The 2003-2004 YESS series is off to a great start! On October 8, the series kicked off its second year with Jim Armitage, Vice President of Engineering for the Northrop Grumman Corporation, speaking on “Modern Airborne Radar.” The following week, Matt Earl, Physicist at the Tate Cancer Center, spoke about the “Physics of Radiation in Cancer Therapy.” The last lecture in October, titled “Role of the Engineer”, was presented by Dr. Taryn Bayles and Dr. Anne Spence of the University of Maryland Baltimore County (UMBC) Engineering Department.

On November 11, Jeff Harris, Former Director of The National Reconnaissance Agency (NRO) and current President Lockheed Martin division for IKONOS Remote Earth Sensing Satellite, discussed imaging from Space. The last lecture of 2003 was presented by Dr. Mario Livio, Head of the Science Division at STSCI (Space Telescope), who spoke about the “Cosmological Aesthetic Principle.”

The 2004 speakers include:

**Dr. Robert Park** (University of Maryland), “The Seven Signs of Voodoo Physics”  
**Joe McGowen** (United States Naval Academy), “Imaging in Medical Sciences”  
**Dr. Joe Tatarewicz** (UMBC), “Challenger and Columbia: Space Shuttle Accidents in Historical Perspective”  
**Dr. Andrew Post Zwicker** (Princeton University), “The Nature of Plasma Physics”  
**Dr. Richard Siergiej** (Northrop Grumman Research Laboratories), “Solid State Electronics”  
**Peter Joyce** (United States Naval Academy), “Composite Materials in Modern Design”

YESS (Young Engineers and Scientists Seminars), partially funded by the Northrop Grumman Foundation, is a lecture series for outstanding high school students in the fields of science, engineering, and mathematics. For more information, visit www.yesshem.com.
It seems like a short 3 years since I took on the obligations of president. The by-laws limit service to 3 years. It is a good rule, designed to give a president long enough to influence museum activities but too short to establish a long term dynasty.

In 3 years, there were many achievements and many tasks left undone. Al Spencer had led HEM through the large expansion, the gallery organization and developed a master plan for the various galleries. It is not time to update the master plan, accounting for the many tasks that have been completed and to develop the directions of the future.

In the past 3 years, there have been many achievements. Among those that are notable are:

- YESS program
- The SCR-584 was moved inside for preservation
- AWACS display was improved
- The Radar Gallery was re-arranged
- The SCR-270 exhibit re-design is well underway
- The SCR-270 Antenna has been painted and restored
- Acquisition of the AN/APQ-163 F-15 Radar
- The Space Sensor Gallery upgrades are underway
- We have increased Grant money and opportunities for grants
- We have retained the support of Northrop Grumman
- We have increased membership

These achievements are the result of many volunteers as well as Kate, Kristin and Anne. I would like to thank everyone for making the last 3 years a very pleasant and worthwhile experience for me personally. I wanted to see some additional accomplishments such as completion of the Space Sensor Gallery, additional graphics improvements throughout the gallery and permanent funding established for the YESS program. I will remain active at the museum and will now concentrate efforts on the Space Sensor Gallery.

Again, thanks for the help and support for my term as president.

Ralph Strong
President
Welcome New and Returning Members

We would like to welcome the following new members of the Historical Electronics Museum, as well as those who are renewing their memberships:

Supporting
Manny Baker
Barbara Everitt Bryant
Kernan Chaisson
Craig Close
Michael Cross
John Fielding
Mr. & Mrs. James D. Hendry
John & Sally Marks
William H. Melton*
Allen W. Moore, Jr.*
Lloyd Pickering
Michael Pobat
Ralph Strong
Chip Weems
William F. Zoller

Mr. & Mrs. Wade H. Turner*
Mr. & Mrs. Robert L. Wells

Individual
Adrian Ashfield
Charles L. Blair
Stephen F. Bonk*
Weston G. Bruner
Russell C. Coile*
John W. Coltman
Michael Conlon
David B. Dobson
Steven E. Fick
Harold Goldberg
B. J. Goldfarb
Ronald L. Goodman*
Richard M. Henry
Wayne B. Lloyd
Gordon M. Melby*
Harry Moses
Edward C. Niehenke
Joseph E. Pratt
Ken Allen Purnell
Bernard Retterer
Charles C. Ryan*
Bill Semenuk
John J. Slattery
Robert J. Stryjewski
Russell Wallace*
David C. Williams

Family
Joe & Barbara Bruce*
John Cross*
Mr. & Mrs. Charles Francis
Mr. & Mrs. William Griffiths
Bruce L. Havlicsek*
Robert Huskey
H. C. Jones*
William Kisse*
August A. Krometis
Kieth Mitchell*
Todd W. Nichols*
Mr. & Mrs. Paul Pittman
Robert & Judy Qualls
Rosemary Shearer & John Heasley

*new members

HEM Spotlight
on...

Connie Langford

Connie has been a volunteer at HEM since 1997. She began as a front lobby volunteer and over the 6 years she has been at HEM, her position has evolved into much more! Connie comes in twice a week to enter data for collections and visitor information, organize large mailings, assemble information binders, and do whatever we need her to do that day!

In addition, Connie received the Governor’s Volunteer and Service Award for her work on researching and writing the museum’s Black History Month exhibit in 1999. What great job!

Thanks to Connie for her time and hard work!
HEM elects a new President!

At the December 10th board meeting, Steve Stitzer was elected President of the Historical Electronics Museum. Many thanks to Ralph Strong who presided over HEM for the past 3 years— the museum made some great progress in that time! Thanks Ralph!

About Steve

Steven N. Stitzer received his BS, MS, and PhD in Electrical Engineering from Carnegie-Mellon University. Presently, he is a Consulting Engineer for Northrop Grumman Corporation Electronics Systems. Steve is involved with microwave device research and development and has been awarded 15 US patents. He is a fellow of IEEE and is of the Chairman of MTTS Historical Collection Committee. Steve was also the Chairman of the 1998 International Microwave Symposium in Baltimore, MD. Steve has been involved with Historical Electronics Museum for over 10 years. During this time, he has been the Collection Committee Chairman and Gallery Lead for the Radar Galleries.

Elections

The Executive Officers of the HEM Board for 2004 are:

President—Steve Stitzer
Vice President—Bill Gretsch
Secretary—Al Spencer
Vice-President Counsel—Dennis Cameron
Vice President, Finance and Treasurer—Bob McFarland

Warren von Uffel, John McCarty, and Ralph Strong were re-elected for their second term. HEM also has 5 new board board members—Vic Grams, Bill Gretsch, James Fritsch, Al Spencer, and John Stuelpnagel. Welcome aboard!

Special thanks

Special thanks to Wally Hoff and Louis Brown for serving on the HEM Board of Directors for the past 6 years. Wally served as one of our liaisons to Northrop Grumman and Louis provided great consultant advice for our WWII Radar Gallery. He also helped to design our interactive WWII radar display. Even though they are no longer on the board, we hope they still stay involved with HEM and wish them both the best of luck in the future.
About the New Directors

James Fritsch is a retired Northrop Grumman/Westinghouse employee. His career has included the following positions: Radar Systems Engineering Group Manager; Definition and Analysis Section Manager; Advanced Tail Warning Systems Design Program Manager; Group Leader-Advanced Tactical Radar; Technical Director of Sensor Study for USAF Tailrats program; HELRATS Study and Proposal-System Concept and Definition; Lead Engineer for air-to-air mode of USAF EAR Program; Group engineer in design of digital signal processor, and Lead Engineer responsible for data analysis in support of Navy FWS flight test Program.

James received his BSEE his MSEE from Carnegie-Mellon University.

Victor J. Grams, Jr. received his BSE from Johns Hopkins University. He is currently retired.

Formerly at Northrop Grumman/Westinghouse, Vic Grams was the Director of Ground & Airborne Early Warning Systems Product Engineering; Director of Multi-Disciplined Engineering and Special Assignment Program Manager for TPS-70 Solid State Radar Development Program; Manager of Equipment Design Engineering Department; Manager of Airport and Air Traffic Control Systems Department; Program Manager for ASR-9 Radar; Programs Manager for TPS-43 Programs for the USAF, Morocco, Argentina, all FMS/USAF Customers; Programs and Test Director on the TPS-43E Program for the USAF.

William R. Gretsch received his BSEE from Bucknell University and his MSEE from New York University. He worked for Westinghouse Electric Corporation for many years, starting out in research, development, and designs. He then became the Manager of Development and Engineering of the Westinghouse Airborne Surveillance Systems and later the Westinghouse Surveillance System Limited in the United Kingdom. He finished his career with Westinghouse as an advisory engineer in the Business Development Department.

Bill has written several technical and management papers for IEEE publications.

Allan L. Spencer isn't exactly new to the HEM board—he was the president for 3 years and has been involved with HEM since 1996. But after taking a year off, as outlined by the museum’s bylaws, he has rejoined the HEM board.

Al received a BS in Business and Engineering from the Johns Hopkins University. He then worked for the Corps of Engineers in the U.S. Army as a Communications Officer. Afterwards, he joined the Westinghouse Electric Corporation Electronic Systems Division in Market Planning and Communications. He was the Marketing Manager of Systems & Technology Divisions, Marine & Electrical Systems Divisions, and the Executive Assistant to the President.

John Stuelpnagel received his BA in Mathematics & Chemistry from Yankton College, in Yankton, South Dakota. He then went on to get his PhD in Mathematics with a minor in Physics from Johns Hopkins University in Baltimore.

Currently, John is a Consultant for Defense Travel Systems. Before that, he worked for Northrop Grumman/Westinghouse. Previous positions include: Program Director for Classified Defense Programs; Director of the Science and Technology Center; Director of Research and Development; Director of Integrated Avionics for Aerospace and ASW Divisions; Technical Director of the Civil Systems Division; Manager of the Digital Systems Department; Program Manager of the F-16 Fire Control Radar; Program Manager of HELRATS; Manager of Air Combat Fighter Digital Subsystem Development & Engineering; and Manager of Full Scale Development of the original F-16 radar.
The New SCR-270 Shelter

As part of a grant from the Maryland Historical Trust, HEM has been upgrading the displays of the SCR-584, MK-26, and SCR-270 by creating dioramas. We are almost complete with all three! In November, we had our mock-up SCR-270 trailer delivered and installed. Built by Accent Displays in Baltimore, Maryland, the trailer was created using old photographs and diagrams.

All that is missing from the new displays are the text panels, which are currently being developed. A full story on these new exhibits will appear in the next issue of Reflections.

Annual Holiday Puzzle by Steve Stitzer

**FIRSTs of History and Electronics in Maryland**

<table>
<thead>
<tr>
<th>Year</th>
<th>Event</th>
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<tbody>
<tr>
<td>1783-1784</td>
<td>The FIRST (and only) State House to serve as the Nation's Capital. was in Maryland.</td>
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<tr>
<td>1784</td>
<td>The FIRST authenticated hot air flight in America took place in Bladensburg, Maryland.</td>
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<tr>
<td>1803</td>
<td>Foods are now kept cold in the FIRST invented in Baltimore, along with the name.</td>
</tr>
<tr>
<td>1806-1840</td>
<td>The National Road, running from Md. to Vandalia, Illinois, was the FIRST American highway.</td>
</tr>
<tr>
<td>1830</td>
<td>The FIRST terminus of the Railroad was built in Ellicott City.</td>
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<tr>
<td>1844</td>
<td>The FIRST electric line was run between Baltimore, Md. and Washington, D.C.</td>
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<tr>
<td>1861</td>
<td>US Frigate, now in Baltimore's Inner Harbor, made FIRST Union Navy capture of the Civil War.</td>
</tr>
<tr>
<td>1879</td>
<td>The FIRST artificial sweetener, was discovered at Johns Hopkins University.</td>
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<tr>
<td>1867-1912</td>
<td>Clara Barton, founder and FIRST president of the American lived in Glen Echo, Maryland.</td>
</tr>
<tr>
<td>1873</td>
<td>Naval Academy graduate Robert Michelson was the FIRST American to win the Prize.</td>
</tr>
<tr>
<td>1907</td>
<td>The FIRST military aviation school was opened at Park, which is home of an air museum today.</td>
</tr>
<tr>
<td>1941</td>
<td>The FIRST Ship, the Patrick Henry (hence the name), was built at Bethlehem-Fairfield Shipyard.</td>
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<tr>
<td>1941</td>
<td>The FIRST telephone dialing system was installed in Baltimore, finally became commercial in the 1960's.</td>
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<tr>
<td>1959</td>
<td>Space Flight Center, named after inventor of the FIRST liquid-fueled rocket, was founded in Greenbelt, Md.</td>
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<tr>
<td>1964</td>
<td>The FIRST atomic-powered lighthouse was built in the Baltimore Channel of the River, but was removed a year later.</td>
</tr>
<tr>
<td>1980</td>
<td>The FIRST museum to display SCR-270 and SCR-584 radars, the Electronics Museum, was incorporated.</td>
</tr>
<tr>
<td>1983</td>
<td>John Atanasoff, inventor of the FIRST electronic digital computer, received honorary Doctorate from Western College.</td>
</tr>
<tr>
<td>1993</td>
<td>The FIRST public museum dedicated to the National Cryptologic Museum, opened near Fort Meade.</td>
</tr>
<tr>
<td>2003</td>
<td>S AND H A P P 2 0 0 4 !</td>
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</tbody>
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Before radio or radar, even before the electric telegraph, military commanders wanted to extend the range of their command beyond the sound of their voice or bugle calls. One of the earliest signaling techniques was the use of flags.

In the 1600's, English Admiral Sir William Penn devised a single-flag system for ship-to-ship signaling. The King’s grant of 45,000 square miles of land to Penn’s son, the state of Pennsylvania, was partly in recognition of his invention. In the late 1700’s, English Admiral Richard Kempenfelt invented a flag system with one flag per letter. These were the forerunner of the familiar multicolored flags seen on ships today. This system was not always effective, if the flags would not unfurl or happened to be seen edge on.

French Revolutionaries invented a very effective semaphore system in 1792. It comprised a post at the top of which were two mechanical arms that could be swung into various positions to indicate different letters. Similar systems were quickly adopted in England and the U.S., but these were rather awkward for use in the field.

Soon the newly developing electrical sciences were put to work in signaling. In 1837, Cooke and Wheatstone demonstrated a two-wire plus ground needle telegraph, and a year later Morse had his single-wire plus ground telegraph. He operated it between Baltimore, Maryland and Washington, D.C. for the first time in 1844.

In 1856, U.S. Army Assistant Surgeon Albert James Myer, stationed west of the Mississippi River, invented and patented his flag signaling system. Myer had been a telegraph operator before joining the army, but there was no telegraphy west of the Mississippi River yet. He was intrigued by the Indians’ ability to telegraph detailed information by various signs, such as those of Comanches he observed signaling by moving lances left and right. He had earlier proposed a system of left-right hand signals for the deaf, which he called “aerial telegraphy”, using the Bain code for an alphabet.

1858 marked the completion of the laying of first trans-Atlantic cable by Cyrus Field. Myer had sent a letter to the War Department proposing use of his flag system, and in 1859 the Army responded by forming a commission, led by Lt. Col. Robert E. Lee, to test the system. Successful tests were carried out at New York harbor between Fort Wadsworth on Staten Island and Fort Hamilton in Brooklyn. In 1860, Myer lobbied the Senate to form a Signal Department. The reviewing committee was chaired by Jefferson Davis of Mississippi, who was not very enthusiastic. Myer finally obtained the position of Signal Officer with help from Senator Joseph Lane of Oregon. Major Myer had succeeded in forming the Signal Department, but their work was mainly limited to training regular troops as signalmen.

Myer joined an expedition against the Navajos in New Mexico under Col. Edward Canby and made the first use of flag telegraphy by the U.S. Army. The system was found to be not only very successful in sending messages, but also in collecting intelligence. Initially, the flagmen, who were enlisted men, knew only the movements, not even the individual letters they were sending and receiving. That part was left to the officers. The flagmen used up to a 6-foot flag on a 16-foot pole, achieving a range of 25 miles, and their effort was recognized and respected as hard physical work.

continued on page 8
There are two designs for the wigwag flags—white with a red square in the center, and red with a white square. The color is chosen to give the best contrast with the background. The International Morse Code is used for wigwag signaling; moving the flag to the right sends a dot, moving to the left sends a dash. Left: Director Kate Marks Persinger holding a wigwag flag.

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The American Civil War started in 1861, and many of the signalmen Myer had trained went to the Confederate side. The Confederate victory at the Battle of Manassas (Bull Run) was facilitated by their signaling of Northern troop movements. Union signalmen played a key role in directing Naval gunfire on Confederate forts. It was estimated that signals multiplied the gun’s effectiveness by a factor of 6. Myer established the Red Hill training center in Georgetown, near Washington. By October 1861, signalmen had linked the Potomac River line, more than 90 miles long, by flags.

Myer and Chief Signal Officer Cushing started developing cryptographic codes to prevent Confederate soldiers from reading Union field orders. They organized signalmen in three functions - reconnaissance, fire control, and general communication, using white flags for general messages, red for fire control. In the summer of 1862, Union troops at Antietam, near Hagerstown, Maryland, used flag signals to alert Gen. Burnside of Stonewall Jackson’s movements, possibly averting defeat. Brig. Gen. John Buford referred to the action as “wigwagging”, which, after being shortened to “wigwag”, became the official name for Myer’s system of flag signaling.

In January 1863, Congress enacted an appropriation bill that included the authorization to form a “temporary” Signal Corps. The new status had the advantage that there was room for promotion of qualified men without their having to leave the department. This gave Myer his chance to recruit and retain better-educated men without having them subject to being recalled to other service. It took until September 18 for Myer to be appointed Chief Signal Officer with the rank of Colonel. Myer had earlier been authorized to purchase a horse drawn telegraph station that he intended to use to link battlefields to nearby commercial lines. In January 1862, the U.S. government had taken control of all telegraphy under the Military Telegraph Department, mainly using civilian operators. After the creation of the Signal Corps, the electric telegraphs remained under command of the Military Telegraph Department. Myer’s insistence on controlling all types of telegraphy, and his suggestion that there had been financial improprieties in the Army’s dealings with the commercial telegraph companies, got him in trouble with Secretary of War Stanton, and he was relieved of his position. But in May 1864, he was brought back in as Chief Signal Officer by now Major General Canby, in preparation for the battle of Mobile Bay. Myer participated directly in the battle and personally accepted the surrender of Ft. Gaines. Signal Corps men were often involved in the very front lines of battle and suffered many casualties.

Myer resumed command of the Signal Corps in 1866. His Manual of Signals was used as a textbook by both the Army and the Navy. In 1869, he transferred his Signal Training School to Fort Whipple in Arlington, Virginia. He was largely responsible for forming the Meteorological Service of the Signal Corps in 1870, mandated to report the weather on the Great Lakes and coastal waters. The civilian element of that service became the U.S. Weather bureau in 1891. Myer retired from the Army in 1880 and died shortly thereafter. In 1881, Fort Whipple was renamed Fort Myer in his honor.

One could argue that the signal flag had as much effect in the Civil War as did radio in World War I or radar in WW II. In each case, the establishment did not at first understand the significance of the new technology, but quickly came to embrace it as vital to their operations. The Signal Corps came to be responsible for the development of countless communications and other electronics systems, including the SCR-268 and SCR-270 (Pearl Harbor) radars that are prominent exhibits in the Historical Electronics Museum. Amazing what wigwagging a simple piece of cloth tied to a stick would ultimately lead to.

References:
Our library continues to grow from donated books, surplus books from the Library of Congress, and sometimes a purchased book. The following four interesting books were recently added to the collection and all can be borrowed by using the library sign out procedure. To make it easy to locate each book at HEM, the shelf number is included here with the title and author.

**TUXEDO PARK**  
by Jennet Conant, 330 pp. 2002 [1.2.30]

This is a biography of an extraordinary individual, Alfred Loomis, whose influence on science was widespread before and during World War II. In the 1920’s he amassed a fortune, coasted through the Great Depression with no losses, and then devoted his time and money to his true interest, science. At Tuxedo Park, NY he created a laboratory which hosted the great scientists of the day. By being an excellent judge of promising scientific fields he put most of his energy into microwave radar, atomic research, the GCA blind landing system, and Loran. He was instrumental in forming the MIT Radiation Laboratory. Loomis was not famous to the public during his lifetime, but this book shows how great his contributions were.

**WIRELESS**  
by Sungook Hong, 248 pp. 2001 [1.2.31]

This book covers the development of radio from Maxwell’s theory, Hertz’s experiments, and Marconi’s triumph to the application of Lee de Forest’s audion to make possible the radios we know today. In addition to these well known individuals there was a host of other experimenters sometimes collaborating and at other times competing with each other. Details are given of the actual equipment used and the experiments conducted by all of these pioneers. This book gives insight into the scientific and engineering practices at the time when radio was coming into reality.

**EYE IN THE SKY**  

Years before the national objective of sending a man to the moon was announced there was an intensive program to build surveillance satellites for intelligence purposes here on earth. From this effort came the Corona satellites which monitored the Soviet Union between 1960 and 1972 with a total of 145 satellite launches. After declassification of the program in 1995 this book which tells the story could be written. The daunting technical design problems are covered, but just as interesting are details of how the surveillance information was used, the cover up stories that were created, and how different US presidents from Eisenhower to Nixon depended on Corona in steering national policy.

**CONTROLLED BOMBS AND GUIDED MISSILES OF THE WORLD WAR II AND COLD WAR ERAS**  
by Vernon R. Schmitt, 127 pp., 2002 [1.1.35]

Presently, when “smart bombs” are considered to be a recent advance in weaponry, it is interesting to learn of the guided bombs that were developed and sometimes used as far back as World War II. Guidance of these bombs was achieved in a variety of ways. Many were steered using radio control by an operator who could visually observe the bomb approaching the target. A more sophisticated design allowed the operator to observe a television picture of the target that was transmitted from the falling bomb. Other designs made the bomb autonomous and employed heat seekers or internal radar equipment. Both Germany and the US made use of guided bombs. This small book is a good introduction to this subject; but parts of the story are omitted, so hopefully a future book will be written to fill in the gaps.
Grand Fall Fest 2003
Wasn't that weather superb! HEMARC operated the equipment test table in Barn #1. Thanks to the fine equipment and good guidance of Fred Heath AI3Z we had a number of happy treasure finders. Test guidance was also provided by Nick Yokanovich K3NY, Gary Ryan W3GMY, Jim Smith N3ZPS, and Sam Dunkle KB3CYL. One buyer tried three Oscilloscopes before he found one that really functioned. As always, this Fall Fest proved to provide pleasant socializing of the HEMARC membership.

Hurricane Isabel
Murphy was busy elsewhere and the W3GR antennas were untouched by the storm. Several members checked before, during and after with all good reports. With amazing foresight, Gene Knapp W3BAB bought a gasoline powered generator the day before the big blow and maintained his Sky-Warn activities despite the absence of line power. Many of us were not so lucky. The W4PBG emergency battery proved to be very limited in life just when needed most. The big storm highlighted the need to do a better job of getting our emergency communications systems, gear and operations up to snuff and keeping them that way. A lot of hams did a fine job and are to be commended.

Memories of Field Day 2003
The pictures and memories of Field Day 2003 are in and we judge it to have been a good event for all involved. Time to start planning for Field Day 2004!

FCC Presentation at September Meeting
The Technical program at the September meeting was a presentation by Bill Cross, W3TN. Bill is the FCC Commissioner of the Amateur Radio Service and spoke on rule-making and regulations affecting the Amateur Radio Service. The talk was very informative and the Q&A session lively and interesting. All hams should be aware of these procedures.

Pearl Harbor Day Special Event Planned
The Annual Pearl Harbor Day Special Event station is planned for December 6 & 7. This event commemorates the tragic attack and the role of electronics in WW2. The museum has a recently refurbished the display of the Baltimore made radar that picked up the attacking aircraft. Operators, loggers and visitors are most welcome on both days.

Northrop Grumman Net
The Wednesday Northrop Grumman Net at

Don’t forget to visit HEMARC’s new web site: www.qsl.net/w3gr
HEMARC meets the second Thursday of each month from 5:30PM to 6:00PM.
Visitors are most welcome.
HEM Needs YOU!
Volunteer Opportunities

Become A Saturday Volunteer!
If you can donate a few hours one Saturday a month/every other month, then become an HEM volunteer! All you need is a sincere interest in providing public service to our visitors and a desire to be part of the HEM team.

Become A Tour Guide!
If you want to share your knowledge of electronic history or just want to interact with people, then becoming a tour guide is perfect for you. We are looking for people who want to lead groups of students and adults, for our non-technical and technical audiences! You don't need to be knowledgeable in electronics, we'll help train you!

Become a Collections Volunteer!
There are lots of fun things to do to help out with our collections! We need help with the accessioning of new artifacts, photographs, slides, negatives, and 35mm films, as well as many other jobs! Come join the team!

Adopt-a-Program
Review our archives for available information. Fill in the information with your recollections, identify and label photographs, solicit and edit recollections of others and generally ensure that the historical record for various projects are accurate and complete.

For more information, please call (410) 765-3803

Northrop Grumman "non-Working Hours" Net
The new NGC "non-Working Hours" Net meets on the FIRST SATURDAY of the month on 14.260 plus or minus a few at 8 AM PT, 9 AM MT, 10 AM CT, 11 AM ET, 1500Z. W3GR does the initial call up on 14.260. If that band does not pan out after 10 minutes or so, 21.360 will be tried. W3GR will pass the call around to be sure as much of the country as possible is covered.

Webpage
Visit the Club WebPage at www.qsl.net/w3gr for the latest info on training classes and special events. HEMARC Club minutes, eNewsletters and the 2003 W3GR Activities Calendar are also posted to the Website. Nick, K3NY, is planning to add links to Club members' pages. Send email to the Club at w3gr@arrl.net if you would like your page included.

Operations
W3GR is up and running for you to come in and enjoy CW or SB. The Museum would especially like to see it on the air Friday and Saturday. Remember that a copy of your license must be on file at the station before you operate.

3:00 PM EDT on 21.360+/10 continues with W3GR as the de facto net control station. Employees and retirees of Northrop Grumman, Litton Ships, Westinghouse, TRW, Nordon, North American Aviation, Hallicrafters, etc are all invited to join. More retirees are needed! See the Website at http://www.qsl.net/w3gr for details.

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Historical Electronics Museum
Membership Application

Name
_________________________________________
Address
_________________________________________
_________________________________________
City
_________________________________________
State __________ Zip __________
Phone
_________________________________________

Please make checks payable to Historical Electronics Museum, Inc.

Please check one:
___ Student Membership $15
___ Individual Membership $25
___ Family Membership $30
___ Supporting Membership $100
___ Life Membership $1000

Our mailing address is:
Historical Electronics Museum
PO. Box 746, MS 4015
Baltimore, MD 21203

The museum’s location is:
1745 W. Nursery Road
Linthicum, MD 21090
(Next to the Marriott Hotel)
(This is not a mailing address)

The museum hours are:
Monday through Friday
9 a.m. to 3 p.m.
Saturdays
10 a.m. to 2 p.m.
(and other hours by appointment)

ADMISSION IS FREE!
OPEN TO THE PUBLIC

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