THE INFOAGE
MARCONIGRAPH

NEWSLETTER OF THE INFORMATION AGE SCIENCE HISTORY CENTER AND MUSEUMS

Volume 13, Number 1 **www.infoage.org** **January – March 2019**

Electronic Warfare – What It's All About

John T. Cervini -Vice President AOC Garden State Chapter; Vice Chairman InfoAge

Those in the Electronic Warfare (EW) community explain to the general public that we don't use bombs and bullets. Instead our "weapons" consist of electrons and photons. But what exactly is EW? A formal definition would be: Electronic Warfare is any action involving the use of the electromagnetic spectrum or directed energy to control the spectrum, attack an enemy, or impede enemy assaults. The purpose of electronic warfare is to deny the opponent the advantage of, and ensure friendly unimpeded access to, the EM spectrum. Additionally, EW provides force protection to our troops.

The key functions of EW are: Interception, Identification, Location, and potentially Countering electromagnetic signals in the battlespace. The role of EW has grown tremendously, and has become critically important to military commanders.

Historically, EW developed and advanced lock step with the state-of-the-art of communications, radar, data links and navigational aids in the military. During WWI, special receivers and direction finders were built to "listen in" to enemy Morse code transmissions, which ultimately advanced to voice communications.

Listening in during WW

In WWII, the same EW functionality was used, incorporating more advanced equipment. But the battlespace expanded to include Air, Land, and Sea. Intelligence and Electronic Warfare became indispensable in preparing for and conducting major operations.

During this time, EW engineers had to deal with a new type of signal, called RADAR. All belligerents in WWII developed and used RADAR effectively during the conflict. New receivers and jammers were developed to deal with RADAR.

WWII DF Germany 1944

After Korea and during Viet Nam, the "threat" greatly increased. Again, new threats emerged that required further advances in EW equipment. The biggest threat to emerge in Viet Nam was the radar directed Surface-to-Air-Missile system. The Soviet SA-2 system was the primary air defense weapon in the North Vietnamese inventory.

SA-2 Fang Song Radar

SA-2 Guideline Missile

The irony is that the SA-2 radar is an improved version of the Camp Evans developed WWII SCR-584 microwave air defense radar, which was given to our Soviet allies under the Lend Lease program. Two decades later, Camp Evans engineers with a working knowledge of the SCR-584 were instrumental in developing countermeasures against the Fan Song.

During the first and second Gulf Wars, new threats emerged that had to be dealt with by EW engineers and scientists. Third world military such as Iraq's were able to purchase more sophisticated RF weapons such as proximity-fuzed munitions. Fort Monmouth EW engineers quickly helped design the Shortstop Self Protection System (SEPS) to effectively deal with this threat. The Shortstop battlefield electronic countermeasures system is capable of prematurely detonating incoming artillery and mortar rounds. It counters the threat of RF Proximity Fuzed munitions by causing them to pre-function, to protect friendly ground troops, vehicles, structures, and other equipment under fire.

SEPS Prototype

The SEPS also possessed a capability that soon had far-reaching effects during the middle-east conflicts. The SEPS could be programmed to jam a specific range of frequencies, in order to defeat any remotely controlled or suicide bombers wearing explosives. Originally designed to defeat proximity fused indirect fire munitions, the next version, known as Warlock, had a dual capability to deny the use of enemy modern communication devices. Warlock was used individually or in groups to provide wide area coverage without mutual interference. The Warlock Force Protection Family of Systems is a lifesaving countermeasure. Warlock effectively countered the threat of RF triggered improvised explosive devices, such as those used by terrorists in Iraq and Afghanistan.

AN/VLQ-12 Warlock

In Afghanistan, U.S. soldiers in operating bases were being ambushed by the enemy who used sophisticated radios to coordinate their attacks. EW engineers provided a Quick Reaction networked system, known as Wolfhound, to detect, ID, and ultimately locate those signals. The Wolfhound is a lightweight radio direction finding system that targets VHF and UHF radio bands. VERSION 14 (V14) is the latest version of WOLFHOUND. V14 users can listen to and locate Push-To-Talk radios from a mobile configuration with the custom backpack or a stationary installation with an accessory kit.

Soldiers on patrol with Wolfhound in Afghanistan

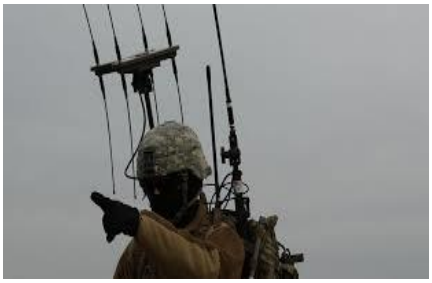
Today, the United States military has embarked on a strategy that moves beyond the traditional areas of operation, and Electronic Warfare provides the thrust behind it. The latest concept is Multi-Domain Operations; and the main goal is Electromagnetic Spectrum Domination at the tactical and strategic levels. The Army is currently advancing this concept in a few Brigade Combat Teams (BCTs) by training a new generation of Electronic Warfare officers. One critical aspect added to this new thrust is the addition of Cyber operations into the mix. An evolving Concept of Operations is underway to train the troops how to deal with all that is necessary to achieve overall spectrum domination in the battlespace.

In order to more effectively incorporate EW and Cyber operations into the force, the Army is developing the prototype Electronic Warfare Tactical Vehicle (EWTV). The EWTV uses a 4x4 M1235 Mine-Resistant Ambush Protected (MRAP) armored truck to carry the complete electronic warfare package. The vehicle also features various antennas on an extendable mast that would help expand the coverage area of the vehicles. Line-of-sight communication systems often have trouble transmitting across complex terrain, such as hills and mountains, and from within constrained urban areas. Jammers, which flood those emitters with electronic "noise," have the same limitations.

Electronic Warfare Tactical Vehicle (EWTV)

This kind of multi-functional electronic warfare system would give Army units the ability to quickly identify the location of potential hostile units, helping commanders either avoid potential threats or decide how best to attack against them, as well as just gain a better overall picture of how the enemy is positioned around the battlefield. Troops could then decide to jam their transmissions, hampering their opponent's ability to coordinate their own offensive and defensive operations, warn their comrades of an approaching American force, or request reinforcements or supporting air and artillery strikes.

Today's Army has a number of challenges it must face, and the Intelligence and Electronic Warfare community has stepped up to ensure future success.



Today's Electromagnetic "G.I. Joe"

As we begin a new year, we would like to thank all those that have been so gracious to us in 2018. We couldn't do what we do without you.

We are expanding our museums to include a 9-11 Memorial Museum and a Leni-Lenape Museum and we are restoring a section of one of our larger buildings in preparation for an expanded Radar Museum. Our gift shop is being renovated and stocked with items for adults and children alike. There are plans to spruce up the InfoAge Science Exploration Center and add more displays.

There are other projects in the works that we are extremely excited about too! Come out and visit on a Wednesday, Saturday or Sunday and see what your support has done.

Again, Thank You and Happy New Year!!!!!!!!

Vintage Computer Federation at InfoAge
By Evan Koblentz - VCF

If someone you know is into computers and you're making resolutions for 2019, then we suggest resolving to bring them on a visit to the computer museum here at InfoAge!

The museum is operated by Vintage Computer Federation, which is a national organization for collectors. VCF formed in 2015 and is a 501(c)(3) educational non-profit organization.

VCF itself collects, restores, and exhibits computers and related artifacts from the 1940s through 1990s. There are mainframes powered by vacuum tubes, minicomputers that run on transistors, built-it-yourself kits based on early microprocessors, and a whole wall showing all the separate products that today are just apps in your smartphone.

You'll be able to see how large a single bit of data was in the 1950s and hear how loud the computers were on U.S. Navy ships in the 1960s. A collection from the 1970s includes rarities like the Apple 1, while systems from the 1980s will bring you straight back to childhood if you're in your 40s today. The collection also includes accessories, books, software, and much more.

The latest major addition to the VCF collection is a Digital Equipment Corp. VAX-9000/440 supercomputer. This beast when fully assembled is more than 30 feet long! It is the physically and computationally largest computer that DEC ever made. It's said that only about 30 were ever built, maybe less, and this is one of two known to exist. VCF acquired a complete system, right down to every cable, manual, and terminal. The system was previously owned by the U.S. government and operated by a defense contractor to the Air Force. It lived in Colorado and was in service until a few months ago! Now it resides in VCF's storage facility, and soon part of it will be on display in their museum. A sign of the times: the defense contractor is replacing it not with another exotic machine, but with some Dell servers and VMware virtualization software. Anyone who works in the IT field will see the irony in that!

VCF does much more than operate its museum at InfoAge. The organization also produces a national event series called the Vintage Computer Festival, with stops in Seattle (at Living Computers: Museum + Labs in March), here at InfoAge (May 3-5), and Silicon Valley (at the Computer History Museum in August). In addition, VCF operates the Vintage Computer Forum, which is a global discussion board accessed through their website at www.vcfed.org.

Vintage Computer Federation is open Sunday, Wednesday, and Saturday from 1pm-5pm. Stop by and see us! You can also visit us anytime at www.vcfed.org, or on Facebook, Instagram, Twitter, and YouTube.

For any questions or comments, please contact Evan Koblentz at evan@vcfed.org or (646) 546-9999. (Please note: you must contact us about artifact donations ahead of time. We cannot accept artifacts left without prior consideration. Thank you.)

Vintage Computer Festival East
May 2019 at InfoAge

Vintage Computer Festival events are a unique family-friendly experience. The events celebrate the history of computing! Festivals include a hands-on exhibition hall, where you'll find dozens of up-and-running examples of historic computers. Minicomputers of the 1960s, homebrew systems of the 1970s, and microcomputers of the 1980s are all represented. Festivals also have lectures, consignment sales, technical classes, food, prizes, and much more

Stay Tuned for more information

The Marconigraph is the Newsletter of the Information Age Science History Learning Center and Museum which is a 501 C (3) Non-Profit Corporation dedicated to preservation of Camp Evans. Membership is $25 per year for an individual and $45 per family.

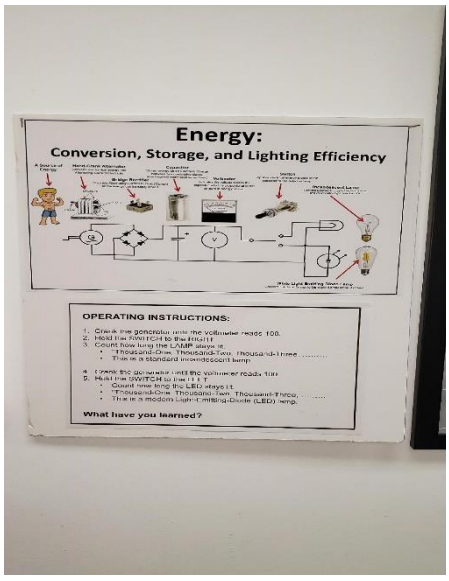
For more information about InfoAge and our Museums or to become a member or volunteer your time call 732-280-3000.

Newsletter Editor – Gloria C. Kudrick
admsupport@infoage.org

New Hands on Display at RTM
By Ray Chase

New Jersey Antique Radio Club member Leo Assur created a new display for our Hands-On room in the RTM that has turned out to be very popular. The display uses a hand crank magneto from an old telephone that once was used to signal a central station telephone operator. Cranking it generates an AC voltage that is fed to a rectifier to make DC that is then stored in a capacitor. A meter monitors the voltage as the person doing the cranking builds it up to 100 volts. Then a two-position switch allows an incandescent bulb or a LED bulb to be switched on. The time it takes for the voltage to dissipate is a measure of the efficiency of the type of bulb used. The LED uses up the voltage much slower than the incandescent bulb which wipes out the stored energy within a second or so. Signage shows how this all works to demonstrate: Electricity Generation, Rectification, Storage and Usage with an implied message about conservation of energy. The whole display is in a transparent case. Kids and adults alike love to operate it. Thanks Leo.

This segues to another RTM project recently completed. The Radio museum has somewhere near fifty dual tube florescent lighting fixtures. It has been a challenge and an annoyance to come in to open the museum and find that several are not working, are flickering or need some time to warm up before they will come on. Often the problem is a defective ballast in the fixture necessitating an involved repair. Over the years, different color temperature tubes have been used causing uneven lighting hues. Then along came a new development, namely LED replacement tubes. We decided to take the leap and solve the continuing florescent tube problem by changing over 100% to LED's. We purchased 144 LED lamps and changed out all the RTM overhead fixtures. We have some extras that will be used to change out other overhead lighting fixtures in the radar and repair shop rooms. The florescent tubes were 40 watts while the LED's are 18 watts and need no ballasts. Considering the lower wattage of the LED's and the elimination of ballasts, the lighting energy use should be reduced to a bit over one third of what it was. The LED's will have longer life and the museum lighting is now improved and more uniform. LEDs are however more susceptible to power line surge damage so InfoAge installed a surge protector at the museum power panel.



One of Our Interns is Going to Yale!
By Robert Perricelli

Cole Snedeker, an InfoAge Intern with the WW II Miniatures, Models, Dioramas and Artifact Museum Gallery has been accepted for early admission to Yale. Cole is 17 and is a senior at the High Technology High School located in Lincroft NJ. He has been working as an intern at InfoAge since July 2016. Further, he will also be working as an intern at the National Guard Militia Museum in Sea Girt NJ starting in February.

Cole performs many tasks at our museum which include inventory tasks, diorama/exhibit construction, guide activities, research/historical document preparation, entrance desk duties etc. He is also involved in all the activities necessary to maintain and expand our museum. In our last newsletter Cole provided an extensive article concerning the use of Rail Mounted Artillery from the Civil War through WWII. During our WW I Armistice 100th Anniversary Event held at InfoAge on 11 November 2018 Cole presented a comprehensive lecture about the Weapons of WWII to a very interested audience.

InfoAge provided a letter of recommendation to Yale concerning his performance signed by myself, John Cervini and Jules Bellisio, both InfoAge Trustees (Jules is a Doctoral Engineering Graduate from Yale). Hope our letter had some influence with the admittance staff at Yale. Cole has proven to be a devoted and energetic intern, with plenty of initiative, motivation, and creativity. He continues to help us effectively accomplish our mission goals at Historic Camp Evans. Cole will be a great addition to Yale's incoming class and to the school. We wish him all our best and continued future success.

Secret Camp Evans Radio Beacon Makes WW2 H History
By Fred Carl

The secret device made a big difference on D-Day, its use ensured victory during the Battle of the Bulge and in espionage missions. It was used by specially trained soldiers known as the Pathfinders. The cutting-edge electronic device was designed and tested at Camp Evans.

Research at the National Archives in Maryland in de-classified WW2 documents found the connection to Wall Township's Camp Evans. The device's code name was the PPN-1A, AKA 'Eureka'. It made the impossible possible. With the Eureka unit sending a homing beacon, a fast-moving transport plane could drop troops and supplies into battle at the right spot. Each plane had a unit named 'Rebecca', which guided the pilot to the Eureka signal. No longer would a team of paratroopers jump at the wrong time and land in enemy territory separated from the main force.

On the night before D-Day, the pathfinder teams used the beacons to guide 18,000 paratroopers to landing zones to cut German telephone lines and wreak havoc before the Allied troops hit the beaches.

In December 1944, 74 years ago, the Pathfinders and their Eureka beacons would be called into emergency service. Adolph Hitler unleashed a quarter of a million men, almost 1,500 tanks and more than 2,000 artillery pieces in a giant surprise attack on Dec. 16, 1944 into Belgian. American units were rushed into a small town named Bastogne. The Germans surrounded and attacked relentlessly.

Supplies of food, ammo, and medicine started to run out. The Germans demanded that the outnumbered Americans surrender. The leader of the Americans in Bastogne, Brigadier General Anthony C. MacAuliffe responded to the German surrender demand with a written message with a single word: "Nuts." MacAuliffe had to hold out until General George Patton with the 3rd Army tank corps, who were fighting toward Bastogne arrived.

The key to the American victorious survival at Bastogne was the Pathfinder paratroopers who jumped into Bastogne with Eureka units. Without the Eureka beacon, the fast-moving supply transport planes would have been unable to ensure that the badly needed supplies dropped inside American lines. An amazing 95 percent of the cargo was retrieved by the defenders. Over 320 tons of supplies were dropped on the first day the Pathfinders arrived on December 23rd. Finally, on December 27th Patton broke through the determined German units into Bastogne. By January 25th the battle was over.

.

WWII Paratrooper with PPN-1A Beacon

Supreme Allied Commander Dwight D. Eisenhower later stated the resupply drops had ensured victory at Bastogne. The pathfinder teams and their Eureka beacons were critical to that success. The 101st division who defended Bastogne where given a citation for gallantry in action.

In the history of WW2, Camp Evans holds a unique place of innovation that played a major role in the Allied victory. The Eureka beacon is just one of many war winning contributions the staff at Camp Evans made. Dedicated people and organizations have worked with the National Park Service to recognize Camp Evans as a landmark. This recognition comes with no funding. Everyone in Monmouth County should support the continued preservation of this landmark that shows what American ingenuity can do. Visit www.InfoAge.org to volunteer or to make a donation.

The "EYES" Have It
By: David C. Gray, NJHDA

Introduction:

"Carl Zeiss [pronounce "Tsice"] (11 September 1816 – 3 December 1888) was a German scientific instrument maker, optician and businessman who founded the workshop of Carl Zeiss in 1846 which is still in business today as **Carl Zeiss International**. By 1847 he was making microscopes full-time.

Carl Geiss's first Compound Microscope, 1857

As part of Nazi Germany Zwangsarbeiter program, Zeiss used forced labor during the Second World War. (Nazi forced labor was extensive throughout Europe, etal. It was a vital part of Nazi economic exploitation of their conquered territories.)

By 1934, Carl Zeiss of Jena was producing some truly remarkable binoculars. While these were designed as terrestrial binoculars, they could also be used for astronomical observation. The price of this binocular, including duty paid, in New York was over $2000.00 in January 1935. (10X80 pictured below)

Also, in 1935, Alexander Smakula invented the revolutionary "T" coating for lenses, which increased the transmission of light through the binoculars by fifty percent. This was a highly regarded military secret when it came to wartime. The pinnacle for Carl Zeiss Jena binoculars came during World War Two, when Zeiss directed production exclusively to military binoculars.

The 10X80 Zeiss Kriegsmarine binocular deck mounted with twenty-degree inclined oculars were developed for the German navy (Kriegsmarine). (fig b) They were also used in observation bunkers on the Channel Islands during its occupation. (fig c) A photograph shows this binocular mounted on a German "Kommandogerat," or commander unit, inside one of the bunkers. These 10X80 were also known as fortress binoculars, an example of which can be seen in the La Valette Military Museum on the British dependency island of Guernsey."1

10X80 Binoculars (fig b)

The Channel Islands – Occupied by Germany for Most of WWII (fig c)

The Binoculars:

In November of 2018, I came into possession of a pair of 10X50 binoculars which are on loan to the New Jersey Ship Wreck Museum, for future display.

After several hours of on-line research, I discovered these binoculars are genuine: Carl Zeiss of Jena Binoculars.

. Dienstglas 10X50, serial # 88092, rln+. (fig d) Manufactured in Nazi Germany in 1943... "rln" is the German Military Letter code for Carl Zeiss of Jena. As the war progressed most contractors moved to letter codes, so items could not be traced. The + sign stands for the type of lubricant to be used."3(these were certified down to -40' C)

Dienstglas: translates to; "Service glass" or "Working glass".

"10x50 binoculars have 10x magnification and the objective lenses (the large lenses on the bottom) are 50mm in diameter. The wider the objective lens, the more light the binoculars will take in making the image brighter." 4 (fig: e)

(fig d)

(fig e)

(fig f)

(fig g)

(fig h)

(fig i)

(d) Hallmark top right prism housing. "Dienstglas 10 x 50 88092 rln+".

(e) Front view,

(f) Left and right eye Turrets.

(g) Right and left Objectives.

(h) Back view showing neck strap attachment.

(i) View thru. Rt Objective lens. 50mm in dia.

In the right objective of this model, are horizontal range markings in 5-degree increments:

| I | I | I | I | I | I | I | I | I | I | I | I | I |

20 0 20

The leather neck strap appears to be hand tooled and the buttons are brass.

The eye pieces or eye "turrets" are focused individually.

Keeping both eyes open and covering one objective at a time. Focusing to just past the sharpest image, (slightly out of focus) then turning back to the sharpest image. Focusing each eye piece to the eyesight of the user.

I was taught this method of focusing binoculars in the United State Navy, where I was a decorated lookout.

The Navy's rules with regard to the care and use of binoculars are:

I. You always wear the neck strap, while using the binoculars.

2. You only clean the lenses with a clean lens cloth or lens paper.

3. Always store them in their proper case.

With the exception of a crack in the left eye piece, the overall condition and visual quality of this 75-year-old instrument is excellent. A comparable model in today's market costs $3,400.00 USD.

These binoculars were prized trophies of the allied forces during World War II.

With care and respect these binoculars have many years ahead of them. Providing a clear view of the target.

The eyes have it.

References

1: Carl Zeiss: The Man, The Company, The Legend April 28, 2014 In Blog By Simon Daniels, MPhil (Cantab) A Brief History of Carl Zeiss

2: Zeiss AG by Bill Graham and assoc Found on "Axis History Forum".

3: International Military Antiques, ima-usa.com

4: Google: www.ebay.com.uk/gd/How-to Choose-Binocular

Google Maps and David C. Gray

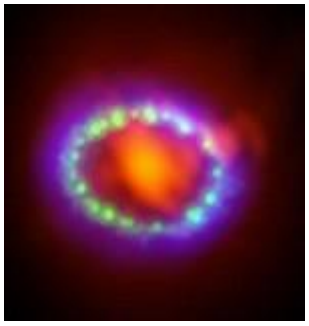
David Gray is a volunteer for the New Jersey Historical Divers Association Museum here at InfoAge. We thank him for his dedication, hard work, and for this article!

Camp Evans Base of Terror 2018

From start to finish the crew of what we call CEBOT (Camp Evans Base of Terror) worked hard for months without fail to bring about the best show to date. Our crew is the best and we can't thank them enough for making this year's fundraiser a huge success.

Can't wait till CEBOT 2019!

InfoAge Happenings



Kimberly Kowal Arcand, imaging specialist from NASA, will be at InfoAge this March. Kim will offer a presentation on how NASA images astronomical phenomena from quasars to super nova's - all while using the latest technology. Check our website for details as they become available.

Starting January 1, 2019 our Museum Admission Fee will be:

Adults:	$7.00
Children 12 & Under	$4.00

Group Tours are available. Call 732-280-3000 for pricing and more information.

STEAM Tank Regional Competition is coming to InfoAge

Central Region – March 16, 2019, 9 a.m. to 3 p.m. at InfoAge Science History Learning Center at Camp Evans, 2201 Marconi Rd., Belmar, N.J. 07719

We can't solve problems by using the same kind of thinking we used when we created them - *Albert Einstein*

STEAM Tank provides New Jersey students a platform to experience real-world problem solving. It allows them to think like entrepreneurs and design and create whatever they can dream using the fields of STEAM – science, technology, engineering, the arts and math. In STEAM Tank, students create innovative products and solutions to problems, which they enter into a competition. Winners at the regional level compete in the finals at NJSBA's annual Workshop, before a judging panel of entrepreneurs and business leaders.

STEAM Tank consists of three regional challenges for three grade levels, elementary, middle and high school. These selected teams pitch their ideas to the judges in the designated regional locations and winners of the regionals will advance to compete at the STEAM Tank finals held at the NJSBA's Workshop Conference at the Atlantic City Convention Center.

The competition asks the district teams to invent something new, modify an existing product, or identify a situation or real-world problem that needs resolution. Teams are provided criteria and a panel of experts judge their designs and or solutions.

InfoAge Happenings

InfoAge

The InfoAge Science History Learning Center and Museum at Historic Camp Evans

Join InfoAge Today!

InfoAge is preserving historic Camp Evans to honor veterans and give students and groups a place for learning more about science and history.

Your donations will help us with this work. You can become a member for $25.00, and are invited to volunteer. Your help will give excellent programs a permanent home to benefit New Jersey science and history education.

Benefits of membership include receiving our newsletter, advance notice of events and discounts. All memberships are annual unless noted. *

- ☐ Individual Membership $25.00
- ☐ Family (up to 5 persons) Membership ...$45.00
- ☐ Lifetime Individual Membership*.....$225.00
- ☐ Lifetime Family Membership* $425.00
- ☐ Club or Organization Membership $250.00

Name: _____

Club/Org.: _____

Address: _____

City: _____

State/Zip: _____

Phone: _____

E-mail: _____

Amount Enclosed: _____

Make checks payable to: **InfoAge**
2201 Marconi Road
Wall, NJ 07719
Attn: Membership Mgr.

Pay online using PayPal on our website at InfoAge.org

☐ **Check here if you'd like to become a volunteer.**

Donations to InfoAge are tax-deductible to the fullest extent allowable by law. Please check with you tax professional.

It's time to renew your annual membership. Simple cut out the form to the left and mail it to the address indicated. We thank you all for your support!

Commissioning a FULL-COLOR tile is a great way to say thank you to a veteran or family member. The hall of Honor is located in the central hallway of the historic WW2 H-building complex, on the Camp Evans National Historic Landmark. The InfoAge Hall of Honor is an excellent place to display your custom tile. You supply the photos and text, and we'll create your unique custom tile. Take it home, or allow us to display it in our Hall of Honor.

The cost to commission a tile is $250, and additional copies can be made for $100 each. You will have the opportunity to approve your tile's design.

Call 732-280-3000 today to reserve your tile, or email admsupport@infoage.org for more information.