Workstation Guide

By Baron Robertson

There are so many terms, technologies, and buzzwords when it comes to computer hardware that it's hard to know where to start, let alone decide which features are most important. The main purpose of this guide is to educate you about the various hardware technologies **from a trader's point of view**. I'll provide detailed information on the system components that are important to the professional trader, while minimizing the use of technical jargon that would only be understood by the most savvy computer geek.

Whether you realize it or not, a commitment to full-time trading also requires a commitment to invest in the best hardware and software that you can get your hands on. With average daily volumes at the NYSE and Nasdaq increasing each year, these virtual arenas have more players competing against each other than ever before. You can't expect to be a competitive participant in today's marketplace by using an unreliable machine with inadequate screen space and a slow Internet connection.

Throughout this guide, I will use the term "workstation" often. This term describes a class of higher-end computers that are configured to do a specific set of tasks very well. As you attempt to find your next computer for trading, you should be looking for a workstation-class machine, not a generic low-end PC that anyone with a thousand bucks could get from a local electronics store. A serious trader must approach the acquisition of a trading workstation in the same educated manner that a dentist, surgeon, or other hands-on professional would approach the purchase of their specialized tools and equipment. This requires a fundamental understanding of the different types of computer hardware, ranging from processors and memory to monitors and

backup power supplies.

We are going to start with an overview of the core components of a computer. From there, we will go through a little process of elimination to determine which operating system is the best for trading purposes. After that, you'll be learning about display technologies like monitor types and video cards. We will also be going over the important, but rarely discussed subject of backup power supplies. And of course, no discussion on trading workstations would be complete without a look at the various types of Internet connections.

Whether you decide to build your own machine or buy a prebuilt system from a manufacturer like Dell, HP, or IBM, this guide will give you a solid foundation of knowledge so you can make confident, wise decisions.

Core Components

By Baron Robertson

As competition among mainstream computer makers increases each year, the prices of desktop computers continue to decline. The problem is that the overall quality of PCs is declining as well. The machines that you see in your average Best Buy or Circuit City these days are smaller, more tightly integrated, and less upgradeable than ever before. If you're not familiar with computer terminology, it's very easy to get coerced into buying a machine that isn't exactly what you need.

Case Size

The easiest trap to fall into is buying a computer with a case that is too small. Generally speaking, machines that have small cases are low-end machines that have been designed for budget-conscious consumers and businesses that have very small or dense work areas. These PCs typically have most of their components built right into the motherboard itself, which reduces costs but also reduces the possibility for internal component upgrades later on.

One of the primary reasons why you need a computer that has a large case is because you will need to run several monitors at once, which will require the use of several video cards, or preferably, the use of a high-performance multi-monitor video card. Most of the video cards available these days are either half-length or full-length. Half-length cards measure about 6" long while full-length cards are a little over a foot long. Full-length cards require a case that is somewhere between 16" and 19" deep. Many of the slim desktop, small form factor, and micro ATX enclosures available these days don't even come close to meeting this requirement.

Case Types to Avoid:

Small Form Factor

Slim Desktop

Micro ATX

CPU

You can also identify a low-end PC by looking at what processor it has. Computers that sport an Intel Celeron, AMD K6/Duron, or any Cyrix processor are entry-level machines that should be avoided. Buying a system configured with any of these low-end processors today virtually guarantees that your machine will be an outdated piece of junk within a year. Just remember, the only things that become worthless faster than produce at the grocery store is computer equipment. Ok, I'm exaggerating a little bit, but you get the point.

The Intel Pentium and the increasingly popular AMD Athlon are the best processors to go with. On the Intel side, you can choose from the Pentium III, the Pentium III Xeon, and the recently introduced Pentium 4.

The Pentium 4 is the fastest chip that Intel has to offer. Recent benchmarks

have shown that the Pentium 4 outperforms the fastest Pentium III in every way. Intel has clearly stated that the new micro-architecture of the Pentium 4 is what the company will be betting its future on for the next several years, so buying a Pentium 4 today guarantees that you'll be able to upgrade easily to even greater speeds if you wish to do so later on. I recommend the Pentium 4 especially if you are setting up a machine with four or more monitors. As screen space increases, the number of applications that can be viewed and actively used simultaneously also increases, which ultimately puts a greater load on the CPU. Once you go past three screens of information, you need the fastest processor available.

You may find it tempting to go with a multi-processor system instead of putting all of the workload on a single CPU. Before you slap down your American Express Card, consider these words of advice: **Don't do it.** Multi-processor machines are a bad investment for a couple of reasons.

First of all, the good systems are expensive due to their use of the Pentium III Xeon processor. This chip has been designed with large amounts of cache memory in order to communicate efficiently with additional system processors. Xeon processors with 2MB of cache memory can easily cost ten times as much as a standard Pentium III chip of like speed. Motherboards that accept multiple processors are high-dollar items as well.

The second and even bigger reason why I don't like multi-processor boxes is because they are a total waste of money when used with mainstream financial applications. Although it's true that two or more linked processors can outperform a single processor system, these gains can only be realized when using specially tuned, multithreaded applications.

Multithreading is a programming technique used by developers to break an application's processes into separate threads. Once separated, the threads can be evenly distributed amongst multiple processors to be worked on simultaneously. After talking with several software companies that design trading applications exclusively, I learned that trading platforms are not multithreaded. Although several companies are currently working on this problem, a fully multithreaded trading platform for dual and quad processor machines is not due out for at least another year. Unless you know for a fact that the applications you will be using are multithreaded, buying a system with more than one processor can be an expensive mistake.

A standard Pentium III processor is a good choice if you're on a tight budget. Now that the Pentium 4 processors are out, the prices of the Pentium IIIs will really start to plummet, making the higher speed Pentium IIIs a very attractive solution. I recommend the Pentium 3 (700 MHz or higher) for traders who are setting up a basic dual-monitor workstation.

Many traders have asked about the suitability of the AMD Athlon for a trading workstation. Having built several Athlon-based systems myself, I can tell you that the Athlon performs flawlessly. We haven't received any reports of performance or compatibility problems from other traders either, so I have no hesitations about recommending the Athlon as a solid foundation for a high-end trading workstation. Considering that the 1.4 GHz Athlon has comparable performance to the 1.7GHz and 2.0GHz Pentium 4s at approximately half the cost, the Athlon is certainly the price/performance leader of the group and a worthy competitor for Intel.

Motherboard

Since this isn't really a guide to building your own computer, there's no point in me going through all the arcane features of motherboards. So here are the basics.

The motherboard is the most important component of your computer. Every other component, at some point, connects to the motherboard. Also, the motherboard dictates what can and cannot be put into your computer later on down the road. Want to upgrade your machine's memory? Well, you first have to check to see what types your motherboard will take, and how much memory it can support. Want that new multi-monitor AGP video card? If so, your motherboard better have an AGP slot. Get the point? If you end up with the wrong motherboard in the beginning, you may find yourself having to buy another down the road to support the upgrade of another system component. A decent motherboard should have 4 PCI slots, 1 AGP slot, and support for 1 GB or more of system memory. PCI and AGP slots will be covered in more detail when we get to the section on video cards.

Memory

The most common mistake that traders make when purchasing a new

machine is getting one without enough memory installed. When your system memory runs out, your hard drive must be used to store and retrieve all temporary data, which forces the drive to be accessed far more often than normal. This slows system performance down dramatically since adding or deleting data from a mechanical hard drive is takes much more time than using RAM for the same purpose. Operating a computer with an inadequate amount of memory for extended periods of time can also cause a system crash or hard drive failure.

As a general guideline, you should install 192 MB of memory for every monitor you will be using. For example, if you were building a four-monitor workstation, you would need to install 768 MB (4 x 192) of memory. This would be enough for your system to handle any peaks in memory demand without having to use the hard drive unnecessarily.

There are many types of memory available, so it's really easy to buy the wrong type if you're not careful. Pentium III systems use PC100 or PC133 SDRAM, while the Pentium 4 systems use the newer RDRAM modules. Athlon systems can use PC100, PC133, or possibly even DDR SDRAM - which is the newest memory type to be introduced lately. The exact type of memory you need is really dictated by the motherboard and processor installed in your system. The easiest way to buy memory is to use the online memory selector at Crucial.com. This handy service shows you which types and sizes of memory are available for your specific machine after you specify the brand and model of your computer. If you have a custom built computer, you can enter your motherboard model to achieve the same results.

Hard Drive

There are two primary categories of hard drives: IDE and SCSI. Within those categories there are more abbreviations, synonyms, and interfaces than you can shake a stick at. A detailed overview of these terms is way beyond the scope of this article so I have no intention of going any further than the giving you an executive summary.

In a nutshell, IDE hard drives are mainstream products

that are standard equipment in just about every desktop computer on the planet. SCSI drives are faster, more expensive drives that are usually found in servers and workstation-class machines. A separate controller is needed for SCSI devices whereas IDE drives have their controllers built in. The necessity for an external disk controller is the main reason why SCSI configurations are twice as expensive as their IDE counterparts. As you investigate hard drives a little closer, you will probably see many of them listed as being ATA, UDMA, or EIDE. There's no point in really knowing the details of these terms. The important thing to remember is that they all describe the same general type of drive, which is IDE.

Having used SCSI hardware daily for several years, I can tell you from experience that SCSI hard drives will not bring a lot to the table in terms of real-world benefits. The fast speed of SCSI drives can be seen most easily when huge files are being read into memory or written to the disk surface. Real-time trading applications do not need to work with large files, so the speed advantages of SCSI are barely noticeable. I recommend you stick with IDE drives.

Ok, you might be wondering why I use SCSI drives myself but tell you to go with IDE instead. Well, it's basically because I'm a little warped and I respectfully assume that most people like you have a more practical approach to choosing computer hardware. See, I look at SCSI vs. IDE in the same way that I look at sports cars vs. regular cars. Although I don't need a sports car to get back and forth to the grocery store, I drive one anyway because I like knowing that I **CAN** go fast if the opportunity arises and I feel like doing so. In the same way, a SCSI drive is not necessary for my daily trading tasks, but it's nice to know that if I need to install a big program like MS Office or work with some other large file, I have the high-end drive it takes to get the job done as quickly as possible! Get it?

Operating System

By Baron Robertson

One of the most important decisions you will need to make when buying or building a trading workstation is what operating system you will use. One system crash can lock you out of the markets long enough to wipe out several weeks, or even months, worth of profit. If you want to run a successful trading business without constantly dealing with lock-ups, memory leaks, and "blue screens of death", you need an operating system that will stay up and running for extended periods of time.

Listed below (in order of importance) are three qualities of an operating system that traders need to be concerned with:

1. Compatibility
2. Reliability
3. Speed

What we're going to do in this section is apply these qualities to the various operating systems out there to logically conclude which one is the best choice for serious traders. I realize this isn't the most scientific method in the world but I think it will get my point across in a way that makes some sense to you.

Compatibility

The first thing to look for in an operating system is how compatible it is with the programs you will be using. You can have the most reliable operating system in the world but if there aren't any trading applications available for that platform, you basically have a worthless machine. Historically, the most reliable operating systems have been the various flavors of UNIX. Vendors

such Compaq, Sun, HP, and IBM have their own versions of UNIX that mission-critical enterprises have been using for decades. UNIX variations like FreeBSD, and Linux -- the increasingly popular open-source operating system, are also regarded to be very reliable. But since there aren't any point-and-click trading packages available for any of these platforms, we have to turn our heads and keep looking for a better solution.

The next operating system to scrutinize is the Macintosh OS from Apple. Supporters have always praised the Mac operating system for its ease of use and intuitive features. Apple recently released a new version of their operating system called "OS X", which is basically a UNIX system with a highly customizable graphical interface on top. Although this operating system is claimed to be the most reliable and feature-rich environment that Apple has ever produced, there are only a few decent trading platforms available that will work with it. For charting and analytics, Mac users should check out Linn Software and Trendsetter Software. For users who need order execution capabilities, Interactive Brokers and thinkorswim both offer platforms worth checking out.

There are a few software emulators on the market that allow a Mac to run programs designed for other operating systems, but the feedback I've received from traders has not been good. The general consensus is that the emulation software slows the performance of applications down dramatically, which is definitely something you want to avoid when trading in real time.

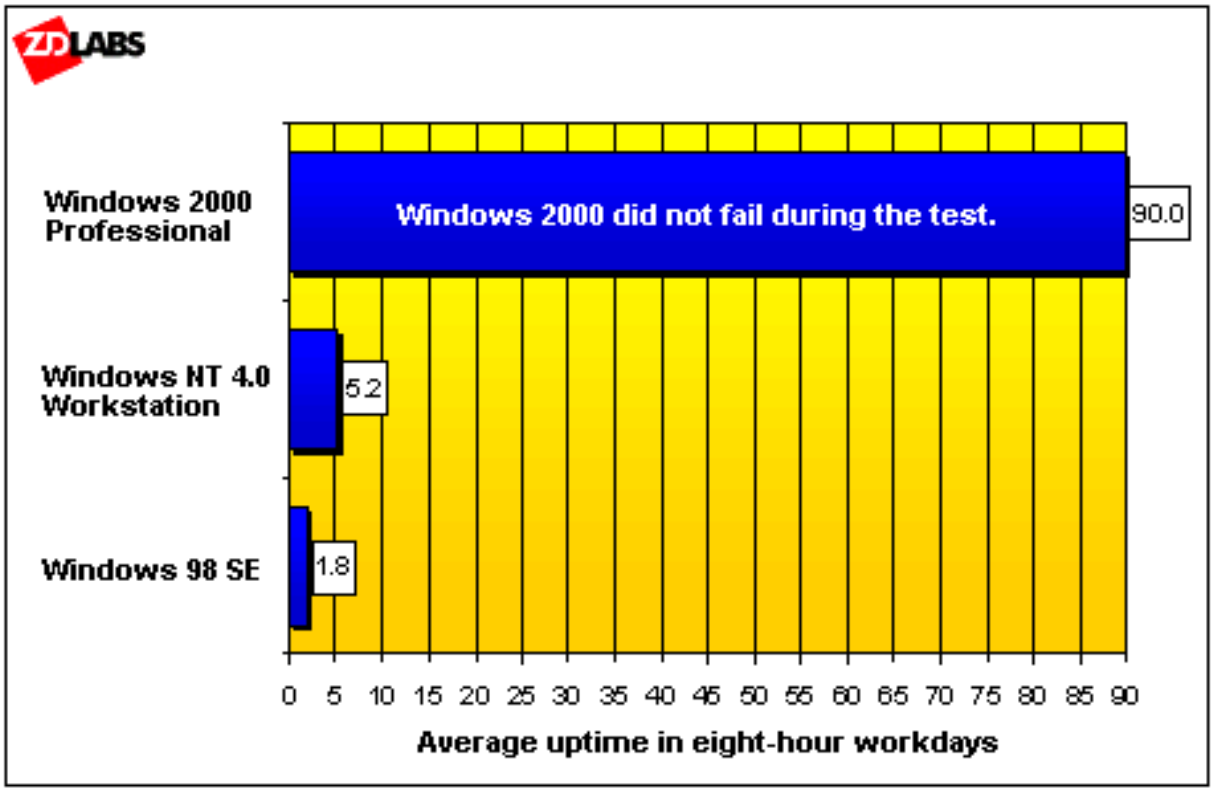
Although it's certainly possible to set up and use a trading workstation configured with the Macintosh operating system, I do not recommend it. Doing so will severely limit your options when it comes to finding suitable trading applications.

With the exception of some relatively unknown operating systems, the only one that remains is Windows from Microsoft. With 98% of the world's computer users running some version of Windows, Microsoft is the undisputed king of the desktop operating system. If you want to have a broad choice of trading software and services, then Windows is the platform of choice, hands down. Although this conclusion may seem obvious, we get questions from new traders on a regular basis regarding trading software for alternative operating systems, especially the Mac.

Reliability

Since the compatibility filter has already eliminated all of the operating systems except Windows, we now have to figure out which version of Windows in the most reliable. Windows 95, NT 3.51, and older versions are not even being considered since Microsoft is trying to get everybody upgraded to newer versions as quickly as possible. This is a good thing, considering that Windows 95 has the worst memory leaks of any mainstream OS I have ever used. That leaves us with four to choose from: Windows 98, Windows 2000 Professional, Windows NT 4.0 Workstation and Windows Me.

Microsoft recently commissioned ZD Labs to compare the reliability of Windows 2000 Professional with that of Windows 98 Second Edition (SE) and Windows NT Workstation 4.0 with Service Pack 6a (SP6a). In the absence of a standard desktop reliability benchmark, ZD Labs created a custom stress test and ran it on each operating system for thirty consecutive days around the clock, or ninety eight-hour workdays. The results of this test are shown below:



I would summarize these results myself but I think ZDLabs' summary speaks for itself:

"While the experiences of individual users may vary from our test

results, the reliability of Windows 2000 Professional was outstanding. It performed continuously and flawlessly for more than ninety business workdays without a single failure. Not only did it not encounter any problems during this extended period of testing, but also the amount of work done was considerably more than that of a typical user.

Although testing with different applications might show different results, based on our testing we conclude that the reliability of Windows 2000 Professional far exceeds that of Windows 98 SE and Windows NT Workstation 4.0."

Although Windows Me was not included in this test, the general consensus among the experts I've consulted with is that Windows Me is a real disappointment. Although Microsoft's marketing machine wants you to think that Me is an upgrade to Windows 98, Windows Me is, as one expert phrased it, "more prone to the blue screen of death and other annoying crashes". Another professional user said, "My systems were actually less stable with Me than they were with Windows 98SE". And a major Windows magazine summed up their opinion of Me's reliability by saying, "Opting for Windows Me is a mistake in any situation". Now, I don't know about you, but that sounds like an operating system worth avoiding to me, especially for trading purposes.

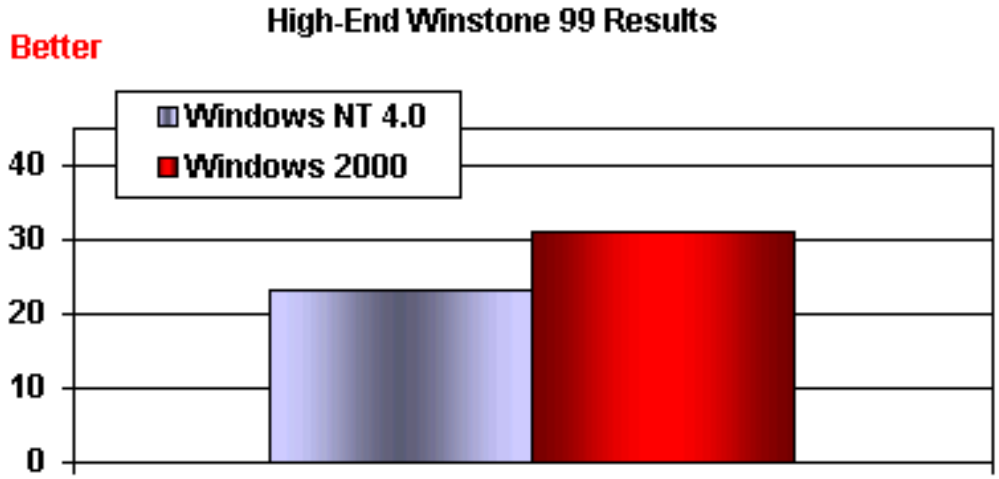
When it comes to reliability, Windows 2000 Professional is the clear winner. But since reliability isn't the only quality to look for, let's advance the two most reliable performers in this category to the final stage of our search for the best operating system.

Speed

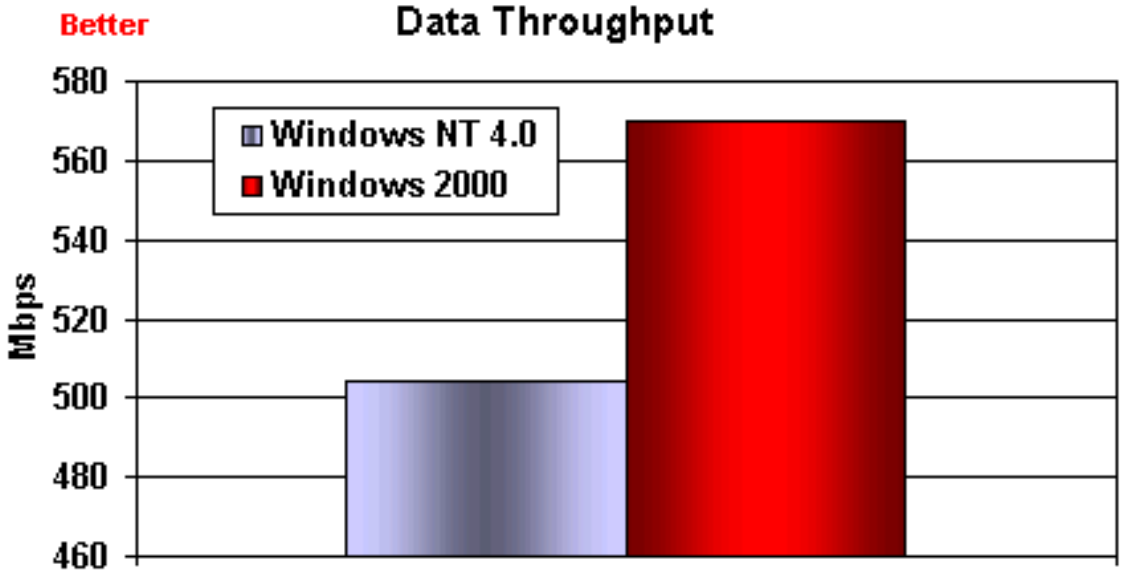
There is no debate as to whether speed is an important issue for day traders. Lagging system performance is clearly something to avoid, as it can cause poor executions, missed opportunities, delayed data and unnecessary losses. Although disk capacity, memory amount, and other external factors can cause an operating system to slow down in a real-world environment, these things can be made equal in a testing lab to determine how one operating system stacks up against another.

IT Week recently put our two finalists -- Windows NT 4.0 Workstation and

Windows 2000 Professional -- against each other using the high-end Winstone 99 workload on identical machines. As you can see below, Windows 2000 Professional significantly outperforms Windows NT 4.0 Workstation.



Although the Winstone 99 results are valuable, they don't take into account network performance. Since traders rely on data feeds from the Internet or satellite networks, it's important to have an operating system that is optimized to handle continuous streams of high-speed data. In a separate test geared specifically for determining network performance, IT Week concluded that Windows 2000 Professional could handle significantly more network data than Windows NT 4.0 Workstation.



Conclusion

Well, I think the choice is pretty clear. With broad compatibility, rock-solid reliability, and great speed, Windows 2000 Professional is the best operating system for traders.

The easiest way to migrate to Windows 2000 is to buy a new machine with it pre-installed. If this is not an option for you, then you will need to do an OS upgrade. Since Windows 2000 has a different underlying architecture than Windows ME, an upgrade is only possible if you currently have Windows 95/98/NT 4.0. Otherwise, you will have to purchase the full version of Windows 2000 and do a new installation.

Having done new installations and upgrades as well, I can tell you first hand that installing Windows 2000 is not the easiest thing in the world to do. In order for Windows 2000 to recognize certain hardware components in your system, you may have to install device drivers and/or BIOS updates manually. Unless you are proficient in this type of work, I don't recommend that you tackle a new installation by yourself. You are much better off paying an expert to handle the installation hassles for you.

For more information about upgrading to Windows 2000, see http://www.microsoft.com/windows2000/upgrade/default.asp

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Screen Space

By Baron Robertson

Screen space is the most important thing to consider when setting up a trading workstation because it directly affects your ability to quickly find and process the information you need to make fast decisions. Many traders try to use one large monitor running at a very high resolution in an effort to get the maximum amount of data onto the screen. This solution requires buying a heavy 21" monitor and running it at a high resolution that can often make small text difficult to read.

A single large monitor does not solve the problem of being able to use multiple applications efficiently. The user interface of applications is designed according to the 4:3 height-to-width aspect ratio of monitors. That's why a lot of display space is wasted when multiple applications are used on one large monitor. This problem is especially applicable to traders because they typically need to run trading software and another application such as a web browser simultaneously. The illustration below shows two 15" monitors compared to a single 21" monitor. Although the two 15" monitors offer the same number of square inches of screen real estate as the 21" monitor does, the smaller monitors provide a much better use of available space.

Trading with a single monitor is like guarding a prison from a guard tower that only has one window. You can't keep your eye on all the things you need to see when your view is limited to one area. To be an effective guard, you need a tower with several windows so you can watch multiple areas of the prison campus at once. Traders use their computers very much like a window

to the markets. In information-intensive environments like stock trading, you need to see as much news, quotes, and charts as quickly as possible. Trying to view all this activity on one monitor is like trying to be the guard in a one-window guard tower. With multiple monitors you can open and view more windows simultaneously, thereby becoming a more effective and efficient trader.

Multiple monitors also offer more display space at a lower cost. While larger monitors have become more appealing to users in information-packed markets such as computer-aided design, 3D animation, and other fields of digital content creation, the increase in demand has not lowered the cost. Bigger monitors cost more money. As a matter of fact, monitor costs increase disproportionately with size. Generally speaking, a 100 percent price increase will buy only a 50 percent size increase.

Multiple monitors offer the added benefit of safety through redundancy. If you're trading using a single monitor and a problem with it arises, your view of the market could be abrubtly halted. This would be a serious problem if you had open positions in a fast-moving market. With multiple monitors, even if one has a problem, you can continue to trade using the other(s).

It's crucial to understand that multiple monitors does not equate to having multiple computers. In fact, having one computer for each monitor is exactly what you want to avoid. I tried to run two computers simultaneously when I first started trading back in 1996. I was using a web browser for research and news on one machine, while my quote software was loaded on the second. I found myself constantly making dumb mistakes, like trying to move mouse #1 when I really meant to move mouse #2.

The real problem came when I started making mistakes that carried greater consequences. For example, I was holding a stock one time when some negative news came out. I immediately tried to get out, but I couldn't. Why? Because I was trying to type my order on the wrong keyboard! As soon as I realized my mistake, I quickly moved to the other keyboard and started over. By the time I entered the order again, the stock had tanked far enough that I could have bought a brand new computer system with the money I had lost. Needless to say, that little incident caused me to rethink my hardware setup.

In the next two lessons, we'll look at the display technologies that are required to build a reliable multi-monitor setup using a single computer.

Video Card

By Baron Robertson

A video card is a computer component that is responsible for sending all outgoing information to a monitor. When you plug in a monitor cable into the back of a new computer, you are actually connecting the cable to a video card that was originally installed in the machine during assembly.

Aside from dedicating a computer to each monitor, there are two ways to implement the use of multiple monitors. The first method is to install multiple video cards in a single machine. This is the cheapest route to take but it has several drawbacks. The biggest problem is that there is no standard configuration that will work for everybody. Adding a second video card is not supported in Windows 95 or Windows NT so this option doesn't even exist for these users. Windows 98/ME/2000 users do have this capability, but each of these operating systems has different requirements regarding which video cards are acceptable. That means you could install multiple cards in a Windows 98 machine, and upon upgrading the operating system to Windows 2000, you would have to purchase new video cards because of incompatibility issues.

The success of a multi-card installation is also dependent upon the hardware configuration of the computer being used. Instead of using a third party video card, some of the lower end machines have their video capabilities built right into the motherboard. Adding a new video card to these machines can be difficult or impossible. I have seen instances where two identical computers had completely different results when adding the exact same video cards to each system simply because the two machines had slightly different BIOS versions.

What I'm trying to convey is that there are many variables involved when

trying to successfully install multiple video cards in a single machine. Unless you have some expertise in hardware installation and troubleshooting, you may find that the hassle involved with this method far outweighs the cost savings.

Another big problem with multi-card installations is that nobody wants to support them. Microsoft doesn't want to support them because most of the problems are related to hardware issues. The video card manufacturers keep their distance because they never guaranteed that their cards would work in a multi-card installation in the first place. And finally, the computer manufacturers don't offer any support either because they don't like supporting systems that are modified from their original configuration with third party hardware. That leaves the end user with the trial and error process of experimenting with various video cards and motherboards in the search of a solution that works properly. Since there thousands of possible hardware combinations, the task of integrating several video cards into a single system can quickly become a nightmare.

Multi-card installations are limited to the number of available slots in your machine. Since most computers only have two or three available card slots, this type of solution is not very scalable. Traders that want to run four monitors or more should not even consider this method.

The best way to add multiple monitors to a single computer system is to install a multi-monitor video card. This is a special type of video card that has been designed from the ground up to control more than one monitor. These cards are typically available in either a 2-port version (shown to the left) or a 4-port version, which allow you to control two, or up to four monitors, respectively.

Although this solution is more expensive than using several video cards at once, there are many advantages that should be noted. A multi-monitor card can be installed in practically any computer in existence, so it can be used by just about anyone. This broad compatibility includes computers with Windows 95/98/ME/NT/2000 as well as systems that use Macintosh, Linux and Unix operating systems. Multi-monitor video products come with specialized software, full technical support and multi-year warranties, which provides some piece of mind regarding performance, reliability and service life. Most

importantly, the installation of a multi-monitor card does not require any computer hardware expertise, so the process can be completed by just about anyone in less than 30 minutes.

No matter which solution you choose, a fundamental understanding of video card terminology is useful for determining the best product for you. So let's take a moment to quickly go over some common specifications and features.

Processor

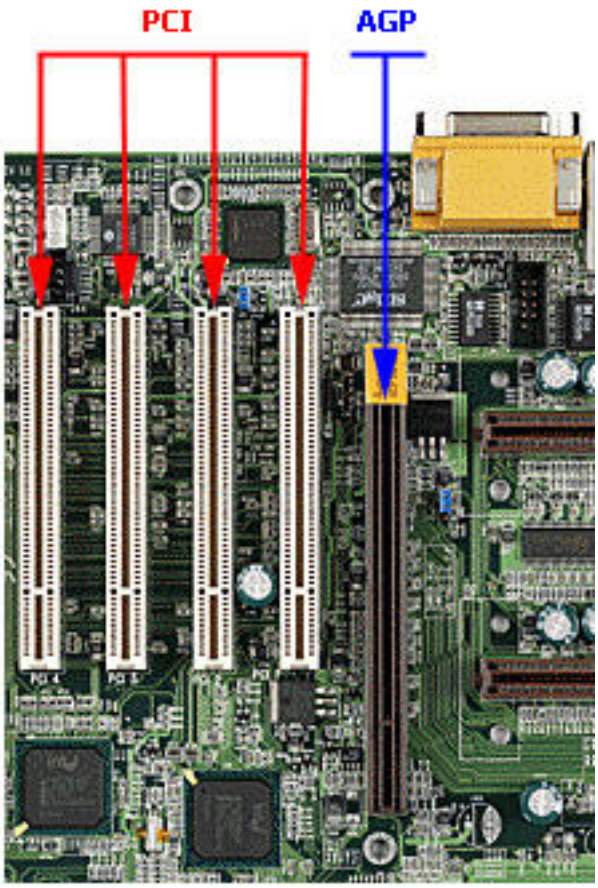
A good video card has its own processor (often called a chipset) that calculates everything related to graphics. This allows your computer's main processor to focus on other tasks like running programs and performing calculations required by the operating system. Most of the on-board processors on video cards today were originally designed to render complicated 3D graphics. Trading software does not produce 3D graphics, and therefore does not push the limits of any modern video card chipset.

Memory

When you start shopping for a video card, you will quickly see that the most advertised feature is how much memory the card has. A common misconception about video memory is that the more you have, the faster your system's video performance will be. In reality, video memory only affects how many colors can be shown at higher resolutions. A video card with 4 MB of memory can display over 16 million colors on a monitor running at 1280 x 1024, which is about at high as most traders go. Today you can't even buy a multi-monitor video card with less that 8 MB of memory, so the whole memory issue is a moot point. The only time that I would specifically recommend a video card with more than 8 MB of memory would be if a trader told me that he also uses his system for graphically intensive tasks like video or image editing at very high resolutions (1600 x 1200 or higher).

Bus

You will also see the terms "PCI" or "AGP" when investigating video cards. These terms refer to the bus type used by the video card and computer system. A bus is simply a common set of wires that connect the components of a computer system together. In order for a video card with a PCI bus to be used, your computer's motherboard must have a PCI slot that the card can be physically installed in. Likewise, an AGP slot is necessary for you to use a video card with an AGP bus. Since the actual dimensions between AGP and PCI slots are different, you can't install a PCI card into an AGP slot, or vice versa. Your computer will probably have multiple PCI slots and a single AGP slot, similar to the one shown here. However, many computers do not have an AGP slot at all so you should inspect your motherboard before you even consider buying a multi-monitor video card with an AGP bus.



From a performance standpoint, AGP is considered to be the faster interface. The problem is that practically all of the performance gains of AGP can only be seen when using 3D applications, so this technology is not of any real benefit to us as traders. Unless you are using your computer for some serious 3D gaming, animation, or 3D modeling, you will not see any measurable gains in video performance by going with an AGP video card. The only true benefit of going with an AGP card is that the AGP slot in your machine would become occupied, which effectively frees up a PCI slot for use by another type of PCI card like a disk controller, sound card, Ethernet card, etc.

Interface

The final feature to look for in a video card is whether it has analog or digital outputs. Most video cards have analog outputs that can control all traditional monitors and some LCD flat panels. However, we live in a world that is swiftly moving from analog to digital technology, so many of the newer video cards and monitors are now equipped with digital interfaces to provide even better picture quality.

You can easily tell if a video card is digital or analog by inspecting its video connector. Digital products use the new DVI connector, while older analog equipment uses the standard VGA connector that we're all familiar with. The DVI connector can come in two types, DVI-D and DVI-I. The DVI-D connector is used strictly for digital transmission, so you can't use a standard multi-monitor video card with VGA outputs to control digital monitors with DVI-D inputs. The second type of DVI connector is the DVI-I version, which can allow the flow of both digital and analog signals. Obviously, the DVI-I connector is best since it allows a video card to be compatible with older analog monitors as well as the new digital flat panels.

When a monitor or video card is called "digital", it doesn't necessarily mean that the product has a DVI interface. There's another type of digital interface called "DFP", which looks similar to a DVI connector but is actually quite different. There are several limitations of the DFP standard that make it less suitable than DVI for the long term. Consequently, the display industry is rapidly accepting DVI as the standard interface for digital components. The reason why I'm bringing this up is because there are still some display products out there with a DFP interface. You should avoid these and purchase only the ones that are DVI-enabled.

At the end of the next lesson, I'll make some video card recommendations that should help you figure out which one is best for your situation.

Monitors

By Baron Robertson

Since most professional traders purchase more than one monitor for their trading desks, the costs involved can be substantial. In fact, it's not uncommon for a trader to spend more on monitors than he does on his computer, chair, and desk combined. As a general rule, monitors should be large, crystal clear, and free of any defects or problems that may cause them to become unreliable or difficult to read.

One thing to remember when investigating monitors is that they don't lose value as fast as other computer system components. Advancements in display technology are still being made, but the industry landscape doesn't change anywhere near as fast as processor or memory technology. So don't be afraid to invest in the highest-quality monitors you can afford, because it's likely that they will outlast your next two or three computers.

Before we dive into the details of monitor types and technologies, I want to encourage you to not forget about the piece of furniture than your monitors will be sitting on -- your trading desk. Many traders mistakenly buy several monitors for their desks before they realize they simply don't have enough space to accommodate them.

Before you start shopping for a bigger display, get out your tape measure and see if you need to buy a new desk first. While you're at it, keep in mind that large traditional monitors are not only wider than smaller ones; they are also much deeper. If you find that you need to purchase a desk, be sure to purchase one that has enough depth to accommodate your monitors plus room for your keyboard or other accessories. The last thing you want is to

buy a shallow desk, only to discover later that your screens are way too close to your face. As a rule of thumb, you should allow at least 18 inches between your eyes and monitors screens to minimize the exposure to monitor radiation and the possibility of eyestrain.

If you plan on purchasing several large monitors, don't underestimate how heavy they are. I know of a trader who decided to add two additional 19" monitors to his existing setup but he didn't have the desk space to accommodate them. So he went out to his local department store and bought a $35 card table as a makeshift desk. Two days later, the entire top caved in and both monitors ended up broken on the floor.

Models that are 17" and larger can weigh up to 60 pounds each, so be sure that your desk has the quality physical construction that will be needed to support them.

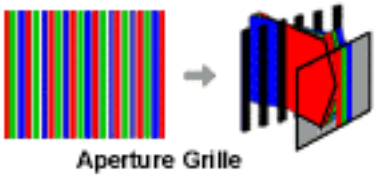
Monitor Types: CRT vs. LCD

There are two primary types of monitors. The first is called a **CRT**, which stands for Cathode Ray Tube. This is what most people refer to as a traditional or conventional monitor. The second and most recent type is called an LCD, which stands for Liquid Crystal Display. This type is often referred to as a "flat panel" because of its shallow depth.

Each type of monitor has its advantages and disadvantages, so I want to give you a brief overview of each. First, let's take a look at CRTs.

A CRT monitor operates very similarly to how your regular television set works. The principle is based upon the use of an electronic screen called a cathode ray tube, hence the abbreviation CRT. This is a mature technology that's been in use for decades.

If you go to your local computer store, you'll see that the glass screens on some CRT monitors are slightly curved in both directions. This type of monitor uses a special tube with curved metal mesh inside called a shadow mask. The major complaint with CRTs that use shadow masks is that their curved glass panels seem to pull in reflections from all directions, making visibility difficult under certain lighting conditions.


Aperture Grille

To get around this problem, some manufacturers use a different type of tube, called an aperture grill. You can tell which CRT monitors have an aperture grill because their glass panels are flat, not curved. An aperture grill is made of ultra-fine metal strips that run vertically from the top of the screen surface to the bottom. The benefit to using this method is that the colors it produces are a little brighter and richer than shadow masks.

The problem with this technology is that thin metal strips don't have the same physical stability as a metal sheet with holes in it (the shadow mask). This means that the metal strips can tend to vibrate. To correct this problem, two or three thin stabilizing wires are run horizontally across the inside of the screen. These eliminate any problems with the metal strips moving around, but they cause an unfortunate side effect: the appearance of very faint lines where the stabilizing wires are. They are most apparent when viewing a full screen of information with a white background such as a web page or Microsoft Word document.

Although most of the marketing buzz these days revolves around the flat CRT monitors, I can tell you first hand that these monitors are more fluff than substance. Although the colors are a little richer, those horizontal lines that I mentioned are really quite annoying. Also, I have found that images and text tend to be a little distorted and and fuzzy around the edges of a flat screen CRT. And the bigger the monitor is, the more noticeable the distortion is. From what I've been told, this is an optical problem that's a direct result of making the glass flat.

From a price perspective, the flat CRTs tend to be more expensive than similar models with shadow mask tubes. Although there is no doubt that both technologies have attained success in the market place, think twice before buying a flat screen CRT, as the few benefits are not justified by the price premiums they command.

There are two important features of all CRT monitors that you need to understand before you decide on a specific model. The first is called **refresh rate**.

Refresh rate refers to the speed a screen is repainted or refreshed. The exact refresh rate of a monitor has two components, the horizontal scan rate and the vertical scan rate. The vertical scan rate, which indicates how many times

per second that a screen is repainted from top to bottom, is much more important because it is so much slower that its horizontal sidekick.

As the vertical scan rate drops, you'll notice an annoying flicker beginning around 60Hz. Flicker is something you want to avoid when using CRT monitors because it causes eyestrain.

Symptoms of eyestrain typically include:

- headaches, neckaches
- blurred vision
- soreness of the eyeball or eyelids

The minimum standard for a flicker-free display is 75Hz, but I recommend you crank up the refresh rate to 85Hz, as there is a noticeable increase in screen quality at that level. As you are shopping, the monitors you purchase should have a vertical scan rate of at least 85Hz at the resolution(s) you plan to use.

Another important specification to consider is **dot pitch**, which refers to the size of the smallest dot (pixel) your screen can display. Dot pitch is expressed as a fraction of a millimeter, such as 0.24 mm or 0.30 mm. The smaller the dot pitch, the more sharp and detailed the image. If you run across two monitors where one uses a .26 mm dot pitch and the other a .31 mm dot pitch, you can usually feel pretty comfortable that the first one is going to give you a better quality image. However, you must make sure that the two monitors you are looking at are in the same category. In other words, don't compare the dot pitch of a shadow mask CRT with the dot pitch of a flat screen CRT. And you wouldn't compare the dot pitch of an LCD monitor with any type of CRT display. To do so would be comparing apples to oranges, as the technologies involved with these types of monitors are totally different.

Liquid Crystal Display Monitors, or LCDs, use two panels of glass with a thin layer of liquid crystal solution sandwiched between them. When a charge of current passes through the layer of liquid crystals, they twist, sort of like shutters, to prevent or allow light to pass through. Unlike CRTs, there are no space-consuming vacuum tubes or electron guns needed for LCDs to create crisp, vibrant images. This

yields a monitor that's about 1/6th as deep and 60% lighter than a conventional CRT display.

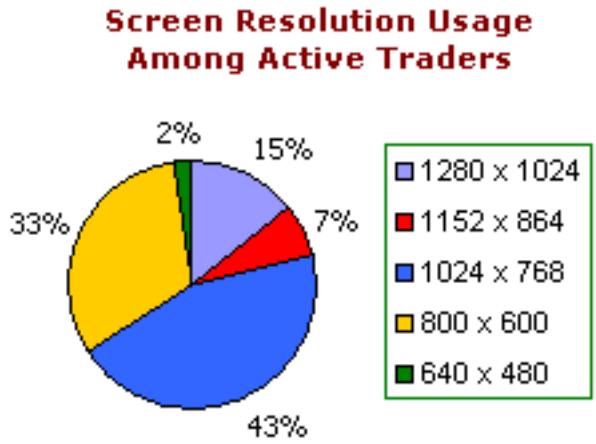
LCDs are also very efficient. If you were to compare the power requirements of a 15" CRT with that of a 15" LCD, you would find that the CRT monitor needs about twice as much power to operate. That additional power means additional heat, which can be really aggravating sometimes.

I used to have several CRTs and a couple of computers running around the clock in my home office. That equipment produced so much heat that it made the room about ten degrees warmer than the rest of house. I used to get so annoyed because in order to keep my office a normal temperature, the rest of the house would have to feel like an igloo.

From a screen quality standpoint, LCDs have virtually no flicker at all so eyestrain is not a concern. Still images are extremely bright and crisp, and text is significantly sharper than the text displayed by CRTs.

The radiation produced by LCDs is very small so you don't have to worry about those irritating high-pitched tones that can be heard from CRTs sometimes. You know, the ones that make you feel like your going to start glowing or get some sort of cancer if you sit too close to the screen.

So far, LCDs sound perfect, right? Well, there are a few disadvantages that you should be aware of. The most obvious one is cost. The lowest price I've seen on a decent quality 15" LCD has been around $500. Shoot, you can buy two 17" CRTs for that price. LCDs are more expensive because nobody has figured out how to manufacture these high-tech panels in a really efficient manner. For every one panel that gets produced, one gets thrown in the trash because of a random defect. Only until the manufacturing process gets more fine-tuned will we see LCDs reach the price domain of CRTs.



The second drawback of LCDs is their inability to run at multiple resolutions without a decrease in quality. CRTs can display a variety of resolutions up to a published maximum without any degradation in the display quality. LCD monitors, on the other hand, work properly only when operated at their "native resolution". Resolutions lower than the published native resolution can be displayed but the image quality is really poor. If you need to toggle back and forth between multiple resolutions for whatever reason, then stay away from LCDs because you will be very disappointed otherwise. And it goes without saying that you should definitely know what the native resolution is for any LCD in order to determine whether it's suitable for your vision before you purchase it. The chart to the right reflects the resolutions used by our site visitors over the past few years. As you can see, the most popular resolutions are 1024 x 768 and 800 x 600. Most LCDs have a native resolution of 1024 x 768 or greater, so if you have vision problems, you'll probably be better off going with a large CRT monitor that can be adjusted to 800 x 600.

LCDs have one more drawback, but this one is pretty small. Motion video reproduction on an LCD is not as smooth as it is on a CRT monitor. This problem exists because the liquid crystals in the panel have a hard time keeping up with the ultra-fast display changes that are required when displaying moving images. Don't get me wrong. The quality isn't awful by any means but the movement between frames is noticeably less smooth than a CRT.

As you're debating which size monitor(s) you should purchase, be aware that screen sizes are measured diagonally. As if that wasn't weird enough, CRT manufacturers have confused the matter even more by measuring their screens before they have been put into their plastic casings. That means there is a portion of the screen that is covered up by plastic. On many models, this reduces the viewable area of the screen significantly by ½ inch, all the way around. Let's say you buy a 17" monitor that has 3/8" of the screen covered by plastic. Multiply 3/8" by four sides and the result is 1 ½ inches of unusable screen space. The effective viewable area on your monitor is now 15 1/2 inches (diagonally).

Viewable area calculations do not apply to LCD panels. If you see an LCD monitor listed as being a 15" display, that's what the final diagonal measurement is. There's no subtraction necessary. The reason why I'm bringing up this issue is because many people make the mistake of thinking that a 15" LCD monitor has the same screen size as a 15" CRT. But nothing could be further from the truth. A 15" LCD is approximately the same size as a 17" CRT, so factor that into the equation when you're out shopping for monitors and/or comparing prices.

Digital vs. Analog

Since a CRT is an analog device, it is designed to accept analog signals from a computer's video card. The only problem is that a video card is technically digital, not analog. To get around this issue, engineers outfitted video cards with components that convert all outgoing signals into an analog format that CRT monitors can understand.

This setup worked fine until LCDs came along. Even though LCDs are digital devices, they could not be introduced as such because all the video cards up until that point were sending out analog signals. So what did the manufacturers do? They put a converter inside the LCDs to convert incoming analog signals into a familiar digital format. This enabled anyone with a standard video card to upgrade to an LCD monitor. It didn't take long for everybody to realize that this solution wasn't all that great. A digital signal, which is natively generated in the video card, is converted into an analog signal for transmission, only to be converted back into a digital signal again inside the LCD display. This double conversion not only increases hardware costs, it also contributes to a loss of display quality.

Nowadays, the display industry is in the process of migrating to all-digital technology. Having a digital signal from start to finish means that images will be more stable, and that monitors will require no tweaking or configuration settings. Many monitors are now shipping with both digital and analog interfaces, and some video cards are doing the same. Although several types of digital interfaces have been introduced over the years, the emerging industry standard is "DVI", which stands for "Digital Visual Interface". For compatibility reasons, the first specification you should check when shopping for digital monitors or digital video cards is that they are DVI compliant.

If you are starting from scratch and you have a decent budget to work with,

there's no need to even consider any video cards or monitors with analog interfaces. The best setup is a digital multi-monitor video card with DVI outputs that controls digital LCD monitors with DVI inputs. This combination of next-generation components will provide the best possible display quality. And since the costs of digital components have come down recently, you'll find that standard multi-monitor cards and analog LCDs are only a little bit cheaper. The best part about investing in digital products today is that they will easily be compatible with any future components that are introduced within the next 10 - 15 years.

Questions & Answers

Q. My computer came with a 17" CRT monitor but I want to replace it with an LCD. For now, I do not want to replace the video card. What type of LCD should I buy?

A. Since you have a 17" CRT, you should be looking for a 15" LCD if you want roughly the same amount of screen space. You could go with an LCD that strictly has analog inputs, but the best choice would be an LCD that has both analog and digital inputs. This will allow you to continue using your existing video card while giving you the ability to use your new LCD with any future systems that may come with a pre-installed digital video card.

Q. I'm currently using a 19" CRT monitor and I want to add another 19" monitor exactly like the one I have to my existing system. I'm basically looking for the cheapest solution I can find. So with that in mind, what would be the best video card for me?

A. You should go with the Appian Hurricane, which is a standard dual-monitor video card with analog outputs.

Q. After measuring my desk, I discovered that I only have

room for three 19" CRTs. What solution exists for driving three monitors?

A. For triple-monitor configurations, the best video card would be the Appian Jeronimo Pro, which is capable of driving up to four analog monitors. The only downside is that you still have to pay for that fourth monitor capability even though you won't be using it.

Q. I bought two 15" LCDs from EBAY but after receiving them, I discovered that one is analog and the other is digital. What should I do?

A. You need the Appian Gemini DVI-I, which is a flexible dual-monitor card with DVI outputs that can drive two digital monitors, two analog monitors, or a combination of analog and digital.

Q. I just purchased a dual-processor machine with two hard drives, 1 GB of RAM and Windows 2000. I want to build a four-monitor system for trading and I'm willing to spend whatever it takes to get the best setup possible. What video card and monitors would be best?

A. You should purchase four digital LCDs, preferably 16" or larger, with DVI inputs. To drive those, you'll need an AppianX 4-Port video card. The AppianX is a high-performance video card with DVI outputs that is capable of driving four displays at extremely high resolutions. This is the best setup money can buy.

Backup Power

By Baron Robertson

Computer users fall into one of two categories: Those who have lost data or hardware because of a power problem, and those who are going to. Having experienced power-related computer problems more than once, I can tell you with certainty that being prepared for these unwanted situations is an aspect of setting up your trading workstation that you should not overlook.

IBM did a study recently that showed a typical computer is exposed to more than 120 power problems per month. The effects of these problems range from the subtle-keyboard lockups, hardware degradation-to the dramatic-complete data loss or permanent hardware failure.

Computers contain sensitive electronic components that are easily affected by fluctuations in voltage. A momentary power glitch of less than a second is all it takes to cause a loss of data. Should a power problem strike while your computer is saving a file, you could lose previously written files or your entire hard disk could be wiped out.

Since day trading requires the daily use of computers, monitors, and other hardware, running into power problems is an almost inevitable occurrence. But unlike a casual computer user, a day trader has much more to

Common Power Problems

Brownout - A decrease in voltage, due primarily to high demand for electricity during peak hours. It can cause unexpected system crashes and keyboard lockups.

Blackout - A total loss of power, causing a loss of all data in system memory. It can also destroy the file system on a hard disk.

Spike - A dramatic increase in voltage caused most often by a nearby lightning strike. It can cause catastrophic damage to computer hardware.

Surge - A short term increase in voltage, typically lasting 1/120th of a second. Surges are usually caused by switching off large devices like washers or dryers.

Noise - Interference caused by many factors such as lightning, radio transmitters, or large

lose than just the data on his local machine. If a power problem strikes, your computer could be rendered useless while you're in the middle of managing open positions. If you are unable to restart it and get back online immediately, it could cost you thousands of dollars or more in losses.

industrial equipment. Noise can introduce errors into computer programs and data files.

The best way you can prepare for power problems is to invest in an uninterruptible power supply, commonly referred to as a UPS. In the event of a voltage decrease or power outage, this device detects the problem and instantly supplies your computer with the electricity it needs to run normally. So even though the building you are in may not have any power, your computer will run as if everything is normal.

A UPS should not be confused with a surge protector. While both can handle surges, only a UPS can provide reliable backup power during brownouts or blackouts. The other difference between them is cost. You can pick up a surge protector for less than $20, but a high quality UPS that can handle a variety of power problems will set you back between $200 and $600. UPS units aren't cheap, but considering how much you can lose without one, I'd say they are a wise investment.

The length of time that your equipment can stay supplied with power is directly related to the size of your UPS. Generally speaking, you want to purchase a UPS that is large enough to keep things running smoothly for at least 15 minutes. That should give you enough time to exit any risky positions and shut your system down in a safe manner.

UPS units come in a variety of shapes and sizes. The size that is right for you will depend primarily on the complexity of your computer system. To save you some time, I've put together a table of three common computer configurations used by traders and the UPS that works best for each (assuming 20 minutes of uptime). I have factored in an overhead allowance of 30%, which means you can add a few additional peripherals to the base systems I have shown below without having to move up to a bigger UPS.

System Configuration	Recommended UPS

• Single Processor Pentium III Computer • Powered speakers • 19" Monitor • Inkjet Printer ---------- **Total Load : 250 Watts**	**Back-UPS Pro 650** **$299.99**
• Single Processor Pentium III Computer • Powered speakers • Two 19" Monitors • Cable/DSL Modem • Inket Printer or Fax Machine ---------- **Total Load : 389 Watts**	**Back-UPS Pro 1000** **$454.99**
• Dual Processor Pentium III Computer • Powered Speakers • Four 19" Monitors • Cable/DSL Modem • Inkjet Printer or Fax Machine ---------- **Total Load : 609 Watts**	**Back-UPS Pro 1400** **$584.99**

Internet Connectivity

By Baron Robertson

Bandwidth is without a doubt the most overlooked aspect of a reliable trading setup. The ironic thing is that it's the most important. You can have the best workstation money can buy but if your connection to the Internet is slow, your quotes will be delayed and your trading will suffer. I know a trader who dropped $10,000 on a quad monitor workstation, but connected it to the internet using a 28.8k modem. And he wondered why his 24 chart windows were not updating properly!

When it comes to trading, speed is king. Those who are able to send and receive real-time data without delay are the ones who have an edge over the thousands of slower participants. Be sure you investigate all the connection methods discussed below and go with the fastest one that's both available and affordable in your area.

56k Modems

56k modems that use the V.90 standard over existing phone lines are standard equipment in PCs nowadays. Theoretically, 56k modems can transmit data at speeds up to 56kbps (kilobits per second), but you can expect to achieve real-world speeds between 35 - 50 kbps, depending primarily on the condition of your phone line. You should be aware that the speeds just mentioned are for downloading only. Maximum upload speeds are usually around 28.8kbps. This is not usually a problem since a traders generally upload small pieces of data such as usernames, passwords, orders, etc.

For the most part, 56k modems work fine, but they are very limited in the amount of data they can transmit. If you have too many applications open for your modem to handle, you will undoubtedly have problems. For example, if you have a real-time news feed, five Level II screens, five intraday tick

charts, and several quote pages all operating at once, your modem will have a problem keeping up. Therefore, the timeliness of your quotes and the accuracy of your order executions will depend largely on you keeping the amount of data being requested to a minimum. This is achieved primarily by using simple quote layouts in your trading software. By simple I mean one Level II screen, two intraday charts, and a basic quote page containing no more than 20 stocks or indices.

The best thing about using 56k modems is their low cost of operation. 56K modems will work with the same phone line you're currently using, so no special equipment or lines are necessary to get up and running. The main costs involved are the phone line charges from your local telephone company and the monthly fee your Internet Service Provider charges you for dial-up internet access. Once a 56k modem is operating online, the phone line it is using can't be used for voice calls. Therefore, you should consider getting a second line installed if you still want to place or receive calls while you are trading online.

In order to minimize the potential for data delivery problems, you should ask your quote provider which ISP they recommend. If your quote provider does not have a specific recommendation, your internet access account should be with a national "Tier 1" ISP that operates its own internet backbone, not with local sub-provider. Some popular national ISPs that offer 56k access are Earthlink, UUNET, and AT&T.

You should also consider having a secondary internet account as a backup in case you experience any connection problems with your primary ISP during trading hours. Many traders have their second account with a free ISP such as NetZero or Juno. These services are free because they display small advertisements in a non-removable window for as long as you are connected online. Although somewhat annoying, most traders consider the ads to be worth the piece of mind that having a backup ISP brings.

ISDN

ISDN, which stands for Integrated Services Digital Network, is a system of digital phone connections which has been available for over a decade. For the individual user, ISDN is available in speeds of 64kbps and 128kbps. A 128kbps line is approximately 3 to 4 times faster than the real-world speed of today's 56k modems. ISDN is a digital connection, which means that it is

constantly connected and thus eliminates the need for dialing up to an Internet service provider like you must do with a standard phone modem. Probably the most unique feature of ISDN that you can place a phone call and access the Internet on the same line simultaneously.

There are three basic cost components to an ISDN line: setup fee, monthly fee, and line fee. All vary widely from state to state, meaning that the actual cost of ISDN really depends on where you live. The setup fee and monthly fee are comparable to the costs of setting up a standard phone line. It's the line fee that's the killer. A line fee is a per-minute charge for the actual line usage and it's typically the fee to consider most when looking into ISDN. The good news is that some ISDN vendors don't charge line fees at all. The bad news is that if your local ISDN provider does indeed charge a line fee, the cost of ISDN service may run several hundred dollars per month or more (assuming you'll be online each trading day during market hours).

The feedback I've received most from traders is that ISDN is a real hassle to set up considering its speed isn't near as fast as other high speed services requiring the same basic installation charges. Even though it uses the existing phone lines in your home, ISDN requires special equipment on your end that must be purchased, installed and configured initially. This equipment can cost as much as $400. If your current Internet service provider is not compatible with ISDN, then you must switch to one that is (which means additional setup hassles, a new email address and more setup fees). Generally speaking, ISDN should only be considered if no other high-speed services are available in your area.

ADSL

ADSL stands for Asymmetric Digital Subscriber Line, and like ISDN, this technology uses existing copper phone lines to transmit digital data at very high speeds. You can use the Internet and talk on the phone simultaneously and the connection is always on. However, when comparing the speed of ADSL versus ISDN, there is no contest. ADSL can reach average speeds of 1.5 Mbps (megabits per second), which is 10 times faster than ISDN and over 25 times faster than a 56k modem.

ADSL, as the name suggests, is asymmetric - providing more downstream bandwidth than upstream bandwidth; about a 10-to-1 ratio. That means you'll be able to receive data much quicker than you'll be able to send it. As I

mentioned ealier, the average trader sends very little data upstream, so this limitation is not considered to be a problem. The only major drawback of ADSL service is that subscribers must live within 3 miles of a phone-switching station, commonly known as a CO, or Central Office. Within a given ADSL service area, those who live closest to the CO will have the greatest download speeds (up to 7 Mbps).

Like ISDN, ADSL requires special hardware and the cost varies dramatically depending on where you live. Once you get past the initial equipment fee ($199) and installation fee ($99), you'll be billed at a flat monthly rate ranging from $40 - $250 per month. For most traders, this is acceptable considering the dramatic improvement in speed over 56k modems and ISDN. If you're interested in subscribing to ADSL or ISDN service, you should contact your local phone company to see if it's available in your area.

Cable Modem

A "Cable Modem" is a device that allows high speed Internet access through a cable TV (CATV) network. That's right, the same cable line that provides dozens of channels to your television can also send data back and forth between your personal computer and the Internet. This technology is referred to as broadband technology and its users can expect to have download speeds from 500kbps - 3 Mbps. The biggest advantage that cable modems have over ADSL is that you don't have to live within a certain distance of your service provider. So if you are currently a subscriber to cable TV, you are eligible to receive cable modem service (assuming it's available in your area).

Most cable modems are external devices that have two connections, one to the cable wall outlet using CATV coaxial wire and the other to your computer through a standard 10Base-T Ethernet card and twisted-pair wiring. Cable operators are typically charging between $40 and $60 per month for the service, which includes cable modem rental and unlimited Internet access. You can also expect to pay a one-time installation fee of $99 - $199 to cover the cost and installation of a networking interface card (NIC card) in your home computer, splitting and running the cable wire to your home computer, and the configuration of any necessary software.

Every trader I've ever talked to with cable modem service loves it. However,

like ADSL, the main problem with broadband cable service is the lack of availability throughout many parts of the country. This is due primarily to the fact that cable companies must invest millions of dollars and years of work to update their networks just to provide this service. Although many cable companies have already updated their systems and are currently offering cable modem service, plenty of others are not yet ready. To find out if cable modem service is available in your area, you should contact your local cable company.

Even if ADSL or Cable modem service is available in your area, I still recommend that you maintain a separate phone line and a tradtional dial-up internet account as a low-cost backup. Although broadband services provide the greatest speed, their networks can still suffer from unpredictable events such as cable cuts, power outages, or equipment failures. So it's a good idea to have a spare connection to ensure that you won't be shut out of the market if there's a disruption in your broadband service.
