

The Digital viking



Twin Cities

PC USER GROUP

NEWSLETTER

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*TC/PC Exists to
Facilitate and Encourage
the Cooperative Exchange of
PC Knowledge and
Information Across
All Levels of Experience*

October 2026

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General Meeting

Tuesday, October 13, 2026

7:00 PM

How Do Inkjet Printers Work

And

HP Printers Blocking non-HP Ink Debacle

Via Zoom Only

At this month's meeting we will take a look via webinar at some printer-related topics. We will watch a video explaining the mechanics behind inkjet printers and then take a specific look at Hewlett Packard and the major role that ink cartridge sales play in the company's bottom. We will be introduced to the mastermind behind ink cartridge sales and recent moves by HP to disable printing on machines using non-HP ink cartridges and look at some suggestions for fixing that issue. If you have been a victim, bring us your story. [Thanks to Curt Trout for the topic suggestion]

Note: All TC/PC Meetings and SIG Groups will be virtual until further notice. Visit tcpc.com for info.

Tech Topics with Jack Ungerleider via Zoom at 6pm before the General Meeting.



TC/PC is a
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Application form inside back cover

The Digital Viking

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Multiple insertion discounts available.

Contact Sharon Walbran at: SQWalbran@yahoo.com

Deadline for ad placement is the 1st of the month prior to publication. All rates are per issue and for digital or camera-ready ads. Typesetting and other services are extra and must be requested in advance of submission deadlines.

Payment must accompany order unless other arrangements are made in advance. Place make checks payable to: **Twin Cities PC User Group**

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Meets once or twice per year. All members welcome to attend.

Visit www.tccpc.com for meeting details.

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Editor Sharon Walbran

Wi-Fi Speed Can Make the Difference

By Phil Sorrentino, Contributing Writer

May 2026 issue, The Sarasota Technology Users Group Monitor

<https://thestug.org/>

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Things like Internet Service Provider data speeds and Wi-Fi speeds combine to determine how happy you will be with your internet communications experience. For a good experience, usually the faster the better. The Wi-Fi speed of each component in your data communications setup will determine the overall communication speed. Fortunately, Wi-Fi speed has improved a lot over the last few years.

As you may remember, Wi-Fi is defined by the IEEE 802.11 standard, a set of protocols for wireless local area network communication. This wireless capability has allowed us to access the internet using any device: computer, tablet, or smartphone, from any place where Wi-Fi is available, like any corner of an office or anyplace in an airport or all around a shopping mall. Basically, it allows us to access the internet without being tethered to a modem/router via a wired (Ethernet) connection. (Hooray for wireless, its inventor, Nikola Tesla, and microelectronics. Though some may disagree and remember that Marconi usually gets the credit for inventing wireless communications.)



Wi-Fi Icon

The 802.11 standard was established in 1997 and has evolved over the years. The initial version laid the groundwork, and subsequent improvements have significantly enhanced wireless communication speeds and capabilities. Each subsequent version has improved the capability by increasing speed/or providing higher bandwidth, or introducing more capable or efficient modulation schemes. (Modulation is the process of adding information to a carrier frequency.) Way back in the 1990s, all our internet communication was over wired Ethernet connections. The first portable computers with Wi-Fi capabilities started appearing in the late 1990s. One of the earliest was the Apple iBook, introduced by Steve Jobs in 1999. This laptop featured built-in Wi-Fi, allowing users to connect to the internet wirelessly. The technology quickly gained popularity, and by the early 2000s, Wi-Fi became a standard feature in many laptops and other devices. Now you wouldn't even think of buying a laptop, tablet, or smartphone without Wi-Fi capability; in fact, you probably couldn't even find one without that capability. You might not need Wi-Fi on a desktop computer if it will be installed in a location where a wired Ethernet connection is readily available. One might use a wired connection because Ethernet may offer faster data transfer rates than Wi-Fi and is generally more secure, being less susceptible to interference and hacking attempts.

Communication speed basically determines how fast your device can communicate with another device. Wi-Fi technology itself has evolved significantly since its inception, with various generations improving speed, reliability, and security. Today, Wi-Fi is an integral part of our daily lives, connecting us at home, work, and even on the go. The earliest version of the wireless standard that most of us experienced, around 1999, was 802.11b, which supported a speed up to 11 Mbps

(Megabits per second) in the 2.4 GHz frequency band. Also in 1999, the 11a version was in use, supporting higher speeds up to 54 Mbps, but only in the 5 GHz band. Although the 2.4 GHz band was limited to only 11 Mbps, it seemed to get the most attention from equipment developers. Both the 2.4 GHz and 5 GHz bands are unlicensed, but the 5 GHz band has certain restrictions that may have made it less desirable initially. Around 2003, the speed of the 2.4 GHz band was increased with the release of the 11g version, which supported speeds of up to 54 Mbps, and was backward-compatible with 11b. Around 2009, 11n was released, increasing speeds in both the 2.4 GHz and 5 GHz bands to 450 Mbps. This was accomplished with a new technology called MIMO, which stood for Multiple Input Multiple Output. 11g is now also known as Wi-Fi 4. The 11ac version, released around 2013, increased the speed of the 5 GHz band to up to 1.3 Gbps, depending on the number of antennas employed. 11ac is now also known as Wi-Fi 5. 11ax, also known as Wi-Fi 6, was introduced in 2020 and can deliver speeds of up to 9.6 Gbps in both the 2.4 GHz and 5 GHz bands under ideal conditions. Additionally, Wi-Fi 6E can also utilize another frequency band at 6 GHz, if needed. The latest version, 11be, also known as Wi-Fi 7, can deliver speeds of up to 30 Gbps. All 802.11 versions are backward compatible, meaning that hardware and software built for a particular version will work with devices that support any prior version of the standard. However, the communication speeds will only reach the speed supported by the earliest standard involved. (i.e., if a device supporting the 11ax version is communicating with a device supporting the 11b version, the communications speed will only be 11 Mbps, even though the 11ax can support many Gbps.)



OOKla Speed Test Icon

Data communication speed is determined by the 802.11 standard supported by the devices involved. Keep in mind that data usually goes in both directions. Transmitting data to a server on the internet is typically called “uploading,” and receiving data from a server is called “downloading.” The speed provided by your Internet Service Provider will affect the communications speed you can expect. Note that the upload and download speeds may be different. In fact, because of the technology provided by Spectrum, the quoted communication speed is usually the download speed, and the upload speed is typically much lower. (Also, keep in mind that communication speed on the Internet can vary depending on other activities in your area (because we all share the available bandwidth). You can test the speed of a particular setup by running a Speed Test from the device in question. OOKla Speed Test is an app that can be downloaded to your computer, tablet, or smartphone in order to get an idea of the speed that you can expect. Speed Test will give you an idea of the upload and download speeds you are experiencing at that time with your setup. If you use Speed Test on a device that is communicating over Wi-Fi, you will get the Wi-Fi hardware and software in your device and in your router into the results. So, like a chain, where the chain is only as strong as its weakest link, the communication speed will be only as fast as the lowest speed supported by the setup. If the service from your provider is very low, you will have very low communication speeds. If your router supports 11ax speeds (Wi-Fi 6) and your device only supports 11b speeds, your communication speed will also be very low. So, the speed of communication may determine how happy you are with your communications session. Digital Communications has many factors, and the cause of slow communications might be difficult to determine.



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Representing Continuous Data On a Computer

By Joel Ewing, President Bella Vista Computer Club

Bits & Bytes, August 2026

<https://bvcomputerclub.org>

contact via: <https://bvcomputerclub.org/officers>



Computers store data numerically with values having a finite number of digits, bits, or precision. Such representations are called "digital". This means that for any measured physical property and a given computer representation of the measurement, there is a fixed maximum on the number of discrete states that can be represented, and only an approximate representation is possible if the true value does not exactly match one of those states.

Most of the properties that our senses perceive in the world – the color and intensity of light, . temperature, pressure, distance and size of things, the frequency and intensity of sounds – we interpret as being continuous. We sense changes that seem continuous with no perceived jumps. Trying to represent such properties to a computer by values that progress in discrete jumps seems unnatural. Properties that are continuously variable are also classed as "analog".

Yet every time we are forced to quantify what we observe, our measurements are always discrete – limited by the precision of our measurement tools, with results recorded as some fixed number of numeric digits. If the precision is high enough, we can't perceive the transition from one state to the next as a jump, and the mind may still perceive a signal derived from a discrete digital representation as continuous.

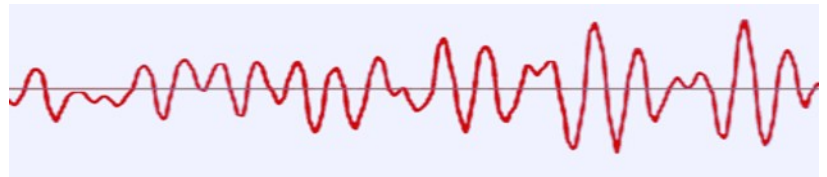
Computer user interfaces are forced to deal with representations of analog data when dealing with audio input/output, video input/output, and images.

Audio Analog Signals

An analog audio signal is a mix of many waves of different frequencies and amplitudes. The range of human hearing roughly spans frequencies of 20 Hz to 20,000 Hz. The frequency range of the conversational human voice is concentrated in the 93 Hz - 238 Hz range. The frequency range for notes on a 88-key piano span from 27.5 Hz to 4,186 Hz, but the mix of higher frequency harmonics present with those notes is what gives different instruments in an orchestra their unique sound.

Analog audio signals are approximated digitally by a series of numbers, representing the amplitude of the signal sampled at regular intervals of time. If the number of digits used to represent each value is large enough and the samples are taken at short enough intervals the original analog signal can be re-created with acceptable accuracy. The sampling frequency must be at least twice that of highest frequency to be captured, and higher than that to minimize distortion and noise.

The sampling frequency affects the frequencies present in the re-created analog signal. The number of bits per sample affects the dynamic range and noise in the re-created signal. The figure on the right illustrates how an analog



¹Our current understanding of atomic and quantum physics [imply](#) that things we think of as "continuous" are in reality discrete, just at too small a scale for our senses to perceive.

²Propagated in air as variations in air pressure over time, or in an electrical circuit as variations in voltage over time.

³Usage of Hz (Hertz) replaced "cycles per second" with the creation of the International System of Units in 1960.

signal may be re-created from a digital representation, both before (abrupt steps) and after (smooth curve) high-frequency artifacts created by the sampling are filtered out.

Conversations can be handled with adequate fidelity with only 4K samples/sec and 16 bits (65,536 amplitude levels) per sample, or $4K \times 16 = 64K$ bits/sec. This is why telephone companies chose 64 Kbps channels when they began converting all long-distance service to digital transmission in the 1960's. Unlike an analog signal where the repeated amplification required for long distance transmission introduces noticeable noise and distortion, a digital signal that can be recognized can be repeated and rebroadcast exactly, without adding any noise or distortion.

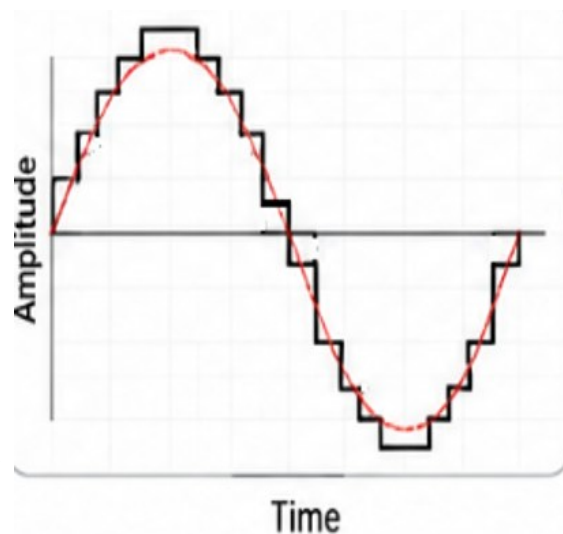
Music CDs use a 44.1 KHz sampling rate and 16-bit sample values. That can at least partially capture frequencies up to 20 KHz. The ability to accurately reproduce the original waveform without loss or distortion decreases as the frequency increases, but since human hearing sensitivity also decreases with frequency, many people find the quality of CDs perfectly acceptable. Serious audiophiles insist they can tell the difference and still adhere to analog audio on vinyl records or audio tape.

The raw data for CD audio amounts to about 635 MB of data for 15 minutes of music, which is about the capacity of one digital CD. This raw data format, saved as a computer data file, would be a file type of .WAV, which retains the data in uncompressed format. Various compression techniques can reduce the size of a music file, sometimes drastically. The popular .MP3 audio format can achieve compression ratios of 100:1, but is "lossy", which means there is some additional loss in sound accuracy when the data is uncompressed. Free lossless audio compression formats like .FLAC lose no accuracy, but achieve much lower compression ratios of only 2:1.

Professional audio processing may use much higher sampling rates and bit depth for greater recording accuracy. Modern PC motherboards and monitor ports can support digital/analog audio conversion at bit depths and sampling rates at the CD standard of 16-bit/44.1 kHz and better; but if the sampling is done by an external USB device, like a webcam, it all depends on the external device. My current desktop hardware under Linux can support stereo playback at 24-bit/192 kHz, and recording at 24-bit/96 kHz from the analog audio-in port. The behavior under Windows could be different, depending on capability of the device drivers supplied by the Operating System. My desktop external USB webcam audio is limited to 16-bit/48 kHz. My current laptop is less capable, limited to 16-bit/48 kHz on the audio-in port and 16-bit/16 kHz from the internal webcam mic. That means any music recorded using my laptop built-in microphone would be considerably less quality than a typical music CD. An easy circumvention to improve live music recordings on my laptop would be to use my desktop's external USB webcam mic to make better-quality 16-bit/48 kHz digital audio.

Digital Images

Images captured by a film camera are limited in resolution by the quality of the camera lenses, the skill of the photographer in getting correct focus and avoiding camera movement, and in some cases by the physical limitations or grain of the film media. With the films and cameras I have used in the past, the film has never been my limiting factor. You can represent an image that appears continuous by a discrete number of squares of a single color, provided the squares are small enough.



Digital to Analog Signal Conversion



The images above are from a hi-res scan of a 35mm slide I took of the NASA rocket transport vehicle in 1995. They show the result of increasing zoom factors on a portion including the top of a fence pole in the image. The slide when projected appears reasonably sharp, but if you zoom in enough you can see that the image is actually made of many individual squares (called pixels), and each pixel is a solid color. The original image is 3095 pixels wide by 2072 pixels tall, for a total of 6,412,840 pixels. The color of each pixel is represented by the intensity of the three primary colors, red, blue, and green, with each color intensity ranging from 0 to 255, represented by three bytes of storage, also called 24-bit color. This can represent over 16 million distinct colors, so gradual color shifts too slight to be perceived by the eye can be accurately represented. The raw size of this image representation would be about 19.2 MB, but there are very efficient compression techniques for images that can greatly reduce the storage requirements. This image was stored as a .JPG compressed file type using only 962.3 KB.

Scanners convert physical documents into digital images by either moving a scanning bar across a document on a flat surface, or feeding the document past a stationary scanning bar. The maximum resolution in a scanned image is fixed by the number of sensors in its scanning bar. To scan an 8.5" wide document at 6400 pixels per inch requires the equivalent of 54,400 color-capable, equally-spaced sensing positions on the scan bar, and equally precise control of the paper or scan bar movement. Scanning at lower resolutions than the physical scanner resolution requires that scanner internal firmware blend the reading from multiple sensors and multiple scanned rows to compute the average color for larger pixels -- effectively using a complex algorithm to convert an image of one resolution to an image of a lower resolution.

Digital cameras produce images by using a lens to focus the optical image on rectangular array of sensors. A camera advertised as 12-megapixel must have a sensor array with at least 12 million color sensor positions. Cameras can produce a complete image much quicker than a flat-bed or document feeding scanner, because there is no physical movement required to produce the rows of pixels; but if the object is to produce the image of a document, post processing is required by software to compensate for the parallax-perspective distortion of the lens, or the document image will not be a rectangle.

When an image is displayed on your monitor by an application on your desktop, we take it for granted that it is possible to display the image at various sizes based on the size of the application

display window or by zooming in or out, but this is actually a very complex process. The monitor display itself is a large array of colored pixels, small enough on modern monitors that you can't distinguish the individual pixels without magnification. To display the same image at different sizes on the monitor requires that either your graphics processing unit (GPU) or a CPU internally expand or reduce the number of pixels in the image to fit the intended area on your monitor.



Digital Video Files

Digital video is like film video in that it does not record a continuously varying image but only a series of images ("frames") of a scene taken close enough together in time that our eyes perceive it as a continuous moving image. Twenty four frames per second (FPS) is usually sufficient for the human mind to perceive a sequence of discrete images as a continuous image. Digital video typically has 24 -60 frames per second.

Enlarged Desktop Icon

All the images in a digital video are at the same resolution. Common video resolutions are based on TV conventions: 480p (SD), 720p (HD), 1080p (FD), 4K. Individual images are represented using pixels, but different compression techniques are used that take advantage of the fact that there may be little change between two consecutive images. The video data is packaged together with audio data, using the sampling techniques previously described, but packaged in a way to keep the video images and audio track in sync.

There are multiple standards in common use that dictate what combinations of video compression and audio compression are combined, and modern PC graphic processing units are able to directly handle the real-time interpretation of common video formats to reduce the CPU overhead of playing digital video. There are a number of different file types used for storing a video on a PC. Some of the common types include .MP4, .AVI, and .MOV. Internal meta data within the file supplies the parameters needed to decode the video and audio.

Even when compressed, digital videos tend to be large. A file containing an hour of compressed FD video can easily exceed a GB in size. Storing and editing digital video recordings is one of the more demanding activities you can do on a PC. It requires significant free space on your hard drive or SSD, and a reasonably fast CPU and enough RAM storage to efficiently convert a a digital video between different formats, a process usually required for video editing.



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Laptop Shutdown Habits

By Joel Ewing, President Bella Vista Computer Club
Bits & Bytes, May 2026
<https://bvcomputerclub.org>
president (at) bvcomputerclub.org



Apparently some people are in the habit of always shutting down a laptop by just closing the lid. Depending on how you use your laptop and how your Operating System is configured, this may not be a good idea.

Most people have been trained to shutdown desktop computers using the Operating System's "Shut down" procedure — **right-click** → **shut down or sign out** → **shut down** — rather than a hardware power off or unplugging the computer when they have finished using the computer. That insures that any processes still running get shut down in a controlled and orderly manner. The only case where you might leave the computer running when done might be when you want some automated process (like Backups or updates) to occur when the computer is not otherwise in use, or if the computer is used as a home server that needs to be available 24x7.

Desktop computers that frequently run unattended should always be behind a UPS (Uninterruptible Power Supply) to protect them from power surges and brief power interruptions. Abrupt and uncontrolled loss of power can result in damaged files or incomplete updates, and for an unattended computer you never know what may have been running when a disruptive event occurred, which means you also don't know what may have been damaged.

Laptops are another story, because they may need to be transported to a new location at inconvenient times — when some process is running that should not be interrupted — and it is generally best to not transport a laptop while it is running. With slower laptops that take longer to shut down or boot up, it may also be expedient to transport the laptop while avoiding that shutdown/reboot overhead. Many laptops support alternatives to a complete power off and may appear to shutdown just by closing the lid; but you need to understand how your laptop hardware and Operating System are configured before relying on this method to shutdown your laptop.

Laptops typically work in concert with the Operating System to support a **sleep** mode (sometimes called **suspend** mode) or a **hibernate** mode, as an alternative to **power off**. Depending on your laptop hardware and the way your Operating System is configured, shutting the laptop lid could cause your laptop to sleep, hibernate, or power off. You should not rely on shutting the laptop lid to "turn off" the laptop without understanding the difference in these modes.

Sleep mode causes the laptop to enter a low-power mode that suspends normal program execution but retains the current contents of RAM memory so execution can be resumed without loss of data. The shut down and later restart is almost, but not completely, transparent: processes like web browser logins that have a time limit may have timed out, or processes that had an Internet or network connection (socket) established may find that connection broken if the same path is no longer available or has timed out at the other end from inactivity.

Because sleep mode does use some battery power, it is primarily intended for short-term, not long-term inactivity (hours, not days or weeks). Should the battery get too low, the laptop could completely power down, with loss of any data that is only in RAM memory. Depending on configuration, it may be possible for the laptop to awaken with the lid closed (activity on connected, or wireless-connected devices or a scheduled task). If there is any possibility of that happening, the laptop should not be left in sleep mode while confined in a case or container where it might overheat.

Hibernation mode is not supported on all laptops, but when supported can be used to preserve and restore the laptop state for much longer periods of inactivity than with sleep mode. The contents of RAM storage are saved on the laptop's disk drive and power is essentially turned off so that there is no drain on the battery. On the next power up, the saved RAM image is found and the RAM contents is restored from the disk drive rather than going through the entire boot process. This is slower than a restart from sleep mode, but much faster than a full reboot, and any applications that were in flight are at the same point as when hibernation was entered, the same as with sleep mode. It is possible for a computer in hibernation mode to auto power up, but only if has been explicitly configured in BIOS to do auto power up after a power failure or auto power up when signaled over a wired Ethernet network connection. If supported, these options would likely also be available after a normal power-down. In either case you wouldn't have to worry about this happening with the laptop in closed case, as there would be no connection to external power or to a wired Ethernet connection.

Since a restart from either sleep mode or hibernation mode bypasses the normal boot process, a restart from either of those modes is unable to tolerate any hardware configuration changes, which are detected and resolved during the boot process. Eventually a normal reboot restart will be required to complete the installation of some Windows updates, or to clear up some issues that can accumulate from subtle software bugs in applications or in the Operating System.

In Windows 11, the Power & Battery System Settings can control what kind of Windows shut down will be initiated on a live system in response to pushing the power button, the sleep button (if you have one), or by shutting the laptop lid. A different action can be chosen depending on whether or not the laptop is running on battery power. On my laptop, the default setting for all appeared to be **sleep mode**. To avoid confusion I changed the settings so that pushing the power button would always initiate a true power shut down.

Unless you can remember for certain how your laptop and Operating System are configured, the only way you can be certain what kind of shut down is being performed is to explicitly select the desired kind of shut down from the Windows Start icon. Unless you have verified what kind of shut down is initiated by closing the laptop lid and know that is the kind of shut down you intend, using the laptop lid as the customary way to "turn off" your laptop is questionable.

Because of the limitations of sleep mode, I would recommend getting in the habit of only using a sleep mode shut down when you are in the middle of a project that you expect to resume in a relatively short time; and in all other cases to use a normal shut down with a complete power down.

Special considerations for multi-boot laptops

Once you understand what sleep mode does, it becomes obvious you wouldn't want to use it on a multi-boot laptop if there is a good chance your next use will require a different operating system. If you have left your laptop in sleep mode, your only restart option is to wake up and resume the same operating system that was in use before. To change to the other operating system, you have to wake up the old one, do a normal shut down of it, then reboot and select the other operating system. There is no way you could reboot a different operating system, which would alter all the RAM memory contents, and then somehow later resume a different operating system that had been left in RAM memory in sleep mode



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Meetings start at 7:00 PM (9:00 AM on Saturday) unless otherwise noted. *Virtual Meetings during Covid pandemic.

October

SUN	MON	TUES	WED	THU	FRI	SAT
				1	2	3
4	5	6	7	8	9	10 Linux on Saturday 9:00 AM—Noon
11	12	13 7pm General Mtg Inkjet Printers & HP Debacle 6pm Tech Topics	14	15	16	17 MS Office (including Access) 9:00 AM—Noon
18	19	20	21	22	23	24
25	26	27	28	29	30	31
1	2	3	4	5	6	7
8	9	10 7pm General Mtg TBA 6pm Tech Topics	11	12	13	14 Linux on Saturday 9:00 AM—Noon
15	16	17	18	19	20	21 MS Office (including Access) 9:00 AM—Noon
22	23	24	25	26	27	28
29	30				Go to Page 1	



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Would you like to receive this delivered directly to your email or business each month?

As a member of TC/PC, the Twin Cities Personal Computer Group, one of the benefits is reading this monthly publication at www.tcpc.com.

As a member of TC/PC, you may attend any or all of the monthly Special Interest Group (SIG) meetings and be eligible for software drawings. The small membership fee also includes access to real-live people with answers via our helplines, discounts, and various other perks.

Does membership in this group sound like a good way to increase your computer knowledge?

It's easy to do! Simply fill in the form below and mail it to the address shown.
(If you use the form in this issue, you will receive an extra month for joining now.)



10/26

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I'm interested in:

☐ Training classes ☐ Volunteering

☐ Special Interest Groups: New User, Access, etc.

List here:

Administrative Use Only Rec'd _____ Chk# _____

October 13, 2026

7:00 pm

General Meeting

How Do Inkjet Printers Work

And

HP Printers Blocking

non-HP Ink Debacle

Via Zoom Only



341 County Rd C2 W
Roseville, MN 55113

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