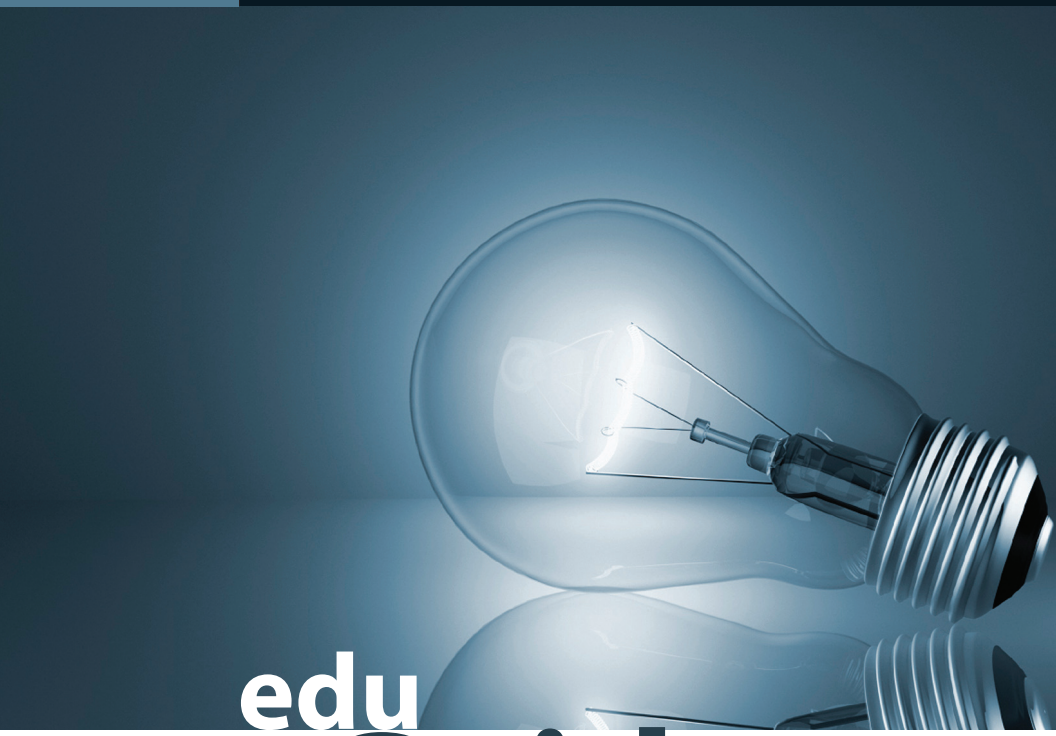

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Scan Converter Buyer's Guide

Everything you need to know and the questions to ask before you buy a new Scan Converter

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October 8, 2009

Introduction

In this first decade of the twenty first century, choosing which TV to buy has become one of the most frustrating, confusing purchase decisions that many consumers face. Until recently, our biggest decision was how big of a screen we wanted. Now, we are forced to decide whether we want DTV? Or HDTV? Should it have a display resolution of 480p, 720p or 1080i? Standard or widescreen? In many cases, the sales people at the store are not even sure of what some of these specifications mean.

There is no question that HDTV is coming. And within the next ten years, there is certain be a surge in the need for HD scan converters as all broadcasters, post houses and HD recorders make the transition. However, if you are not a broadcast or video "professional" and are considering buying a scan converter purely for presentation of computer graphics on a DTV or HDTV display, you may discover that you do not need one. Many DTVs and HDTVs have the ability to take in a computer signal directly and scale it to a resolution that they can display.The following guides were written not so long ago, but before HDTV - and even DTV - were a consideration. The information in them is still relevant if you are using a standard television or VCR and wish to display or record computer-generated images on it. However, if you are using a newer, digital TV or an HDTV, check the inputs on the back of your unit. You may be able to plug your computer right into it!

If you've ever considered purchasing a computer-video scan converter, but felt put off by all the choices available, this guide is for you. The two parts of this booklet will help you first, develop a clear understanding of the technology behind computer video scan converters, and second, make an informed decision about which scan converter best meets your needs.

What's Inside:

Part One:
Six Common Misconceptions
About Converting Computer to Video

TVs and computers. Both play an important role in our lives. And more and more, we hear about the impending convergence of these technologies. But while, for many of us, this seems like an obvious "marriage," the technologies behind computer and television video are quite different. And connecting one to the other is far from a simple process. This guide is designed to explore some of the common misconceptions you might have regarding the process of converting computer video to TV video. Computer video scan converters are products designed to perform this function, and the issues addressed here explain why their role is so complex. After reading this guide, you should have a fairly solid understanding of the differences between the computer video and TV video technologies, and how scan converters compensate for these differences. If you already have an understanding of this subject and are actually in the market for a scan converter, you may prefer to skip ahead to Part II - *Ten Questions You Should Ask Before Buying A Computer Video Scan Converter*. This section addresses more specific issue relating to differences in price and performance between scan converters, and will hopefully provide you with some guidance in selecting a scan converter that is right for your specific needs.

One: Connecting a TV to a computer is basically a simple process

Not really. But today we are using TV and computer monitors for increasingly similar purposes, and so many of us are unaware that these two types of equipment are technically quite different. In fact, each generates its picture in a unique way. Some new products on the market, such as those that allow you to browse the internet on a TV, make the differences in technology invisible to the user.

However, whenever a computer picture is displayed on a TV, you can be sure that a sophisticated conversion process is taking place, whether it's being performed by a free-standing scan converter or by components hidden within another type of equipment. And as the quality of this scan conversion process can vary greatly, so can the quality of your final, converted image.

Computer and TV monitors differ technically in two important ways. First of all, the rate at which an image is "painted" onto a computer monitor can be more than twice as fast as the rate at which it is "painted" onto a TV monitor. This is called the scan rate. A computer paints an image onto a computer monitor going from left to right at a horizontal scan rate of 24,000 to over 65,000 times a second (also referred to as 24 to 65 kilohertz [kHz]), and from

top to bottom at a vertical scan rate or refresh rate of up to 75 times a second or more (75 Hz).

By contrast, a TV scans much more slowly, going from left to right approximately 15,000 times a second and from top to bottom 60 times a second. The role of a scan converter is to change or convert the faster scan rate of the computer image to the slower scan rate that is compatible with TV technology. This basic process is called scan rate conversion. The second fundamental difference between computer and TV monitors is the form of the video signal received by the monitor. When a computer sends an image to the computer monitor, the video signal is divided into separate red, green, blue and sync components.

A TV monitor, on the other hand, is designed to receive a single electrical signal, called composite video, that combines all the necessary visual information together. A scan converter changes the multiple video signals coming from the computer to the single composite video signal that the TV can receive. This process is called encoding. So, in order to connect a TV to a computer, the computer output must first undergo both scan rate conversion and encoding.

As for the mechanics of physically connecting a computer to a TV monitor, today's scan converters make this an easy process. Most TVs feature a video input (RCA jack) on the back that allows you to hook up a scan converter with a simple cable. Older TV sets, that do not have a video input, require you to purchase a small device called an RF modulator that permits the attachment of a scan converter through the antenna jack. When using an RF modulator, your incoming computer signal will "ride" on a TV channel, such as Channel 3.

Two: My TV monitor should generate as good a picture as my computer monitor

Only if you have a really bad computer monitor and a really super TV! In fact, the very reason that separate computer monitor technology was invented was that TV's were insufficient for displaying certain high-resolution images, such as small text, spreadsheets and still photography. For example, have you ever tried to read the small disclaimer text at the end of car commercials?

Why is TV technology so inferior? TVs are based on a video standard developed 45 years ago, called NTSC (or PAL outside the US and Japan). Computer monitors, by comparison, were developed using today's improved technology, allowing us to create affordable displays with more information content (bandwidth) and higher resolutions. So what are the primary differences between NTSC and the technology used in today's computer monitors?

First of all, computer monitors receive their video signal in a more basic, pristine form than TVs do. As discussed earlier, the video signal sent by a computer to its monitor is broken into multiple electrical components (red, green, blue and sync) while a TV signal has all necessary information combined into a single composite signal. In order to process this composite signal, a TV must break it up into its original components, inevitably degrading the picture quality and creating distortions.

A second factor contributing to the inferior quality of images displayed on TV monitors is interlacing, a technique by which a complete TV picture is drawn in two passes from top to bottom on the picture tube. In interlacing, the first pass paints all the "odd" lines and the second pass paints the "even" lines. Noticeable flicker occurs when the images in the odd lines are very different from the images in the even lines. As the odd and even lines are alternately displayed, the eye perceives the quick appearing and disappearing of visual information. Flicker is especially noticeable when viewing thin horizontal lines that only take up a single odd or even row. If, for example, the line happens to be on an odd row, it totally disappears every time the even rows are displayed.

Unlike TV monitors, computer monitors paint an entire image in one pass from top to bottom, in a display format called non-interlaced. Images displayed in a non-interlaced format do not suffer from the same flicker problems. One day in the not-too-distant future, high-definition TV, or HDTV, will replace our current NTSC standard. Like computer monitors, the new HDTV standard will be non-interlaced, eliminating the flicker problem. Also, the new standard will possess more than twice the number of lines of resolution than the current NTSC picture. So, when HDTV becomes a reality, you will at last be able to enjoy the same quality of picture on your TV as on your computer monitor.

Three: A good scan converter will make the colors on my TV monitor look exactly the same as they do on my computer monitor

Maybe. On a good day. And with a lot of luck in adjusting your TV controls.

Even without using a scan converter, the colors on your TV monitor will tend to look less vivid and less pure than the colors on your computer monitor. This is because of inherent differences in the way computer monitors and TV monitors process color, and also differences in the construction of their picture tubes. Computer monitors have an advantage over TV monitors in that the colors defined by the computer are sent to the monitor using the three primary colors: red, green and blue (RGB). The computer monitor has to perform almost no processing in order to display them. TV monitors, on the other hand, receive a composite signal that they must separate and

process into meaningful color components (red, green and blue) before displaying them on the picture tube. As discussed previously, the additional processing performed by TV monitors degrades both picture quality and color reproduction.

A scan converter, then, cannot be held totally responsible if the colors on your TV display do not exactly match the colors on your computer monitor. (Video professionals often joke that NTSC stands for "never the same color.") However, all scan converters will add further distortions and small amounts of color impurities when converting from computer RGB to composite video. These distortions are more evident with certain colors. For example, red on a green background looks fine on a computer monitor but looks terrible on a TV monitor. Fully saturated (bright, intense) colors also look noticeably poorer on TV monitors than they do on computer monitors.

This is not to say that all scan converters perform equally in color reproduction, or offer the same level of control in adjusting color output. For example, some scan converters actually provide features such as test pattern generators and output processing controls to help you make as close a match as possible between the colors on your TV and computer monitor. To learn more about the specifics of how scan converters differ in their ability to generate colors, refer to question 3 in the next section of this booklet, on page 14.

Four: Computer images displayed through a scan converter should be flicker-free. The less flicker, the better the scan converter

Not necessarily. It depends on what level of scan converter you are purchasing.

From high-end scan converters, priced above $4000, it is reasonable to expect a virtually flicker-free image without significant blurring or softening of the converted image. However, even at this level, you will find dramatic variation in the quality and control offered by different models, so be sure to do some comparisons. When testing a flicker-filter, look at a variety of images, ranging from graphics to text, as different types of images respond differently to the anti-flicker processing.

Among mid-priced scan converters ($800 to $3000), eliminating most of the flicker is generally a better solution than eliminating *all* of it. Here's why: Anti-flicker filters work by altering the information in the odd and even lines of a TV picture so that the alternating lines are more similar to each other. This way, when they appear and disappear in the interlacing process, the flicker is less noticeable. The more similar the lines are made to appear, the less flicker is visible.

However, the obvious trade-off is that as flicker is reduced, more and more information is being altered or lost from the original picture. Vertical resolution is therefore sacrificed.The reason more expensive, high-end scan converters can eliminate more flicker with less loss of resolution is because, among other reasons, they are able to selectively apply flicker reduction only to those portions of an image where the effect will be beneficial. Mid-range scan converters tend to apply the anti-flicker filtering process to the entire screen.

Low end scan converters, priced in the low to mid-$100s, generally eliminate all flicker. These low-end models eliminate flicker by completely discarding every other line of the image, and displaying two successive passes of the remaining lines. Because the interlaced lines are now identical, no flicker is visible. Obviously, this method of removing flicker has serious drawbacks, as half the visual information from your original image has been lost. Small text becomes unreadable. Thin, horizontal lines may disappear. Plus, this method of flicker reduction compromises the actual NTSC standard – the very signal the scan converter was designed to create. (Remember, adherence to the NTSC standard is essential in professional video applications.)

So, don't be too quick to judge the quality of a scan converter based simply on the amount of flicker in its output. Effective flicker reduction (and not necessarily removal) must always be evaluated in conjunction with the scan converter's ability to generate a consistently crisp and readable image.

Five: When displaying a computer image on a TV monitor, the scan converter's level of performance is the only element affecting the quality of the converted image

While images generated by scan converters won't look exactly the same as the original computer image, there are many things you can do to get the best picture possible. First, if your TV monitor has an S-video input and your scan converter has an S-video output, use them! This is the one thing that will have the most impact on the quality of your picture.

Next, adjust the brightness, contrast, color, and tint (or hue) controls on the TV monitor. In order to correctly adjust for brightness, turn down the brightness level until the black on your screen appears as true black - not as dark gray. To correctly adjust for contrast, look at the border between a light and dark object displayed on your screen. When contrast is set too high, blooming may occur, in which the light area bleeds or blooms into the dark. To properly adjust the color and tint, you really should use test color bars, but if this is impossible and you're using a scan converter, you can use the colors generated by your computer for reference. (As discussed earlier, you won't be able to obtain an exact match.)

Finally, when creating images on your computer for display on a TV monitor, keep in mind the limitations of television technology. To avoid excessive flicker, refrain from using thin horizontal lines whenever possible. Try to avoid using saturated colors next to each other, such as intense reds and greens. Grays, on the other hand, tend to display quite well in NTSC. Also, avoid small text, as it will always be difficult to read.

And here's one last pointer. If you intend to record your computer generated image on a VCR, record it in the two-hour mode using a professional quality tape.

Six: All scan converters, regardless of price, basically perform the same process in converting computer images to TV. Discrepancies in price are primarily due to differences in features

And a Geo Metro and a Mercedes are both cars – one just has power windows.

Scan converters vary widely in price but not simply because some have more features than others. The price differences are mainly due to the differences in circuitry used to accomplish the basic scan converter functions. Low-end, mid-range and high-performance scan converters vary greatly in the way they process images.

Let's start with low-end scan converters, priced in the low to mid-$100s. These scan converters are sometimes "software-aided." This means that the scan conversion process is not performed entirely by external hardware, but that the computer itself is aiding in the conversion process.The use of a software driver may conflict with the graphics processing of your computer and/or some of the applications you intend to use. Also, these low-end scan converters offer a very poor-quality anti-flicker filter (if they offer one at all).

The low price of the units prohibit the inclusion of processing components necessary to do anything but the most rudimentary flicker reduction - that is, eliminating every other line of the image. And, low-end scan converters are limited in the resolutions they support. Generally, they support only 640 x 480, with some newer models also supporting 800 x 600 at low refresh rates. However, often if they support 800 x 600, they only allow you to see 640 x 480 pixels at a time, clipping off the remainder of the image.

Mid-range scan converters offer software-free performance and a much improved level of flicker reduction. In addition, mid-range scan converters are able to support higher resolutions (generally up to 1024x 768). They also offer 24-bit color processing, meaning that the converted image will feature the same depth of color as the original computer picture. Low-end scan

converters may be able to accomodate16.8 million colors in the incoming computer signal, but the converted image rarely maintains this level of color depth.

Finally, high-end scan converters offer an even greater level of image processing. These models are able to support resolutions as high as 1600 x 1280, and therefore require the expense of much more memory than scan converters that only support lower resolutions. These models also have superior anti-flicker algorithms and are often more flexible in accepting non-standard incoming computer signals.

So, separate from the many features that differentiate scan converters in different price ranges, there are also real differences in the quality and complexity of the scan conversion process. Price/quality trade-offs exist throughout the scan converter design. As with most things in life, you get what you pay for.

Part Two:
Ten Questions Your Should Ask Before Buying A Computer Video Scan Converter

So you're ready to buy a computer video scan converter? Then this part of the booklet is meant for you. The following ten questions are ones you should ask before making a purchase. They are intended to help ensure that you select a scan converter that will best satisfy your specific needs, regardless of which manufacturer's product you choose to buy.

One: What computer display modes does the scan converter support?

Unlike televisions and related video equipment that always use the same display resolution, computer monitors generate a wide range of display resolutions with varying refresh rates. "Resolution" refers to the number of pixels, or dots, that comprise the image. "Refresh rate" is the speed at which the image is painted on the screen, in one-pixel-high horizontal lines drawn from left to right, top to bottom. The video card inside your computer determines the resolution and refresh rate displayed on your monitor, and often you can choose between a number of different settings. Common computer resolutions are 640 x 480, 800 x 600 and 1024 x 768, but they may go as high as 1600 x 1280 and beyond. Common vertical refresh rates are 60 Hz (an entire screen is drawn from top to bottom 60 times per second), 70, 72 and 75 Hz, although there are many others.

The most basic, low-end scan converters usually provide support only for computer resolutions of 640 x 480 with a vertical refresh rate of 60 Hz. This is because this combination of resolution and refresh rate is mathematically easy to convert to a standard TV resolution. The number of pixels on both the computer and TV monitors are almost the same, and the TV refresh rate is just about half of the computer refresh rate. As of a few years ago, most PCs and Macs operated in 640 x 480 as a default setting. However, as computer applications have become more graphic intensive, including applications such as web-surfing, many people prefer to set their computers to higher display resolutions. In these cases, a scan converter that only supports resolutions of 640 x 480 will not suffice.

Mid-range scan converters often support resolutions as high as 1024 x 768. However, be careful to also check the vertical refresh rates the scan converter supports. Many scan converters only support lower refresh rates at higher resolutions. For example, if you generally operate your computer in 1024 x 768 with a 72 Hz refresh rate, and the scan converter only supports 1024 x 768 at 60 Hz, the scan converter will not be compatible with your computer. Also, make sure that if a scan converter supports resolutions such

as 1024 x 768, the entire converted image will be viewable on the TV monitor at one time. Some scan converters "support" 1024 x 768, but only allow you to see 640 x 480 pixels at any one time, forcing you to scroll across and down the screen.

High-end scan converters support the even higher resolutions used by work station computers, such as 1280 x 1024 and 1600 x 1280. Sometimes, the refresh rates these high-end scan converters support are defined by the horizontal, rather than vertical, refresh rate. The vertical refresh rate is the speed at which the entire screen is drawn from top to bottom, whereas the horizontal refresh rate is the speed at which one line of pixels is drawn from left to right. Because in high resolutions there can be more than 1000 horizontal lines on the screen at one time, the horizontal refresh rate is much faster than the vertical refresh rate and is measured in kilohertz, or 1000's of times per second.

In summary, before you go shopping for a scan converter, make sure you know the resolution and refresh rate you use on your computer. Then, be certain that the scan converter you buy supports both.

Two: What video outputs does the scan converter provide and do the outputs adhere to the NTSC and PAL standards?

The NTSC standard is the very precise definition of television signals as they are used in North America and Japan. Created by the National Television Systems Committee in the early 1950's, the NTSC standard specifies the format of the transmission signal used to create a television picture, including information defining the picture's resolution, color and brightness. The reason you can buy any camcorder or VCR and know that they'll both work with your TV is because each piece of equipment is required to adhere to the NTSC standard. In other parts of the world, PAL is the accepted video standard.

You might assume that the TV output generated by a scan converter would, by definition, adhere to the NTSC (and/or PAL) standard. However, this is a false assumption. The output ***should*** adhere to the standard. *Should* and *do* are two very different things!

While it's pretty safe to assume that any mid-priced or high-performance scan converter will generate a true NTSC signal, many low-end models take shortcuts in the conversion process, therefore failing to meet all the rigid NTSC specifications. Most consumer-grade televisions are lenient in accepting sub-standard NTSC signals, so the "cheating" of the scan converter may not be evident to the user. However, problems will inevitably arise when attempting to use the scan converter with other, less-accommodating types

of professional video equipment. One of the most common ways a scan converter might violate the NTSC standard is by not locking the colors in sync with the brightness portion of the TV image. This is called unlocking the color subcarrier and will make the colors on the TV appear to wave or "swim," even on a consumer TV.

Once you are assured that a scan converter outputs a true, NTSC (or PAL) standard, you need to evaluate the formats in which it provides this output. There are actually many different types of NTSC output. The most basic is called composite video. All scan converters provide this output as a standard feature. In composite video, all the information defining the picture is combined into a single, "composite" signal. This is the format that you are most accustomed to viewing. It is also the poorest quality.

S-video is a better quality NTSC format because it separates the color and brightness information into two separate signals before going into the TV or video monitor. This separation results in a crisper picture with less distortion. Many higher-end consumer TVs and projectors as well as all professional video equipment offer an S-video jack. By purchasing a scan converter that offers an S-video output, you will be able to make use of this input option on your TV or video equipment and benefit from a far superior picture.

The best quality NTSC display format is RGB at 15 kHz. Like a computer picture, NTSC in an RGB format keeps the red,green and blue information as separate signals. ("Sync", or information regarding the synchronization of the picture, is carried in a separate fourth signal.)

Certain professional types of equipment, such as video projectors with separate red, green and blue "guns," accept NTSC in this format. While still not as good as a computer picture, NTSC displayed in RGB offers a vast improvement over the quality of NTSC in standard composite format.

"Component video" is another variation of NTSC, similar to RGB in picture quality, that was developed exclusively for use in professional video production and recording. There are multiple variations of component video, including Betacam and MII. Some scan converters in the mid-price range and almost all high-end scan converters offer component video output.

Finally, certain high-end scan converters offer a digital version of NTSC output. Serial digital output, or SDI, enables the scan converter output to be used in conjunction with other digitally-based equipment in a broadcast environment. Although the above discussion has referred only to the various formats of NTSC, the same format options also apply to the PAL video standard - composite, S-video, RGB and component. Some scan converters

offer both NTSC and PAL outputs in the same unit. Others support only one or the other. Depending on where you plan on using your scan converter, you can determine your specific needs.

Three: How many colors does the scan converter output?

The maximum number of colors that can be displayed on a computer monitor is a function of the graphics card in the computer and the number of "bits" it uses for color processing. What does this mean? Before a computer can tell a monitor what colors to display, it processes the color by breaking it into individual "bits" of information, each containing an "on" or "off" message. The maximum number of colors that the computer can describe to the monitor is a function of how many bits are dedicated to this process. The more bits, the more colors. This chart shows the maximum number of colors a computer monitor can display based upon the number of bits used in color processing, ranging from 6 to 24-bit color. 24-bit color means that 8 bits of information are dedicated to describing the color red, 8 different bits describe the level of green, and 8 more bits describe blue.

Number of Bits	Maximum Number of Colors	Maximum Number of Grays
6	64	4
12	4,096	16
18	262,144	64
24	16,777,216	256

By contrast, televisions use an analog, rather than digital, means to process color. To visualize an analog signal, think of a wavy horizontal line. Information describing the color of the television picture is carried along that wavy line. There are no discreet "bits" of information. Instead, the level of color can fall anywhere on the continuum of the wave, from a peak (maximum color) to a valley (no color). Of course this is a very simplified explanation, but you can imagine how the continuous nature of an analog signal would allow the color processing within a television to describe a huge range of color, without the limitations that digital processing (containing a low number of bits) might impose.

So, if a computer monitor running in 24-bit color and a TV monitor can both display millions of colors, shouldn't a scan converter connecting the two also be able to output this number of colors? Not necessarily.

Today, most scan converters use digital processing for at least part of the scan conversion process. So, just as a computer graphics card operates in settings

ranging from 6 to 24-bit color, scan converters can differ in the number of bits they dedicate to color processing. Some scan converters offer 24-bit processing; others provide only16-bit or less. If the incoming computer image contains 24-bit color but the scan converter doesn't offer 24-bit processing, the maximum number of colors displayed in the converted image will be limited to the level of processing offered by the scan converter.

When evaluating scan converters for their ability to convert and output 24-bit color, be wary of advertising claims. Some manufacturers promote their products as having the ability to "support" 24-bit color, but this may simply mean the scan converter can accept a 24-bit color input without crashing. The unit may not necessarily provide a 24-bit color output. If full and accurate color representation is important to you, shop for a scan converter that provides *24-bit sampling and processing*.

Four: How many samples-per-line does the scan converter take of the original computer image?

In order to convert a computer image to a television image, a scan converter takes samples of the incoming computer image, manipulates the information in those samples, and then generates a converted NTSC output. Scan converter manufacturers typically define the number of samples their products take in a measurement of samples-per-line. So, if a scan converter takes 700 samples-per-line, this means that if a computer were providing an input of 640 x 480 resolution, the scan converter would take 700 samples across the 640 pixels that make up each line.

Obviously, the more samples-per-line a scan converter takes, the more image detail the scan converter has available for processing.

Often times, manufacturer's literature on their products does not reveal the number of samples-per-line their products take. This is a number you should know. A low number of samples-per-line guarantees a fuzzy picture, regardless of any other features or specs the scan converter offers. As a general rule, look for scan converters that offer at least 640 samples-per-line.

Five: How does the flicker reduction work?

For a discussion of what you can expect in the area of flicker reduction from scan converters in various price ranges, please refer to question 4 in the other section of this booklet, found on page 7. As the other section explains, less flicker does not necessarily mean a superior anti-flicker filter. There are several variables to consider when evaluating the quality of a scan converter's flicker reduction feature.

Separate from the "quality" issues of flicker reduction, you may also want to consider how many levels of control a scan converter offers in its anti-flicker filter. Some scan converters give you only one level of flicker reduction - on or off. Others give you a virtual continuum of control, with many levels between the off and fully "on" mode. As text and graphics often require different levels of flicker reduction for the optimal effect, multiple levels of flicker reduction will provide you with more satisfactory results across various applications. Also, some products allow you to select a "threshold level" - that is, the level of detail in the image that will be subject to flicker reduction. This feature, in combination with various levels of flicker filtering, can provide you with the optimal effects.

Six: Does the scan converter allow you to manipulate the sizing and position of the converted image?

When you look at a computer monitor, you'll notice that borders of the picture do not extend all the way to the edges of the screen. This is unlike a TV monitor, on which the picture bleeds off the edges in all directions. When displaying a computer image on a TV monitor, this bleeding effect can pose problems. For example, menu bars, critical for operating the computer, may be lost above the visible area of the screen.

Most scan converters compensate for the overscanning effect of TVs by offering a feature called "underscan." However, the nature of the "underscan" feature is not the same across all scan converters. At the most basic level, look for a scan converter that shrinks the converted image both horizontally and vertically. (Not all do!) And make sure the underscanned image appears to maintain the correct aspect ratio. Next, you might want a scan converter that allows you to position the image on your screen. As all monitors are calibrated slightly differently, without an image positioning feature, your underscanned image may appear off-center on the TV monitor.

Some higher-end scan converters offer sizing and positioning controls beyond those necessary to solve the overscanning problem. A fixed-percentage "image magnify" is a feature offered by some mid-range scan converters. However, when evaluating scan converters with this feature, make sure that "image magnify" not only enlarges the picture, but also increases its clarity. Some manufacturers offer a magnification feature that enlarges images on the screen, but the enlarged image is pixelized and just as unclear as the original, smaller version. A true image magnify feature should dramatically increase the readability of small text and show significantly more detail.

Also, when selecting a scan converter that offers a fixed-percentage image-magnify feature, make sure the unit allows you to select which portion of the screen will be subject to magnification by panning around the screen while

in the magnify mode. Going a step beyond "image magnify," some high-end scan converters offer continuous sizing controls, allowing the user to "zoom" in or out of the original image, while maintaining the correct aspect ratio. Some also allow the user to size the horizontal and vertical dimensions independently. And, again, these high-end units should also allow for positioning the image anywhere on the screen. Also, these units sometimes offer memory "preset" positions that allow the user to store certain levels of magnification and image positioning that may be used frequently.

Seven: Does the scan converter offer built-in genlock with timing?

There was a time when if you didn't know what "genlock" meant, chances were, you didn't need it. However, the ongoing convergence of computer and video technologies has created opportunities for computer professionals to work with video editing programs and equipment. A basic understanding of genlock is necessary to achieve the best results in video editing.

Genlock allows you to put the converted output from a scan converter "in sync" with another video source, so that the two video outputs can be edited together. For example, if you are currently involved in multimedia development, and at some point you plan to integrate your computer-generated creation with some other, preexisting video, for recording video onto videotape, you will probably need the genlock feature. When buying a scan converter with genlock, make sure it offers easy-to-use controls to adjust both the horizontal and subcarrier phasing, also called "timing."

Eight: What other special features does it offer?

Scan converter manufacturers try to differentiate their products by offering slightly different combinations of features. In addition to those we've already discussed, here are some you might find useful:

- Built-in test pattern generator (helpful in adjusting your monitor)
- Output processing controls (helpful in adjusting your image)
- RS-232 remote control (ideal for system integration)
- Down-conversion (converting higher-resolution computer video to lower-resolution computer video)
- Component output (for professional video production)
- NTSC and PAL support (for use outside the US)
- Image freeze (freezes the output from the scan converter)
- Standby (puts the unit in a powered-down, "sleep" mode)

Depending on your specific applications, some features will be more important to you than others. Don't feel compelled to purchase a product packed with features you don't think you'll need. First and foremost, focus on purchasing a product that provides a converted image that meets your expectations for quality, and then determine what additional features might be useful.

Nine: What accessories come with it, and are there any extras that need to be purchased?

Don't assume that the price of a scan converter includes all the cables, connectors, power supplies, and other accessories that you'll need. Some manufactures provide a complete package with their products, even including rackmount kits. Others include some items standard but charge for others. A few issues you might want to check are:

What cables come with the unit, and how long are they? (At minimum,you should receive three cables - one for connecting the scan converter to the computer, and one each for composite and S-video outputs. The latter two should be at least 10 feet long.)

Does the unit require a special cable or adapter to support Macs, or in some cases, workstations? If so, is it included in the price?

Does the manufacturer offer international line cords and power supplies? Can they be ordered in lieu of the North American versions, or do they cost extra?

Can the unit be rackmounted? Does the hardware cost extra?

Does the unit have "upgrade" options that can be added at a future date? Can these upgrades be installed in the field, or must the unit be returned to the factory?

Be sure to ask these questions in advance. Otherwise, hooking up your new scan converter may be reminiscent of opening up a great holiday gift as a child, and discovering the batteries weren't included.

Ten: How does the manufacturer stand behind its product?

Once you have your scan converter up and running, you want to keep it that way. Ask if the product comes with a manufacturer's warranty, and if so, what is the length of coverage. Does it exclude certain types of repairs? Also, if repair or replacement is necessary, find out how quickly the manufacturer guarantees to get your product back to you. Generally, you can feel confident that a company that offers a standard extended warranty period is selling

a product that isn't likely to need repair. Otherwise, honoring the warranty would be cost-prohibitive to the manufacturer.

In addition to warranties, some manufacturers offer other types of guarantees, such as a 30-day satisfaction guarantee. These types of guarantees further reduce the risk involved in trying a new product, and also make a statement about the company's commitment to customer satisfaction.

Providing technical support is another important way that manufacturers can stand behind their products. Do they offer free, unlimited technical support? Do they have a web site? Do they offer informational literature? Do they have a network of dealers who can provide on-site help at the local level? All these services can help ensure that product ownership will be a pleasant, stress-free experience.

Remember, not only do you want to pick the right product for your immediate scan conversion needs, but also the right manufacturer who is committed to your continued satisfaction.

Get Information about Communications Specialties award-winning line of scan converters, Scan Do®:

Phone: 1-631-273-0404

Email: info@commspecial.com

Online: commspecial.com
scandohd.tv

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About Communications Specialties, Inc.

Communications Specialties, Inc. (CSI) is an award-winning, Long Island based company that manufactures and sells a variety of products for the distribution, conversion or transmission of television and computer video signals, including fiber optic transmission systems, scan converters and video scalers.

The company was founded in 1983 by veterans of the broadcast industry. Since then, CSI has managed to consistently design innovative products that are used worldwide by Fortune 500 Companies and Government Agencies in a variety of markets such as Broadcast, Professional A/V, Videoconferencing, Education, Home Theater, Security, ITS, Industrial Monitoring, Digital Signage, Government/Military and more!

The **Pure Digital Fiberlink®** line offers an extensive and affordable family of fiber optic transmission systems for the Professional A/V marketplace and includes several ground-breaking products for the transmission of high-resolution RGB signals. Systems for point-to-point and point-to-multipoint signal distribution make these products highly desirable for any Pro A/V applications.

Our premier product line, the **Scan Do®** family of computer to video scan converters, has redefined industry standards in computer video to NTSC/PAL technology with unsurpassed performance in its price range. All models support high resolutions and refresh rates and are VGA and Mac® compatible. The feature-rich and versatile Scan Do family offers the widest range of scan converters on the market.

The award-winning, **Deuce®** video scalers convert NTSC and PAL to high-resolution, non-interlaced video and offer a far superior and affordable alternative to line doubling and quadrupling. The new generation of Deuce products offer a wide range of non-interlaced resolutions and refresh rates for every application, from professional A/V installations to home theater, including a model designed especially for use with HDTV displays.

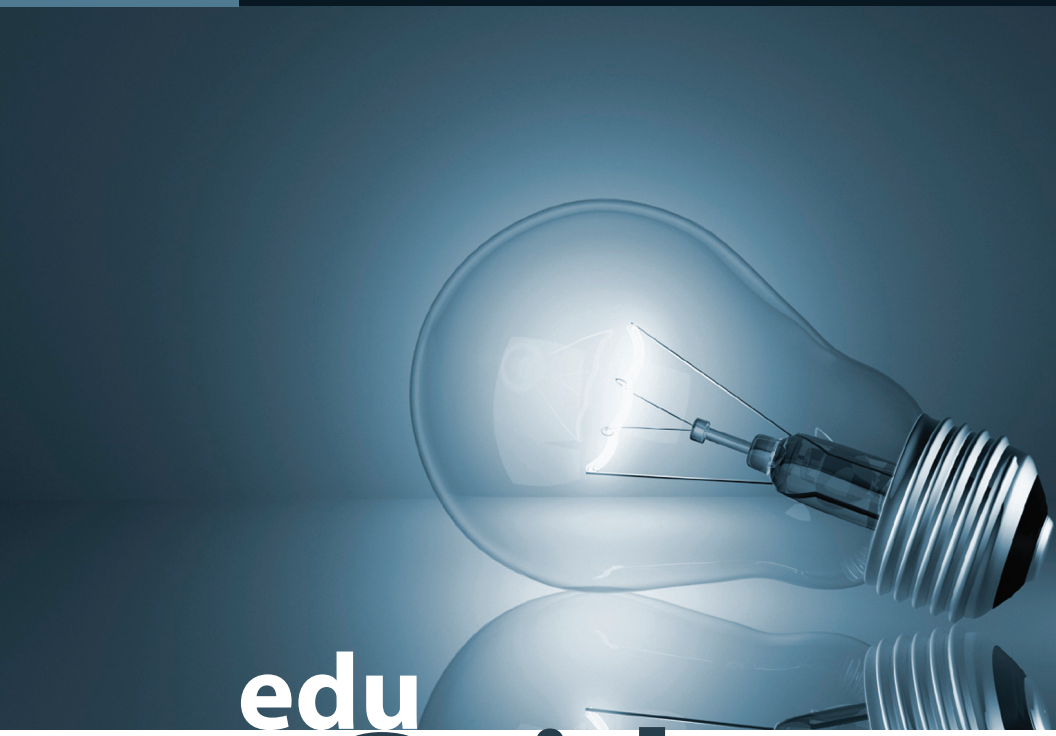
In addition, CSI manufactures a comprehensive selection of distribution amplifiers, VGA monitor, keyboard and mouse extenders and accessories for our entire product line.

Communications Specialties and its products have been the recipient of numerous industry awards. In 2005, the Pure Digital Fiberlink® 7220 Series for high-resolution RGB and Stereo Audio was honored as one of the AV industry's best technological innovations of the year by receiving a "rAVe Radical Product of the Year" award as "Best New Analog Signal Processing Product". The rAVe email newsletter is published by professional audiovisual industry veterans and is read industry-wide.

Among CSI's many other awards are AV Video Magazine's Platinum Award (given to Scan Do® Ultra and Deuce®) and the Video Systems' Vanguard Award (given to Deuce).

The company is headquartered in the United States on Long Island, New York, with Sales Offices in Florida, Indiana and Virginia. Research, development, design, engineering, manufacturing and customer support operations are performed at the New York headquarters. Other locations include Communications Specialties Pte Ltd (CSPL) - a wholly owned subsidiary office in Singapore that provides support to distributors in the Far East and Pacific Rim.

Our in-house sales department handles complete product-line sales directly to end-users as well as to an international network of representatives and resellers. All of our products are backed by an exceptional warranty.



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