQUIREMENTS

Video Toaster [2] performs best on the fastest processor available, though you still get superb results on a less powerful processor. The faster processor lets you achieve the benefits of real-time performance because Video Toaster [2] uses the processor of your machine to process its effects. The details below outline the base requirements for gaining the best performance possible from Video Toaster [2].



HINT

Remember that you are working on a computer, so you can work elegantly. Just because you can put 24 proc amps on a page doesn't mean you should, or that you need to. In the real world you would need 24 proc amps, but this is the Video Toaster [2] world. Now, just think of all that money you saved.

The software-only model of Video Toaster [2] needs multiple data streams, to gain equal access to system resources—streams are packets of information that pass between Video Toaster and your computer. You must keep an eye on the computer's available bandwidth (how much information your computer can transfer, and how quickly). In particular, you should know how quickly video can be moved into and out of system RAM.

The Video Toaster [2] supports dual processors; the Storyboard Editor, Speed Razor, LightWave VT, and Aura VT are all multithreaded applications that take advantage of dual processors. You will see significant performance improvements in all Video Toaster [2] modules when you add a second processor to your machine.

SYSTEM SPECIFICATIONS

- Pentium 4; 1.4 GHz; 400MHz Front Side Bus
- Microsoft Windows 2000 running Service Pack 2
- Intel 850 chipset motherboard Model # Intel D850GB
- 256 Megabytes of PC800 ECC RDRAM (2 128 MB RIMMS)*
- 20GB ATA-100 IDE (7200 rpm) system drive
- Adaptec 19160 Ultra 160/M SCSI Controller Card
- Four Ultra160/M SCSI (7,2000 rpm) (or three 10,000 rpm) drives striped as a video RAID.

Any of the following graphics cards:

- nVIDIA GeForce 2 GTS 32MB

- nVIDIA Quadro2 Pro, 64MB
- nVIDIA GeForce 2 MX 32MB for Dual Monitor displays

** With Video Toaster [2], more RAM will give you even better performance—so if you can, opt for 512 MB, or even the magical 1GB of RAM.*

You can do more on Video Toaster [2] with a faster drive system. Get the biggest, baddest computer that you can.

If for some reason, you don't need a fast stream, a less powerful system will give you acceptable results. Video Toaster [2] even scales down well.



NOTE

For real-time, dual-stream editing, NewTek suggests using a hard drive array capable of sustaining 70MB/second (or faster) reads.

Visit the NewTek Web site early and often to get the latest information about Video Toaster [2]: www.videotoaster.com.

VIDEO STORAGE REQUIREMENTS

You get optimum output with Video Toaster [2] when you use uncompressed video, and one second of uncompressed video needs 22MB of hard drive space. With 3,600 seconds in an hour, you'll need 79,200MB (79.2GB) of hard drive space to digitally store one hour of uncompressed video.

Video Toaster [2] also supports compressed video formats at different frame rates. These formats and rates need less hard drive space than uncompressed video, so you can store more files or longer files. For example, you need only 12.9GB of hard drive space to store an hour of DV footage.

Because Video Toaster [2] uses the NTFS file system you are not limited to a 2GB partition size. The NTFS address size is 64 bits. This just means that the file system can handle large-capacity storage disks, which you need for video. The maximum recording time with the NTFS system is 27,854 years. (Darn. And you thought you might have some freedom.)

When you record audio and video together in the same file, you record both to the same drive. When you record only audio, you may choose to save the audio to a hard drive other than the drive for video.

Recording audio and video separately can help you maximize system resources and manage projects; video professionals tend to separate audio and video for organization. For example, you may place your files in specific folders based on their purpose, such as audio for narration or audio for background music.

If you run separate audio and video files from the same drive or drive chain (or an audio/video file and additional separate audio), you force your system to work too hard. You may want to record audio to a drive connected to your system IDE controller.

If you plan to record to an IDE drive, you need to activate IDE DMA. You can get information on how to active IDE DMA from Microsoft's Web site.

**TIDBIT**

An IDE drive (Integrated Drive Electronics) is a hard drive that you can add internally to your computer. It has slightly slower data transfer rates than a SCSI drive (Small Computer System Interface) and it is not as expandable.

The IDE controller is the chip on the motherboard of your computer that controls IDE drives. Obviously, a SCSI controller controls SCSI drives. IDE DMA (Direct Memory Access) is a mode that uses your CPU resources a little more efficiently when you work with IDE drives.

DEDICATED DRIVES

To capture video, you need a drive array (or a RAID) that meets the 70MB/second (or faster) data transfer requirement for Video Toaster [2]. Drive arrays stripe multiple drives together as a single, ultra-fast hard drive. Usually, you need at least four hard drives in your stripe set for an IDE or SCSI configuration to meet 70MB/second sustained throughput.

Hard drives are connected to your hard disk controller card (not supplied) and installed in a PCI slot on your computer. The key to a successful video array, or stripe set, is a fast, high performance hard drive controller.

Ultra160-SCSI is the recommended SCSI controller for the Video Toaster [2] because of its reliable sustained throughput. It currently provides the most bandwidth, reliability, and expandability for your investment. If you want multi-stream performance, a slower system than Ultra160-SCSI may be insufficient. Ultra160-SCSI can transfer data at 160MB per second, so it is the most future proof system (rates refer to an ideal, not sustained throughput).

UltraATA/100 (an IDE drive) can transfer data at 100MB per second (rates refer to an ideal, not sustained throughput). For Video Toaster [2], IDE hard drives may be fast enough, though they may cause problems. For example, they may use the PCI bus less efficiently.

Video Toaster [2] uses Windows 2000's support for striping two or more drives together to achieve fast transfer speeds.

To create a stripe set for Windows 2000

- 1 Right-click on the **My Computer** icon and choose **Open**.
- 2 Right-click on the **Control Panel**, and choose **Open**.
- 3 Right-click on the **Administration Tools** icon, and choose **Open**.
- 4 Right-click on the **Computer Management** icon, and choose **Open**.
- 5 Double-click on the **Storage** icon (come up for air, you're almost there).
- 6 Double-click on the **Disk Management** icon.
- 7 Right-click on one of the drives you want to use for the stripe set.
- 8 Choose **Create Volume**, then pick **Stripe Set** at the next menu.
- 9 Now select the other drives and click the **Add** button.
- 10 Make sure you choose NTFS for a file system and select **Full Format** and the default settings, then click **Next** and **OK**. The drives will start formatting. The nice thing about Windows 2000 is that it contains a built-in defragmentation feature.

Some motherboard-based SCSI controllers do not share bandwidth between the PCI bus and disk controllers, and this leaves more PCI bandwidth for Video Toaster [2]; you'll see increased performance. You get the most advantage from a disk controller on a 64-bit PCI bus.

For information on how to install IDE or SCSI hard drives, consult the documentation that accompanies your hard drive.

AUDIO DRIVE REQUIREMENTS

Compared to video, audio doesn't need the same sustained rates for data transfer, so you do not need a stripe set for audio. If you plan to do any sort of audio work, consider using a dedicated drive for audio; a single, standard SCSI or fast IDE hard drive is sufficient. Uncompressed audio usually needs 150KB per second for storage, so an hour of audio needs 5.4GB of hard drive space. Audio should never be on your system hard drive because you force your system resources to work too hard. We strongly recommend that you use a second slave IDE drive dedicated to audio.

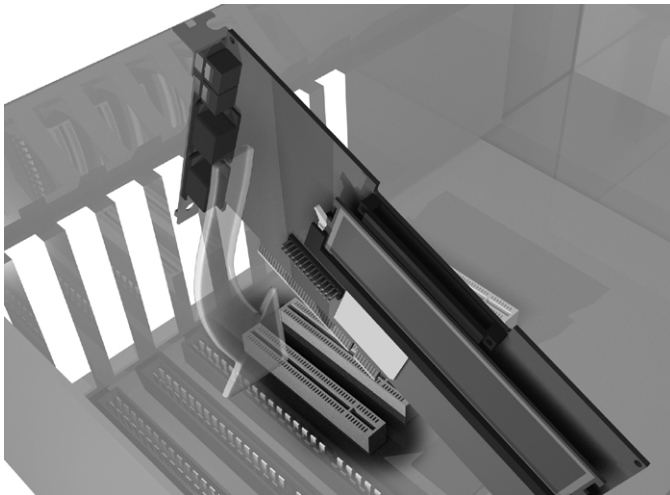
GRACEFUL SCALING OF PERFORMANCE

Even if your system does not meet the minimum requirements outlined here, NewTek designed Video Toaster [2] to be extremely scalable. The feature set gracefully adapts to less powerful machines. For example, the new Storyboard Editor will offer a “Quick Render” option. If your machine cannot create transitions in real-time, this option will render the 3D DVEs significantly faster than in version 1.0. Note that on sub-Pentium 4 machines, you may experience some performance issues if you try to run ToasterVision or ToasterScope.

HARDWARE INSTALLATION: VIDEO TOASTER CARD

Take care when you install the Video Toaster card; avoid touching any of the components on the card. Ground yourself before you touch the card or your computer board.

- 1 Turn off your computer and all peripherals, and disconnect the power cord from your computer. ***Take precautions against electrostatic discharge (ESD), such as ground straps, gloves, ESD mats, and so on, to avoid damaging the processor and electrical components in the system.***
- 2 Remove the computer cover. Then locate a free PCI slot and remove the slot's cover. Keep the retaining screw nearby.
- 3 Carefully insert the Video Toaster card into the slot. Do not try to force the card into the slot.



Inserting the Video Toaster card in a PCI slot. Illustration by Argon Hennley.

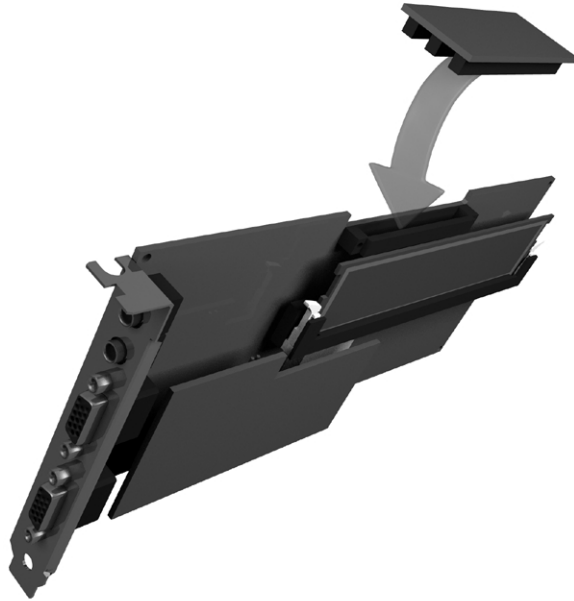
- 4 Secure the card with removed slot cover's retaining screw.

- 5 Replace the computer cover and reconnect the power.
- 6 Turn on the computer and install Video Toaster [2] software.

Attach the Bridge Card

If you add the optional SX-8 breakout box or SDI card to your system, then you must attach the bridge card. (If you plan to use *both* the SX-8 breakout box and the SDI card, you must use a special three-connector bridge card.) The procedures for adding the daughter card for the breakout box, and for adding the SDI card are discussed in the next chapter.

- 1 Turn off your computer and all peripherals, and disconnect the power cord from your computer. ***Take precautions against electrostatic discharge (ESD), such as ground straps, gloves, ESD mats, and so on, to avoid damaging the processor and electrical components in the system.***
- 2 Remove the computer cover. Remove the Video Toaster card.
- 3 Attach the bridge card to the Video Toaster by firmly pressing the bridge card connector on the edge connector of the Video Toaster card.



Attach the bridge card to the edge connector. Illustration by Argon Hennley

PC MONITOR REFRESH RATE

Ideally, you should set your PC monitor's refresh rate to 60Hz when you edit NTSC video (75Hz for PAL). This rate improves the appearance of video played back on your PC monitor.

To Verify Monitor Refresh Rate

- 1 Click on the **Start** button on the Windows task bar.
- 2 Choose **Settings > Control Panel**. The Control Panel opens.
- 3 In the Control Panel, double-click on **Display**.
- 4 In the Display Properties panel, choose the **Settings** tab and then click on the **Advanced** button at the bottom of the panel.
- 5 Choose the **Monitor** tab. In the **Monitor Settings** region, the **Refresh Frequency** field should read 60Hz (NTSC) or 75Hz(PAL). If not, click on the arrow and select the correct setting from the menu.
- 6 Click **OK** to exit the panels.

You may also see benefits in your Video Toaster workflow if you employ dual monitors. The dual monitors give you more room to enjoy Video Toaster [2] and can ease multi-tasking between other applications.

SOFTWARE INSTALLATION: VIDEO TOASTER [2]



NOTE

You must have Administrator rights/privileges when you install the software.

- 1 Insert the Video Toaster [2] CD-ROM in the appropriate drive. The installation procedure should run automatically. If not, double-click on the **My Computer** icon and double-click on the drive letter to open the drive window. Double-click on the Setup.exe icon.
- 2 Follow the instructions within each of the setup dialogs. When you have set the options as desired, click the **Next>** button to proceed to the next setup dialog.
- 3 Register your product: visit www.newtek.com

You made a wise choice by purchasing Video Toaster [2]. If you're new to NewTek, we welcome you. We have a history of being very nice to our customers. For example, we sometimes make free stuff available to our registered users. We've done free upgrades and upgrades that are so fantastic that we actually charge for them.

You should visit our Web site often for tutorials, links to tutorials, cool merchandise, and tapes and books.

