

The Dipole

Radiating the News of the Marple Newtown Amateur Radio Club

November 2009

Next Club Meeting: Thurs. Nov. 5th, 2009, 7 p.m. at The Gauntlett Center

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PRESENTATION FROM OCTOBER

The Marple Newtown Amateur Radio Club (MNARClub), a group of FCC-licensed Amateur Radio operators drawn from Pennsylvania, New Jersey, Maryland, and Delaware has a long history of supporting education. During the regional organization's October 1 meeting, they extended Honorary Club membership to New York City's Joseph Fairclough. Mr. Fairclough has become internationally recognized for his innovative method of motivational learning.

The Radio Club of Junior High 22-NYC is associated with the FCC-granted Amateur Radio call WB2JKJ is New York City's largest Ham Radio Club. Additionally, this organization is the Nation's only full time non-profit organization that is striving to have Amateur Radio introduced into school curriculum throughout the nation. Their EDUCOM program fosters this theme through the "Education through Communications" concept...

Through Amateur Radio contacts, the students have found an appealing and rewarding way to understand math, social studies, varying world cultures, history, written communications, and other traditional study areas.

This recent program assemble by Media's Dan Amoroso, W3DI, was presented to 45 members of the regional Amateur Radio group is an ongoing association of more than 20 years between the MNARClub and the Radio Club of Junior High School 22, New York City.



Walter Faust (N3FXR), MNARClub president (left) presents a certificate of Honorary Membership in the regional Ham Radio group to Joseph Fairclough (WB2JKJ trustee)(right). Mr. Fairclough continues to be a pioneer in a successful learning technique that associates individual Amateur Radio contact with a standard learning curriculum.

MARPLE NEWTOWN AMATEUR RADIO CLUB
c/o The Gauntlett Center
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Newtown Square, Delaware County, PA 19073

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The Dipole

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Meetings, Nets, and Packet BBS
Monthly Club Meetings: First non-holiday Thursday,
7:00 p.m. at the Gauntlett Center in Newtown Square,
Delaware County. Talk-in: 147.195 repeater
Daily Weather and Information Net: Every morning at 8:30
a.m. on 147.195 repeater
Club Web Page (including online version of *The Dipole*):
<http://mnarc.org>
Delaware County ARES Net: Every Wednesday at 19:30 local

DX-pedition Planned

A very ambitious DX-pedition has been brought to the attention of the *eDipole* by Marple Newtown Amateur Radio Club (MNARClub) member Dan Amoroso, W3DI. Readers of the *eDipole* that have not followed other DX-peditions may need some background education about this type of radio adventure. They must understand that this type of

operation --, like the majority of vagabond or ambitious, Amateur Radio outings – is fueled by dreams and ambitions and transformed into reality by serious planning, skills, and a willingness to work within a team environment.

This DX operation will begin in Montana hopefully in November and last for two to three months.

The itinerary for this over-the-road trek will carry the Amateur Radio operations from north county of Montana and wend its way into Mexico, cross the Panama Canal and then tour select areas of South America. The initially planned areas of the southern part of the Western Hemisphere include Peru and the tip of Argentina.

Transportation for this outing will be done in a restored, Volkswagen Bus. The redo of the VW includes a new engine, new brakes, Jeep hi-back seats, and some well-planned special comfort items. The comfort additions include a three-inch memory foam bed, hot water, a small refrigerator, and solar panels.

The current radio equipment lineup includes the following:

- Icom IC706MKII-G/ transceiver
- Antenna: 8-foot fiberglass whip/IC auto-tuner

The compliment of operators is not totally complete at the press time of this issue of the *eDipole*. Interested personnel should possess the following characterizes:

1. Hold a General Class or higher Amateur Radio license as well as possessing other skills
2. Be drivers that have experience with standard, stick-shift transmission driving, as well as exhibiting the capability of demonstrating slow, careful driving skills.
3. Good health--no debilitating issues
4. Possessing a valid US passport
5. Make a good faith deposit of US\$500
6. Other skills that include capability of Skype operations, cooking experience, medical training and Spanish speaking experience

Interested participants in this DX-pedition are encouraged to make contact with the planners through gorvonj4@frontiernet.net or call/fax 1-406-837-0525.

Bonus Opportunity



The ARRL Handbook for Radio Communications 87th Edition

The Comprehensive RF Engineering Reference

- **The BIGGEST Handbook EVER!**
- **THE Standard. Period.**
- **At the radio...on the workbench...in the library**
- **BONUS!** Get the **HARDCOVER** edition for softcover price when you **order by October 31, 2009** or while supplies last. **Only \$49.95** (retail \$59.95 -- save \$10)
- **Hardcover. Includes book and CD-ROM.**
 - ARRL Order No. 1462 (ISBN 0-87259-146-**Limited Time \$49.95** (retail \$59.95))
- **Softcover. Includes book and CD-ROM.**
 - ARRL Order No. 1448 (ISBN 0-87259-144-1) **\$49.95**
- Since it was first published in 1926, **The ARRL Handbook** has been a mainstay for the radio electronic experimenter. A core resource for radio amateurs, hobbyists, engineers, and scientists, **The Handbook** is the single most authoritative reference on practical communications topics. It is both reference book and tutorial—woven together with practical applications and solutions.
- The “WOW” Factor!
- More than 60 authors and reviewers contributed over 70% **NEW** or completely revised content, making this the biggest Handbook...**ever** (over 1,250 pages). Including all new treatments of **digital communications technology**, solid-state **RF power amplifiers** and switch-mode

power supplies. Plus, even **MORE NEW PROJECTS:**

- **250-W solid-state amplifier for 160-6 meters.**
- **Variable-voltage bench supply using switch-mode modules.**
- **Antennas! Extended double-Zepp, multi-band horizontal loop and inexpensive Yagis for VHF/UHF.**
- **Station accessories, including a high-power 160/80 meter matching network for 43 foot verticals, a 100 W Z-match antenna tuner and transmitting chokes. ...and MORE!**

CD-ROM Included! Includes the fully-searchable book and new design software on CD-ROM. System Requirements: Windows[®] XP, Windows Vista[®] or Windows[®] 7, as well as Macintosh[®] systems, using Adobe[®] Acrobat[®] Reader[®] software.

Continuing the practices of the ARRL, the Acrobat Reader is a free download at www.adobe.com. It should be noted that PDF files are Linux readable.

- **NEW Table of Contents:**
- Electrical Fundamentals
- Analog Basics
- Digital Basics
- RF Design Techniques
- Computer-Aided Circuit Design
- Power Supplies, Modulation
- Oscillators and Synthesizers
- Mixers
- Modulators and Demodulators
- RF and AF Filters
- Receivers
- Transmitters
- Transceivers
- DSP and Software Radio Design
- Digital Modes
- RF Power Amplifiers
- Repeaters
- Propagation of Radio Signals
- Transmission Lines
- Antennas
- Component Data and References
- Circuit Construction
- Station Accessories

- Test Equipment and Measurements
- Troubleshooting and Repair
- Electromagnetic Compatibility and Direction-Finding
- Safety, Assembling a Station
- Space Communications
- Digital Communications
- Image Communications

A Path to Follow

As was cited in another feature within this month's issue of the *eDipole* [Region 3 Conference and its progress], there was acknowledgment of a New Zealand effort by that nation's Amateur Radio community. This text, while from "down under," has a great potential for here in the United States.

Rather than wait for the national conversations to take place, it would be fitting for this region to consider pioneering a regional effort that will "lift the profile of Amateur Radio" and to attract new Amateur Radio operators.



**INTERNATIONAL
AMATEUR RADIO
UNION
REGION 3
FOURTEENTH REGIONAL
CONFERENCE**



12 – 16 October 2009

Document No. 09/XIV/047

Agenda Item: 11.11

ZL3 Radio Buildathon Project

A Model to Lift the Profile of Amateur Radio & Attract New Amateurs.

A Paper from NZART prepared by David Searle,
ZL3DWS.

Introduction

In November 2008 and again in April 2009 "ZL3 Radio Buildathon" events were held in Christchurch, New Zealand. This involved radio amateurs assisting people, who had no prior

experience in electronic construction, to build working radio units.

The objectives for the events were:

- to bring members of the local radio clubs together in a joint project;
- to build small electronic projects in a self-help setting;
- to encourage participation by the general public, and
- to increase the profile of Amateur Radio.

Each Buildathon event was held in a local school hall on a Saturday morning.

Similar events have been held regularly in the USA, and more recently in Bath, UK. The local events were modeled on those organised by the Bath, UK, coordinator, Steve Hartley, G0FUW.

The first event attracted 27 participants, mainly local radio amateurs, their family, and friends. The project was to build TRF SW receivers designed by the doyen of modern day TRF's, Charles Kitchin N1TEV. The kits of parts were assembled in Christchurch.

The second event attracted 52 participants with many more participants from the general public. The youngest participant was just 10 years old, with the oldest being an 81 year old gentleman from Australia. Family involvement was very evident, including parents, brothers and sisters. The kit used this time was an MK484 broadcast radio imported from Australia.

Past Buildathon events have largely served those already involved or already interested in amateur radio or electronics. The objective of the local effort was to attract members of the general public, thus generating new recruits for the amateur radio service.

Public Relations and Event Promotion.

Publicizing both events was a challenge. A steep learning curve followed on how to create news, what really interests news media outlets, and how to gain their attention. After the first event copy and photographs were sent to community newspapers, local clubs and posted on a specially generated website. Coverage was achieved in *Break In*, and one local newspaper, (which would later prove its

worth) plus half a page (with photos) in *Practical Wireless* magazine (January `09) UK.

Following the second event, reports appeared in *Break In* (May/June `09) and *Radcom* (April `09) UK, and again in the local newspaper. Associating the activity with World Amateur Radio Day (April 18th) attract a reporter from a local daily newspaper. On arrival to report the activity the reporter asked "Has amateur radio been overtaken by the internet?" This was the only negative on an otherwise very constructive day.

The Break Through

The Christchurch City Council, like many councils around our world, encourages safe, secure, and supportive communities. One method of encouraging this is to offer grants for worthwhile community initiatives.

David, ZL3DWS reports: "We attended two meetings with Council representatives to present our case. After the second meeting we were telephoned to ask if we would hold Buildathons for groups of 10-13 year olds and selected youth clubs. It seemed that both representatives had seen the newspaper report before the meeting and were impressed!" A substantial grant soon followed.

Holding a Successful Buildathon?

The key objective is to bring people together, Amateurs and the general public. The project need not be complex nor represent the latest in technology. These events sought to introduce new comers to "the smell of solder" and their "first project" while meeting kindly amateurs who could help them get started. That was the objective and the reward, an experience that would last a lifetime.

To summarise: Keep it simple.

- Carefully consider the venue. A school was chosen as it was secure and familiar to all. It was also cost-effective and, in this project, the school Principal emailed to more than 100 schools suggesting they give publicity to the event in their school newsletters. Some did. Some didn't.
- Food. Youngsters still enjoy their cool drinks and food. Healthier snacks will keep parents happy and the builder even more alert!

- Safety. Never assume that everyone knows which end of a soldering iron to pick up or what to solder and where it was placed. Or how to correctly solder. It was found that 10 year olds learn exceptionally well.
- Communicate well and often. In this way everyone is clear on what to bring and what to do on the day. An early start on a Saturday morning can a challenge even for the keenest old timers.
- After the event review feedback and inform the news media and extend thanks to all who assisted. Build a brag book and post latest photos and reports to website.

Further information

Full reports and photographs of the events are available on the ZL3 Buildathon Project web site at <http://sites.google.com/site/zl3buildathon/>

NZART is confident that the model developed can readily be adopted and adapted by other Societies; and that the lessons learned will assist in the success of similar projects.

Acknowledgements

The generous support and financial assistance of local NZART members; The NZART Radioscience Education Trust; NZ Vintage Radio Society; and the Christchurch City Council is gratefully acknowledged.

Recommendations

That Conference;

Recognising that creative means must be used to generate and renew interest in the amateur radio service by the public generally and among young people in particular; and

Noting that considerable help and community funding can be available for genuine projects of education;

Commends the efforts of the "ZL3 Buildathon Team" and recommends the project to member societies as one avenue fo r introducing people to Amateur radio.

Researchers Need Help



Researchers are seeking copies of amateur station logs from 1913-1927, in hopes they may offer insights into the relationship between individuals' work and leisure activities, technology, and their social networks. This 1XM log from the Second Trans-Atlantic Test is signed and certified by Marconi Inspector and test referee D.E. Pearson. [Log courtesy of the MIT Radio Society]

A group of university researchers are looking for help from Amateur Radio operators and the families of deceased Ham Radio operators. This help is needed as researchers in two USA universities have announced they are studying early Amateur Radio station logs.

Need Your Help as they Study Early Amateur Station Logs

Researchers at the University of Wisconsin and Miami University of Ohio are seeking copies of Amateur Radio station logs from 1913-1927 in hopes they may offer insights into the relationship between individuals' work and leisure activities, technology, and their social networks.

"Early hams laid the foundation for today's use of technology for communications and entertainment," said Director of Engineering and Operations for Wisconsin Public Radio Steve Johnston, WD8DAS.

Johnston added, "Many operators did not work in a technical field, but pursued Amateur Radio as a hobby for its own sake. This is a true success story about how a pastime can develop into an entirely new commercial and social phenomenon."

Phil Kim, an Assistant Professor at the Wisconsin School of Business, has noted that diaries, letters, QSL cards and station logs can

contain valuable insights into the link between an individual's occupation, hobbies and friends.

Early in Amateur Radio history, thousands of Ham Radio enthusiasts were licensed by the government to comply with the Radio Act of 1912, and began to more carefully document the new communications era.

"Amateur Radio operators during this time period were on the forefront of a new method of communication and social interaction, similar to how social media is evolving today," Kim said. "We notice a lot of similarities between these two groups, even across time."



Researchers have noted that diaries, letters, QSL cards and station logs can contain valuable insights into the link between an individual's occupation, hobbies and friends. ARRL co-founder and its first President, Hiram Percy Maxim, sent this QSL card out in January 1925. [Photo courtesy of Anthony Quest, G4UZN]

Steve Lippmann, an Assistant Professor at Miami University of Ohio, concurred: "We can learn a lot about ourselves -- and our own interactions -- from how these pioneers pursued their hobby and expanded their social networks."

In an effort to uncover new information about approaches to work and leisure time and the development of social networks, Kim, Lippmann and Johnston are comparing early ham licensing records from the Department of Commerce with detailed information in amateur operators' station logs. If you happen to have an old ham station log from the period (1913-1927) that you would like to include in this study, please contact Steve Johnston, WD8DAS, via e-mail (johnston@wpr.org) or by telephone at (608) 262-5584.

"A jug fills drop by drop." –Buddha

"Neither current events nor history show that the major rule, or ever did rule." –Jefferson Davis

The Future

Dan Amoroso continues to unearth very meaningful programs for the monthly meetings of the Marple Newtown Amateur Radio Club. This list of programs begins with the upcoming meeting and this schedule extends through March 2010

2009:

- November - ARRL Technical Coordinator Joe Dozpat WA3UVP
- December – Annual Auction

2010:

- January- Dr. Denis Silage - K3DS QRP kit built during meeting
- February- Dr. Denis Silage - K3DS - completion of QRP kit
- March - Mr. Joe Vilardo - K3JV - New Digital modes

SKs from CQ Contest Plane Crash

Living up to its former identity, the American Radio Relay League became the sad relaying factor in announcing the death of four Amateur Radio operators in a plane crash. The four were en route to the CQWW Phone Contest.



Robert Biss, W8ZA, accompanied Radding, Steeble, Carter and Hargenrader to the Bahamas last year for the 2008 running of the CQWW SSB Contest. The crew getting ready to leave for C6: Ed, K3IXD/C6IXD; Dallas, W3PP; Pete, W2GJ/C6APR, and Bob, W8ZA (not pictured Randy Hargenrader, K4QO). [Photo courtesy of Robert Biss, W8ZA]



Bird Rock Lighthouse, ARLHS BAH-005, through the window of Pete Radding's W2GJ, twin-engine plane. [Robert Biss, W8ZA, Photo]



Bob, W8ZA, and Dallas, W3PP, look over the shoulder of Pete, W2GJ/C6APR, while calculating the weight and balance for the trip. [Robert Biss, W8ZA, Photo]



Dallas, W3PP tunes the 80/160 meter vertical under the watchful eye of Pete, W2GJ/C6APR. [Robert Biss, W8ZA, Photo]

Just after take-off -- around 6:30 AM on Wednesday, October 21 -- a twin-engine plane carrying four Amateur Radio operators crashed into the woods, only 250 yards off the end of the runway in Jedburg, South Carolina, about 20 miles northwest of Charleston. The plane -- piloted and

owned by Peter Radding, W2GJ -- carried Ed Steeble, K3IXD, Dallas Carter, W3PP, and Randy Hargenrader, K4QO. The four men were on their way to the Bahamas to operate in this weekend's CQ World Wide Phone Contest as C6APR, competing in the Multi/2 category.

Radding, of North Charleston, South Carolina, was 69; Steeble, of Summerville, South Carolina was 68; Carter, of Laurel, Delaware, was 67 and Hargenrader, also of Summerville, was 55. All were ARRL members; Radding and Steeble were Life Members.

According to Dorchester County Coroner Chris Nisbet, the four hams had made this trip before with Radding piloting the plane. Nisbet said Radding had flown to Delaware to pick up Carter earlier in the week.

"How quickly can a joyous event -- setting off with close friends in anticipation of a weekend of intense radio activity -- turn to unfathomable tragedy," said ARRL Chief Executive Officer David Sumner, K1ZZ. "As we mourn the loss of these four well-known members of our global Amateur Radio community, our hearts go out to their families."

Dorchester County Administrator Jason Ward characterized the crash site 250 yards east of the runway as "extremely severe" and that the plane was fully engulfed in flames when firefighters arrived; investigators were hindered by the flaming wreckage and "charred foliage" at the scene. A crew from the county public works department had to create a path to the wreckage. Chief Deputy Sheriff Sam Richardson said there was damage to treetops in the area of the crash. The coroner said it appears the severity of the crash, and not the fire, is what killed the men.

One of the victims was found beneath some of the wreckage, Ward said. Debris was spread around an area several yards wide at the crash site, and the wrecked plane was apparently upside down, he said.

It was extremely dark when the plane took off, Ward said. Airport Manager Don Hay said the weather was clear at the time. "[Radding] was a very experienced pilot who knew the area," Ward said. "He had been flying for over 40 years." Nisbet said Radding filed a flight plan detailing his route and who was on board, but the plane never climbed high enough for those plans to be activated.

Robert Biss, W8ZA, of Harpers Ferry, West Virginia, accompanied Steeble, Carter, Radding and

Hargenrader to the Bahamas last year for the 2008 running of the CQWW SSB Contest. "It was only one year to the day that I first flew with Pete Radding, W2GJ," he told the ARRL. "He was a good pilot with more than 40 years experience. He loved to fly and did a lot of it. Pete was also president of the Angel Flight organization for the Southeastern United States. I met Ed Steeble through common interests -- ham radio and contesting -- and the Potomac Valley Radio Club. In time, Ed became the Liaison Officer between my place of employment and his, and we spent more time together. He also joined our club station at work and became one of the operators at W8ZA Multi-Multi station for SSB DX contests. Even after he moved to South Carolina, he made the 10 hour trip several times to contest with friends. I had talked with Dallas many times over the years, but had never met him personally until just before we left for the Bahamas. I met Randy for the first time in October 2008 when we had our departure dinner in Summerville. It is just too hard to understand what went wrong this time. I will wait until the NTSB releases its report. Until then I will grieve along with their families and the ham radio fraternity, for we have lost four very special people in this one tragic event."

Radding's neighbor, Jim Deaton, said the man and others planned to stop in Florida, pick up more passengers and then head to the Bahamas.

Stella Bazzle, who lives about a half-mile from the airport, described to *The Summerville Journal Scene* what she heard right before the plane went down: "The motor sounded like it was coming over the house. I heard the first explosion...then the second (explosion) wasn't as loud." She described the engine noise as "kind of a funny noise, like a grinding type thing." Bazzle said she then heard ambulances and called her neighbor, who'd heard similar noises.

Carter, Steeble and Radding were members of the Potomac Valley Radio Club (PVRC), Carter and Radding were also members of the Frankford Radio Club (FRC). PVRC President Ken Claerbout, K4ZW, told the ARRL that he was "stunned and saddened" when he heard the news of the crash: "I had several e-mail exchanges with Dallas over the last two weeks about our Sweepstakes effort. He spoke with excitement of the group's trip to C6 for CQWW SSB and vowed to be on for Sweepstakes

CW. He said he might have to work during Sweepstakes SSB, but if not, he would be there! Dallas joined PVRC in 1963. Ed was also a very active member of PVRC before moving to South Carolina. Ed joined PVRC in 1992 and is a past chairman of our Northwest Chapter. Our thoughts and prayers go out to the friends and families of all four gentlemen. Another stark reminder of how fickle life can be."

In keeping with proper journalistic protocols, the ARRL extended gratitude to the many friends of the four Amateur Radio operators, *the Associated Press and The Summerville Journal Scene* for information in Newington's sharing of this news.

Did You Know?

One of the more important broadcasters today, is not a satellite-supplied format. For some, the availability of this service is a key ingredient in the "times of their lives," as well as the most important form of time accuracy for North America and other areas of the world.

The following text was presented by the ARRL. Like many of its features, their information is a valued source of accuracy and often information not easily found elsewhere.

The American Radio Relay League is both a strong voice and a massive force in educational tools.



WWV is located in Fort Collins, Colorado, about 60 miles north of Denver. As the Amateur Radio world knows, this unique radio station broadcasts time and frequency information



In the Pacific Rim, WWVH in Barking Sands, Kauai is America's second source of time and frequency information. In the foreground is the weather instrument tower, in background, standby 2.5 MHz monopole.

Today, most amateurs know radio stations [WWV](#) and [WWVH](#) broadcast time and frequency information 24 hours a day, seven days a week to millions of listeners worldwide. Administered by the National Institute of Standards and Technology ([NIST](#)), WWV is located in Fort Collins, Colorado, about 60 miles north of Denver; WWVH is located on the Island of Kauai, Hawaii on a 30 acre site near Kekaha at Kokole Point. Both stations broadcast information that includes time announcements, standard time intervals, standard frequencies, UT1 time corrections, a BCD time code, geophysical alerts, marine storm warnings and Global Positioning System (GPS) status reports.

Most hams today think of WWV and WWVH as "time stations." According to *QST* Editor Steve Ford, WB8IMY, that's only half-true: they are really time and frequency stations. "The time signals that you hear are regulated by an atomic clock that uses the oscillations of Cesium atoms as its standard -- 9,162,361,770 oscillations equal 1 second," wrote Ford in the June 1994 issue of *QST*.

WWV History

WWV has a long and storied history that dates back to the early days of radio broadcasting. The NIST has been involved with radio and radio frequency research almost from its founding in 1901. Scientists at the National Bureau of Standards (NBS), as it was then known, began research in radio frequency propagation as early as 1905. During World War I, the NBS had established its Radio Section, working closely with the military to research and develop radio techniques for defense and navigation.

"He that lives to live forever, never fears dying." –William Penn

"It's not the money. It's not the fame. It's the influence."
–Clay Aiken

The radio station call letters WWV were assigned to NBS in October 1919. Although the call letters WWV are now synonymous with the broadcasting of time signals, it is unknown why those particular call letters were chosen or assigned. By December 1922, officials decided that the station's purpose would be the transmission of standard frequency signals, as a reference standard for other radio broadcasters. The first tests of WWV as a standard frequency station were conducted in January 1923, with an output power of 1 kW.

After 1924, Amateur Radio saw new rules governing the Service, and what we know as "bands" came into being. Now that WWV had begun transmitting broadcast standard frequency signals, hams knew just where they were on the bands as to not be in violation of the rules.

A quartz oscillator made it possible for WWV to meet the needs of the radio industry, which desperately needed a reliable reference standard for frequency. The number of amateur and commercial radio stations was rapidly increasing across the United States, and it was essential for all stations to stay near their assigned frequencies so that stations would not interfere with each other, keeping the airwaves usable. By 1928, the Federal Radio Commission was calling for all commercial stations to stay within 500 Hz of their assigned frequency.

WWV and WWVH Today

"The [WWV] clock is accurate to 1 part in 1 trillion," Ford wrote in his article, "At the Tone..." "The transmitting frequencies are accurate to about 1 part in 100 billion. These signals serve as the most popular time and frequency standards for engineers, broadcasters, scientists, sailors, pilots and Amateur Radio operators worldwide. If the accuracy is good enough for astronomers, it's good enough for Amateur Radio. I don't think too many hams lose sleep whether or not their rigs are off frequency by 1 part in 10 million. When I tune in WWV and my frequency display reads 10 MHz, I'm happy in the knowledge that all is right with the world. If, on the other hand, my display read, 10.130 MHz I think I'd expect a problem in my rig before I'd get on the phone and call Fort Collins!"

Back in 1945, Isidor Rabi, a physics professor at Columbia University, suggested a clock could be made from a technique he had developed -- called atomic beam magnetic resonance -- in the 1930s.

That dream became reality in 1949, when the National Bureau of Standards announced that using Rabi's technique, they had developed the world's first atomic clock using the ammonia molecule as the source of vibrations.

WWV and WWVH operate in the HF portion of the radio spectrum. Both stations radiate 10,000 W on 5, 10 and 15 MHz, but WWV radiates 2500 W on 2.5 and 20 MHz, while WWVH radiates 5000 W on 2.5 MHz. Each frequency is broadcast from a separate transmitter. Although each frequency carries the same information, multiple frequencies are used since the quality of HF reception depends on many factors, such as location, time of year, time of day, the frequency being used and atmospheric and ionospheric propagation conditions. The variety of frequencies makes it likely that at least one frequency will be usable at all times.

The WWV antennas are half-wave vertical antennas that radiate omnidirectional patterns. There are actually five antennas at the station site, one for each frequency. Each antenna is connected to a single transmitter using a rigid coaxial line; the site is designed so that no two coaxial lines cross. Each antenna is mounted on a tower that is approximately one half-wavelength tall. The tallest tower, for 2.5 MHz, is about 197 feet tall. The shortest tower, for 20 MHz, is about 25 feet tall. The top half of each antenna is a quarter-wavelength radiating element. The bottom half of each antenna consists of nine quarter-wavelength wires that connect to the center of the tower and slope downwards to the ground at a 45-degree angle. This sloping skirt functions as the lower half of the radiating system and also guys the antenna.

Recent Antenna Changes

From 2000-2007 at WWVH, NIST has installed new antennas encased in fiberglass -- rather than traditional steel supports -- to resist corrosion from the salty ocean air. The fiberglass design will reduce maintenance and repair costs. The new design also enables the flexible, lightweight antennas to be easily lowered to the ground for maintenance, reducing safety hazards to staff. The improved antennas should reduce signal downtime for WWVH users. The 5 MHz antenna system consists of half-wave phased array vertical antennas. The 2.5, 10 and 15 MHz antennas are base-fed vertical monopoles that radiate

omnidirectional patterns. Each frequency also has a vertical monopole standby antenna connected to the standby transmitters, in the event that the primary system fails.

The signals broadcast by WWV and WWVH use double sideband amplitude modulation. The modulation level is 50 percent for the steady tones, 50 percent for the BCD time code, 100 percent for the second pulses and the minute and hour markers, and 75 percent for the voice announcements.

Next time you are tuning across the bands and hear WWV or WWVH, stop and listen -- there's a lot of history in those tones. -- *Thanks to NIST Special Publication 250-67, [NIST Time and Frequency Radio Stations: WWV, WWVH and WWVB](#), by Glenn K. Nelson, Michael A. Lombardi and Dean T. Okayama, for information on the early days of WWV.*

QC and Detective Work Yields a Problem

A collection of wonderful trips back into the regional outlets that where for years the sources of parts and dreams has fostered a more current problem with the parts used by today's electronic builders. Like so many of our daily consumables, the electronic component world has been invaded by Chinese knock-offs.

Some of these 'bargain' components are finding their ways into both research and manufactured items. It appears that the retail source makes no difference. We are being invaded by "look-a-likes."

One story that has been shared with the *eDipole* explains more about this problem.

A mobile radio manufacturer was being plagued with a repeating problem. That problem dealt with two negatives with any type of two-way radio manufacture. The transmitters had a very low output power and the receiver section had poor reception.

The problem turned out to be one particular capacitor on the circuit board, which was actually soldered to the back of the board. At first, the electronic trouble-shooting detective thought the problem might have been that of too much heat being applied to this component. We all know that heat can be a component killer.

This electronic detective began by replacing the suspect capacitors. Realizing that heat can indeed introduce damage and troubles, extra efforts were undertaken to avoid overheating the replacement suspect component.

Even with this careful diagnostic repair, a once-successful product design was experiencing a test-failure rate of nearly 50%. UGH

The value of this capacitor was of a low value, somewhere in the 27-pf region. The true detective spirit next looked to an investigation of the actual values of the entire stock of capacitors in the manufacture's storeroom.

The result was the first in a collection of shocks. The entire collection of the two-way radio manufacturer's stockroom supply of these labeled 27-pf components turned out to be 300 pf.

Continuing the investigation, the research left the corporate arena and these detectives sampled capacitors in the retail marketplace. Approximately half of the labeled 27-pf capacitors were found to be in error. Again, despite the labeling, again, the results showed the tested values to be 300 pf.

This research went one step more in this search for component truth. All of these components, regardless of sampling source, were from the same manufacturer. Even more disturbing was the discovery they came from different batches.

So much for faith in the component world. One simplistic comment would be, "One gets what they pay for."

Whatever happened to pride in the world of manufacturing.

Region 3 Conference and Its Progress

Not only do radio signals from USA Amateurs leave the boundaries of our nation, there is also a need for international dialog for our hobby to be both orderly and successful. ARU officials recently undertook this task as they attend the Region 3 Conference in New Zealand.

Hosted by the New Zealand Association of Radio Transmitters (NZART) officials from the International Amateur Radio Union ([IARU](#)) attended the IARU [Region 3](#) 14th Triennial Conference on October 12-16, in Christchurch, New Zealand. Attending were- IARU President Tim Ellam, VE6SH, Vice President Ole Garpestad,

LA2RR, and Secretary Rod Stafford, W6ROD, along with Region 1 President Hans Blondeel Timmerman, PB2T, Region 1 Secretary Dennis Green, ZS4BS, and Region 2 Secretary Ramon Santoyo, XE1KK.

Attending the Christchurch gathering were delegates from 10 Member-Societies -- ARRL (USA), ARSI (India), CRSA (China), HARTS (Hong Kong), JARL (Japan), KARL (Republic of Korea), NZART (New Zealand), ORARI (Indonesia), SARTS (Singapore) and WIA (Australia)

I was noted that the Member-Societies of RAST (Thailand), RSGB (Great Britain) and VARC (Vietnam) -- were represented by proxy.

Joel Harrison, W5ZN, ARRL President, represented the ARRL. Also attending for the ARRL was the organization's Chief Executive Officer and former IARU Secretary David Sumner, K1ZZ.

According to the League's Sumner, the IARU Region 3 Directors had identified two topics as being highly important-- the IARU Monitoring System and Emergency Communications. Major decisions were made on both of them.

At the triennial meeting, three working groups were established:

The IARU Monitoring System (MS) (WG-3)

Policy matters that included education, training, development of Amateur Radio and international and regional conferences involving radio administrations (WG-1).

Operational and Technical Matters, including Emergency Communications, the IARU R3 Award and band plans (WG-2).

An outcome of this Conference was the reality that the Amateur Radio services must take action to protect their bands. Without any complaints about an intruder causing harmful interference, it may be claimed that there is no breach of the ITU Radio Regulations. There was keen interest and participation in that working group. As a result of its work, the Conference resolved to acknowledge the contributions over many years of the IARU MS Region 3 Coordinator Arasu Manohar, VU2UR.

The Conference identified the need to update and modernize the IARU protocols as well as the procedures. This was done to aid in having a process that will effectively deal with intruders causing harmful interference in the Amateur Radio

bands. A package of proposed measures adopted by the Conference included the following:

Greater coordination between the IARU MS coordinators in the three IARU regions,

A single Web site to more effectively collect data on intruders and to record action being taken on them

Provide information to assist those submitting intruder observation reports.

The Conference confirmed the importance of participation in regional telecommunication organizations, which are setting directions on regulatory matters that could have impact on amateur services. Wherever possible, IARU Member-Societies are encouraged to be involved in that activity. The regional telecommunication organization's decisions significantly influence the decisions taken by the ITU World Radiocommunication Conference (WRC). It was noted that WRC-12 is scheduled to take place in January 2012.

New Zealand's Member-Society, NZART, received praise for a number of its initiatives. One of these initiatives was its "ZL3 Buildathon" project that involved the encouragement of electronic project construction in schools and elsewhere in the community to lift the profile of Amateur Radio [see additional discussion about this topic in the November 2009 feature "A path to follow"].

Another of the New Zealand's Member-Society's contribution was "Radio WAVE" " project

[<http://www.nzart.org.nz/waves/HandsOnToRadioWaves-Project.pdf>]. This presentation demonstrates the principles of radio frequency propagation, polarity and effective radiated power.

The Conference heard that the Amsat-ZL's KiwiSAT Amateur Radio satellite project was undergoing final development. It was noted that difficulties have arisen, due to US restrictions on the export of technology. KiwiSAT was expected to be ready for launch in 2010, although no decision has been made on launching it into orbit.

*"A man is not old until regrets take the place of dreams.
-John Barrymore*

*"All our dreams come true,
if we have the courage to pursue them."
-Walt Disney*



Amsat-ZL's KiwiSAT Amateur Radio satellite project. Mark 2 design with improved Solar cells and enlarged structure.

A total of nine documents on the agenda referred to Emergency Communications and Amateur Radio. ORARI and CRSA were highly commended on the role that they and Amateur Radio operators had played in Indonesia and China after major natural disasters.

The Conference considered the concept of emergency Center of Activity (CoA) frequencies worthwhile, and adopted 3.600, 7.110, 14.300, 18.160 and 21.360 MHz. These have been immediately included in the IARU Region 3 Band Plans.

It was noted that the CoA frequencies are not spot frequencies, but starting points + or - 5 kHz. Additionally cited was that these are not the only frequencies to be used and are not mode specific and should be considered as being "all modes."

In a parallel activity, the Conference also encouraged radio societies and emergency groups to include how best to publicize the role of Amateur Radio operations during emergencies and make it known internationally in their planning and training.

There were other agenda items that were considered during the Conference. They included the following:

- Amateur Radio Direction Finding (ARDF)
- Better utilization of all allocated amateur bands
- BPL/PLT, EMC
- Visitor licensing

- Liaison between societies and the radio administrations in their nations
- Operating ethics and standards
- Support for the development of Amateur Radio in the region.\

The IARU recognized the work of Bob Knowles, ZL1BAD, on his retirement as the IARU MS Coordinator. He has held this position for more than 20 years.

The Conference elected Peter Young, VK3MV, as the IARU R3 Regional IARU MS Coordinator. Concluding this segment of the Conference activities, all other regional coordinators were reappointed.

It should be noted that this conference received two invitations, one from ORARI for Bali, Indonesia, and another from VARC for Ho-Chi-Minh City, Vietnam to host the next Conference. The delegates voted in favor of accepting the VARC invitation for the 15th Conference in late 2012.

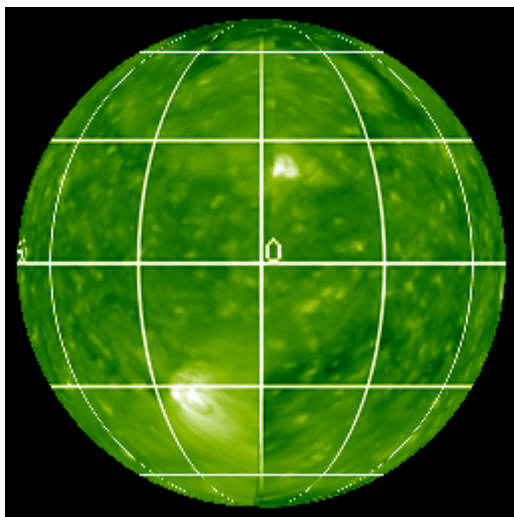
Did You Know This?

- No piece of paper can be folded in half more than seven (7) times. Oh go ahead...I'll wait...
- Donkeys kill more people annually than plane crashes or shark attacks.
- You burn more calories sleeping than you do watching television.
- Oak trees do not produce acorns until they are fifty (50) years of age or older.
- The first product to have a bar code was Wrigley's gum.
- The King of Hearts is the only king WITHOUT A MOUSTACHE
- American Airlines saved \$40,000 in 1987 by eliminating one (1) olive from each salad served in first-class. [look what that trend started!]
- Venus is the only planet that rotates clockwise. (Since Venus is normally associated with women, what does this tell you? Could it be that women are going the 'right' direction...?)
- Apples, not caffeine, are more efficient at waking you up in the morning.
- Most dust particles in your house are made from DEAD SKIN!

- The first owner of the Marlboro Company died of lung cancer. So did the first 'Marlboro Man'.
- Walt Disney was afraid OF MICE!
- PEARLS MELT IN VINEGAR!
- The three most valuable brand names on earth: Marlboro, Coca Cola, and Budweiser, in that order.
- It is possible to lead a cow upstairs, but not downstairs.
- A duck's quack doesn't echo, and no one knows why.
- Dentists have recommended that a toothbrush be kept at least six (6) feet away from a toilet to avoid contact by airborne particles resulting from the flush. (This may be the time to move the toothbrush into the living room now!)
- And the best for last.... Turtles can breathe through their rectums (Are they the only animal that has this characteristic?)

STEREO and Its Benefits

STEREO in a unique application associated with solar activities consists of two space-based observatories - one ahead of Earth in its orbit, the other trailing behind. With this new pair of viewpoints, scientists will be able to see the structure and evolution of solar storms as they blast from the Sun and move out through space.



This image is a still of the rotating image found at the STEREO Web site, listed below.

This movie shows a spherical map of the Sun as it currently appears, formed from a combination of

the latest STEREO *Ahead* and *Behind* beacon images. The movie starts with the view of the Sun as seen from Earth, with the 0 degree meridian line in the middle. The map then rotates through 360 degrees to show the part of the Sun not visible from Earth. There is a black wedge noticeable in this movie. It shows the part of the Sun not yet visible to the STEREO spacecraft.

During the first week of autumn, propagation-minded Amateur Radio operators received a double-dose of good news. Right at the time of the Autumnal Equinox, on Tuesday, September 22, sunspot 1026, a new Cycle 24 sunspot, came into view over the Sun's eastern horizon. We watched this emerge a week ago on the Sun's far side via the STEREO project (see <http://stereo.gsfc.nasa.gov/>).

STEREO has been described as a fantastic tool. Why? Because it gives us all a live view of nearly the whole Sun, and it displays very recent images. It turns out that images from each craft--the ahead (leading earth in its orbit) and the behind (trailing earth in its orbit) satellite—are updated approximately every 15 minutes! As Amateur Radio operators wait in anticipation of solar activities, STEREO can help remove anticipation. No more guessing about activity on the other side of the Sun, because we can see it live in animated form based on real time data.

When viewing the animated Sun display readers of the *eDipole* will see there are longitude lines every 30 degrees. Since there are twelve of them, and a rotation of the Sun takes approximately 27.5 days (it varies by latitude), then on average it takes about .0764 days (1 hour, 50 minutes) for the sun's rotation to progress one degree longitude. Therefore, when we saw the sunspot at -120 degrees longitude, we could estimate that it would take about 2.2917 days (2 days and 7 hours) for the spot to reach the Sun's eastern horizon (at -90 degrees) and first become visible.

This becomes a welcomed form of “new math.”

It appears to many DX hunters that STEREO has come at a very opportune time.

Planning and Knowledge Pay Off

Many years ago when National Geographic began to shock readers with the vivid images that could be captured by the then new color film, it was

standard practice to have camera data accompanying every photo.

Virginia Jennings, KA3VZG, shared this very vivid image. She is a daughter of Jack Kramer, KA3PJC.

This story was aired by the news arm of England's prestige broadcaster and nationally funded BBC.

As has been demonstrated by many of the current generation of Amateur Radio operators, cameras and radios are a natural combination. Within the Marple Newtown Amateur Radio family this is well documented by the artistic talents of "Bud" Turner, N3IUT.



Jose Luis Rodriguez's haunting portrait of an Iberian wolf won over the judges

Hasselblad 503CW with a 6x6 Fujichrome backing + Planar 80mm lens; 1/30 sec at f11; ISO 50; purpose-made Ficap infrared camera trap

Not all photographic images are unplanned. The contrary of unplanned image capturing was responsible for this picture of a hunting wolf. This photograph has won the prestigious Veolia Environment Wildlife Photographer of the Year 2009 award.

The story behind this picture is a study in patience and planning. This picture that was captured by Jose Luis Rodriguez also captured the imaginations of the judges. The planning for this well researched image had taken year. It was even sketched out on a piece of paper.

In describing his quest for the image that earned this enviable award, Rodriguez volunteered "I wanted to capture a photo in which you would see a wolf in an act of hunting - or predation - but without blood. I didn't want a cruel image."

In what many Amateur Radio, DX hunters have exhibited, patience was key ingredient in the success of this image. The award-winning artist also added that the careful observation of the wolves' movements became an ingredient in his success in taking the award-winning photograph.

Incorporating some current science tools, Mr. Rodriguez used a custom-built infrared trap to snap the wolf in the instant it leapt into the air. This device included a motion sensor and an infrared barrier to operate the camera.

This subspecies of the gray wolf lives close to human habitation in northern Spain. They are often persecuted by people who see them as a threat to livestock, and they are consequently very wary. Because of this shared environment, he feared that he might not be able to get close enough to the Iberian wolves.

The careful research included his observations that this subspecies of gray wolf returned to the same spot to collect food each night. This observation provides the foundation for the planning of Mr. Rodriguez dream shot.

Another contributing factor was the beauty of how these beautiful animals live alongside their human neighbors.

Cars Can Become Too Small

Gary Bodnar, K3GZ sent this image. Indeed, not everyone will fit into the newer, smaller, and less fuel-consuming vehicles. This is claimed to NOT be trick photography.



It may be a wise move to only consider installing an HT and a sidebar amplifier in this

vehicle. It is doubtful if there will room for anything much larger.

Sad News

An old saying, “Bad news travels fast” has been validated through the unfortunate deaths of parents and their son. Adding to the impact was the added information that the deceased were Amateur Radio operators whose death occurred during their erection of an antenna.

The initial brief print story was for many the first awareness of this sad information. The next reaction was to share this news with other fellow Ham Radio operators.

The following was the initial print information as supplied by the Associated Press:

Florida Family Electrocuted Trying to Put Up Radio Antenna

Tuesday, October 13, 2009

PALM BAY, Fla.—Police say a mother, father and 15-year-old son were electrocuted while putting up a ham radio antenna in their Palm Bay home.

The victims were not identified Tuesday morning.

Authorities say rescue crews responded to a 911 call about the electrocution Monday evening when they found the three on the ground not breathing.

Authorities say the family was attempting to raise the antenna when they lost control of the pole and it struck an overhead power line. The impact sent 13,000 volts of electricity through the pole the three were holding.

The woman was pronounced dead at the scene. The father and son were taken to a hospital where they were pronounced dead.

Depending upon the retention policies of the Orlando, Florida Fox television outlet, additional information about this collection of four death may still be viewable by visiting the following URL:

http://www.myfoxorlando.com/dpp/news/brevard_news/101209_Three_dead_from_electrocution

Hibernation Year Round

Charles Higgins, a long-time and appreciated contributor to the *eDipole*, shared an environmentally-based concept. In a recent release that told of “greening” one’s computer, Microsoft share information about energy saving capabilities of computers.

Do you need to turn off your PC at night?

By Monte Enbysk

For many years now, I’ve been shutting off my computer at night. But I’m now convinced you can leave your computer on at night and still conserve as much energy.

If you’re a Windows user, just set up your PC to “hibernate” overnight. “Hibernate” powers down your monitor to about 5 watts of energy and your PC to 2.3 watts—virtually the same as turning your PC off (your monitor uses zero watts when turned off; more on this below). Either way, you save as much as \$90 a year in power costs compared to a PC left on with a 3-D screen saver running.

“Well, duh. Welcome back from the Disco Era,” many of you are thinking. You already knew all this.

Maybe so, but the question keeps coming up, year after year: Should you shut your computer down at night or leave it running? Some time ago, I touched on the issue in a previous column—I essentially passed on the recommendation of the good folks at Energy Star, a product-labeling program sponsored by the U.S. Environmental Protection Agency, that “if you are going home for the day, turn it off.”

“Andy in Austin” triggered my interest in revisiting the subject by raising the question in tech guru Kim Komando’s weekly e-mail newsletter. “Should I shut my computer down at night? Or is it better to leave it running?” he asked. Komando’s response, in a nutshell: “The truth is, it really doesn’t matter.”

The truth is, if you use the “hibernate” feature of Windows XP (and previous versions including Windows 2000 and

Windows Me), or even the “sleep” feature of most new Dell and other PC models, it really doesn’t matter much. Even the folks at Energy Star agree you save almost as much energy as you do turning off your computer for the night (minus unplugging it). And you won’t have to endure a lengthy “re-booting” process the next morning; your computer should “wake up” in 30 seconds or less.

Again, I may not change my habits. I like the security of having it off (though locking your system or logging off is just as secure), and I like the ability to shake the cobwebs from my system on a daily basis. I also like not having to worry about any issues that may result from a power outage. But, with every minute I spend booting up in the morning, I can see why someone would rather leave their machine on.

Turn it off, they still say

Full disclosure: Those at Energy Star still prefer that you turn your computer off at night, for maximum energy savings. “We are all about energy savings, and when you shut off your computer at night, you save the most energy,” says Craig Hershberg, program manager for office equipment and consumer electronics. “Every little bit helps. It all adds up.”

But Energy Star supports the practice of putting computers in “hibernate” or “sleep” mode—most newer Dell desktop PCs, among other models, contain “sleep state” power-management programs that work similarly as “hibernate.” Energy Star applauds companies such as Cisco Systems and Pitney Bowes that have made enabling computers to “hibernate/sleep” at night a company policy. (The organization issued press releases touting the dollar volumes in energy savings at each company.)

Hershberg estimates that as many as 50 percent of U.S. users are enabling their PCs to “hibernate/sleep” at night, a percentage Energy Star hopes will continue to climb—even if the users are doing it for the wrong reasons. Many users simply don’t like the 2-5 minutes it takes to re-boot a shut-off computer; they’re more concerned about the re-boot time than saving energy. For that

reason, and because the power-management features in Windows continue to be improved, “the trend is for fewer people to be shutting off their computers at night,” he says.

However, here are some consumer “myths” that are worth addressing:

Turning your PC off uses more energy than leaving it on. Not true. The small surge of power you use when turning it on—which varies per PC make and model—is still much smaller than the amount you use in keeping it on for lengthy periods.

Turning your PC on and off wears it out. A decade ago, there was something to this, but not today, say Hershberg and others. It used to be that PC hard disks did not automatically park their heads when shut off, and that frequent on/off cycling could damage the hard disks. Today’s PCs are designed to handle 40,000 on/off cycles before a failure, and that’s a number you likely won’t reach during the computer’s five-to-seven-year life span.

Screen savers save energy. Not true. Screen savers, at a minimum, can use 42 watts; those with 3-D graphics can use as much as 114.5 watts, according to Don McCall, a Dell product marketing manager who does power measurement studies for the PC manufacturer. “It’s absolutely wrong thinking that a screen saver will save energy,” he says.

Your computer uses zero energy when “off.” That’s true only if it is unplugged. Otherwise, the PC utilizes “flea power,” or about 2.3 watts, to maintain local-area network connectivity, among other things, McCall says. In “hibernate” mode, your PC uses the same 2.3 watts; in “sleep” mode, your PC uses about 3.1 watts. Monitors do use zero energy when turned off.

Lab tests done by Dell show that a PC running Microsoft Office Small Business 2007 uses 42.7 watts, McCall says. If it runs continuously at that rate for 365 days, at 7 cents per kilowatt-hour, the power consumption costs would be \$26.18 for the PC and \$45.99 for a regular monitor, for a total of \$72.17 for the workstation.

Flat-panel monitors use less energy (22 watts when left on, 3.3 watts in “sleep” mode) than regular monitors (75 watts when left on, 5 watts in “sleep” mode), McCall says. So the same workstation with Microsoft Office running for a year would use \$39.67 in power with a flat panel.

Meanwhile, if a PC was kept in “sleep” mode for 20 hours, for every four hours “on,” as Dell recommends, the annual energy costs per PC would total \$16.17 with a regular monitor and \$9.88 with a flat panel. Using “hibernate,” the costs would be slightly cheaper.

Enabling “hibernate”

As I said, “sleep” mode is available on most newer Dell PCs, among other models, while “hibernate” is available to any user with Windows Vista Ultimate and previous versions from Windows 98 Second Edition on. (The feature was greatly improved for Windows 2000 and Windows Me, and further improved for Windows XP, which wakes faster from “hibernate” than any previous version).

To enable “hibernate,” simply go to your Control Panel, click Power Options, and set your PC to “hibernate” after a specified time (most recommend 30 minutes).

If you are away from your PC a lot during the work day, you may want to set it to “hibernate” after 45 minutes to an hour, and set it to “standby” to 15 minutes. Under “standby,” you’ll be conserving power but you won’t be saving your computer memory onto your hard disk, as you will with “hibernate.” “Standby” is meant for shorter absences.

Better Than a Weather Report

Even a short glance at each of the Philadelphia area television stations will provide testimony that weather is an important element in the money generating concept of area broadcasting. The rural, agricultural needs provided a segment of this justification. Knowing how to dress the school children and recreational plans also contribute to the impact of weather reporting.

While Amateur Radio operators have their own reasons for knowing about the local weather. This same group of community communicators has another reason for yet another kind of weather reporting.

The sun, that big bright light in the sky will hopefully begin its impact on Ham Radio communications. The radiation from our star can also have negative impacts. All of this special space weather has been explained in an extremely easy to understand format.

The NOAA/Space Weather Prediction Center has assembled a collection of Space Weather Scales. These numeric values bring this information “down to earth.”

The NOAA Space Weather Scales were introduced as a way to communicate to the general public the current and future space weather conditions and their possible effects on people and systems. Many of the SWPC products describe the space environment, but few have described the effects that can be experienced as the result of environmental disturbances.

These scales will be useful to users of other NOAA products and those who are interested in space weather effects. The scales describe the environmental disturbances for three event types: geomagnetic storms, solar radiation storms, and radio blackouts.

The scales have numbered levels, analogous to hurricanes, tornadoes, and earthquakes that convey severity. They list possible effects at each level. They also show how often such events happen, and give a measure of the intensity of the physical causes.

For more information, check out the NOAA site at...

<http://www.swpc.noaa.gov/NOAAscales/>

“Forgiveness is a gift you give yourself.” –Suzanne Somers

“A true friend never gets in your way unless you happen to be going down.” –Arnold H. Glasow

“Friendship... is not something you learn in school. But if you haven’t learned the meaning of friendship, you really haven’t learned anything.” –Muhammad Ali

*“Nobody can bring you peace but yourself.”
–Ralph Waldo Emerson*