

SQUAKBOX

Issaquah Amateur Radio Club

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March 2019

Riley Hollingsworth, K4ZDH, to Oversee Volunteer Monitors Development and Implementation

Riley Hollingsworth, K4ZDH, will oversee the development and implementation phases of ARRL's new Volunteer Monitors (VM) program, which will replace the Official Observers (OO) program. Hollingsworth, who once handled Amateur Radio enforcement for the FCC, has stepped down as ARRL Atlantic Division Vice Director to avoid any appearance of a conflict of interest. The development phase of the program is already under way.



"I am grateful for the Atlantic Division ARRL members support-

ing me, but I think I can better serve the Atlantic Division and all ARRL divisions by working in the Volunteer Monitors program," Hollingsworth said in his resignation letter. A new Atlantic Divi-

(Continued on page 4)

Earth's Magnetic North Pole Shifts toward Siberia

National Centers for Environmental Information (NCEI) scientists have updated the world magnetic model (WMM) mid-cycle, as Earth's northern magnetic pole has begun shifting quickly away from the Canadian Arctic and toward Siberia, an NCEI report said this week. While the new WMM more accurately represents the change of the magnetic field since 2015, it has no impact on propagation.

Updated versions of the WMM are typically released every 5 years. This update comes about 1 year early.

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March Program

More Summits On The Air

John O'Brien K7JRO will be presenting more of his experiences with SOTA activations.

Future programs are as follows:
Apr - Coast to Coast , W7BMH
May - GoTennas, W4MHI

Contact Joe KF7BMD 425-985-1562 to volunteer.

At the last meeting . . .

February 6, 2019

Meeting canceled. Issaquah Senior Center was closed due to snow.

The 2019 QST Key Design Competition

Hams have been building their own Morse keys since the dawn of Amateur Radio, and some creations have become legend. In 2019, QST is inviting participants to submit their best Morse key/paddle designs in the QST Key Competition. Design styles can include straight key, semiautomatic key (bug), paddle, or side-swiper. The winner in each category will receive \$250. Only one entry may be accepted per person or team, and the deadline to submit is June 1, 2019.

Entries must include the actual key (it will be returned following



A straight key originally designed and built by Hiram Percy Maxim, W1AW, ARRL's first president and cofounder. The key was provided courtesy of the Antique Wireless Association.

judging), as well as detailed draw-

(Continued on page 4)

E-Mail Elmer

Got a HAM radio question and can't find an Elmer to talk to? Just send your question by E-Mail to our E-Mail Elmer at:

Elmer@w7bi.com - Ed. - S

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New Plan Aligns ARES with the Needs of Served Agencies

The new ARES Plan adopted by the ARRL Board of Directors at its Annual Meeting in January represents an effort to provide ARES with a clearly defined mission, goals, and objectives; specific training requirements, and a system for consistent reporting and record-keeping. The Board's Public Service Enhancement Working Group (PSEWG) spent more than 3 years crafting the ARES Plan which, ARRL officials believe, provides a much-needed update of the program's role in public service and emergency preparedness in the 21st century. Concerns focused on bringing ARES into alignment with the National Incident Management System (NIMS) and Incident Command System (ICS), and creating more consistent and standardized ARES training requirements. Given dramatic changes



and upgrades in national, regional,

(Continued on page 3)

ARES Cont.

and local emergency and disaster response organizations, ARRL faced a major challenge, said ARRL Great Lakes Division Director Dale Williams, WA8EFK, who chaired the PSEWG.



"If we didn't address these issues, such as training standards and organizational management, ARES faced the very real possibility that it would no longer be viewed as a valid and valuable partner in emergency and disaster relief situations," Williams said.

With input from ARES members and a peer review team, and the assistance of emergency response officials with some partner organizations, the PSEWG came up with a plan that provides guidelines to ensure that ARES remains a service of organized, trained, qualified, and credentialed Amateur Radio volunteers who can provide public service partners with radio communication expertise, capability, and capacity, Williams added.

Training requirements in the final ARES Plan consist of the free FEMA Professional Development Series of independent study (IS) courses, as well as the ARRL's EC-001 and EC-016 emergency communication courses. The ARRL Board approved a proposal to make the ARRL EC courses free

for ARES members.

The plan highlights some additional training programs that ARES participants are encouraged to consider taking, but that are not required, such as AUXCOMM and training courses like ICS-300 and ICS-400.

The ARES Plan outlines a three-tiered membership structure based on increased responsibility levels and accompanying training requirements. The optional tiered system serves to define three distinct ways to participate in the ARES program, leaving it up to participants to determine their level of involvement.

The ARES Plan points out that public service events such as parades and marathons are within the realm of ARES activity and are an integral part of effective training.

The Plan notes that training requirements are ultimately the responsibility of the Section Manager, with each SM approving training for local ARES teams, as local conditions and needs dictate.

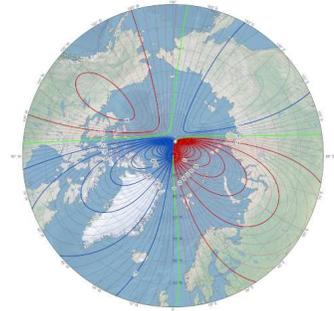


ARRL Great Lakes Division Director Dale Williams, WA8EFK.

The ARES Plan also highlights the relationship between ARES

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Magnetic North Pole Cont.



This map shows the location of the north magnetic pole (white star) and the magnetic declination (contour interval = 2°) at the start of 2019. [Photo courtesy of NOAA NCEI/CIRES]

"This out-of-cycle update before next year's official release of WMM 2020 will ensure safe navigation for military applications, commercial airlines, search and rescue operations, and others operating around the North Pole," said NCEI, which is part of the National Oceanographic and Atmospheric Administration (NOAA). "Organizations such as NASA, the Federal Aviation Administration, US Forest Service, and many more use this technology. The military uses the WMM for undersea and aircraft navigation, parachute deployment, and more." Other governmental entities use the technology for surveying and mapping, satellite/antenna tracking, and air traffic management. Smartphone and consumer electronics companies also rely on the WMM to provide consumers with accurate compass apps, maps, and GPS services.

Airport runways may be the most visible example of a naviga-

(Continued on page 4)

ARES Cont.

and the National Traffic System (NTS).

Williams noted that, within the ARES structure, the Emergency Coordinator (EC) will continue to lead the ARES team locally during an incident, while the District and Section Emergency Coordinators will continue to serve as resources and support for the EC. The ARES Plan stresses that ARES participants are not first responders, and it encourages ARES leaders to develop and grow their group's partnerships with state emergency management agencies and officials. Williams said the adoption of the ARES Plan is not the end of this process.

"ARES cannot remain stagnant only to be updated once every few generations," he said. "The ARES Plan, and the ARES program, must be able to evolve." Williams added that the ARRL Headquarters emergency preparedness staff will review the program annually to ensure its continued relevance. – ARRL Letter, 2/21/2019 - S

Ab Things

Milli, kilo, mega and micro are familiar prefixes used in our hobby and we may recognize prefixes like nano and giga, even if we don't use them. I was surprised to learn there is also a group of units beginning with the prefix ab. They are centimeter-gram-second electromagnetic units and they (at least those that I found) are listed below.

Abampere 10 amperes

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Magnetic North Pole Cont.

tion aid updated to match shifts in Earth's magnetic field. Airports around the country use the data to give runways numerical names, which pilots refer to on the ground. The declination has changed slightly more than 2.5° over the past 2 decades or so. Compasses use declination -- the difference between true north and where a compass points -- to help correct navigation systems for a wide variety of uses. -- Thanks to NOAA-NCEI – ARRL Letter, 2/7/2019 - S



Key Design Cont.

ings, photos, and a written narrative. Winners will be chosen based on ingenuity of design, ergonomics of operation, and overall craftsmanship. The judges' decisions are final.

The key must be an independent mechanical device, not an integral part of another device, such as an electronic keyer. Keys must be the sole creations of the entrants and not available for sale.

Complete details and entry requirements will appear in the January 2019 edition of QST. The digital edition will go live on Friday, December 7, 2018. – ARRL Letter, 12/6/2018 - S

Volunteer Monitors Cont.

sion Vice Director will be appointed.

ARRL President Rick Roderick, K5UR, said that Hollingsworth was the ideal person to lead ARRL's efforts in the development and implementation of this joint program with the FCC.

"I support Riley's decision to concentrate his efforts on this very valuable project on behalf of the ARRL," Roderick said.

Approved by the ARRL Board of Directors last July, the Volunteer Monitors will work in cooperation with the FCC. Volunteers trained and vetted by ARRL will monitor the amateur bands for possible instances of misconduct or to recognize exemplary on-air operation. Cases of flagrant violations or noncompliance will be directed to the FCC for action, in accordance with FCC guidelines. The program, which aims to re-energize Amateur Radio enforcement efforts, was proposed by the FCC following the closure of several FCC regional offices and reductions in field staff.

Hollingsworth has identified three phases to the program -- development, solicitation and training, and implementation. The development phase will include drafting a mission statement, clearly defining ARRL's and the FCC's requirements and needs as part of the program, drafting a Volunteer Manager job description, and developing a training manual for volunteers.

The solicitation and training

(Continued on page 5)

KickSat-2 is Alive and Being Tracked, Sprites Deployment Pending

For the first couple of days after the 3U KickSat-2 was deployed from Cygnus NG-10 last November, nothing was heard from the satellite. But in a February 16 post to AMSAT-BB, Nico Janssen, PA0DLO, reported receiving several short and weak transmissions from KickSat 2 -- short telemetry bursts on 437.5077 MHz. Stanford University Assistant Professor of Aeronautics and Astronautics Zac Manchester, KD2BHC, is the principal investigator for the KickSat project, which NASA adopted as an official technology demonstration mission.



"Yes, KickSat-2 is alive," Manchester told ARRL. "We have been tracking it since Thursday, [February 14,] and have been able to decode at least some packets. The signal is weak, and we think the antenna did not properly deploy on the CubeSat."

KickSat-2 may deploy up to 104 tiny Sprite satellites into low-Earth orbit. The Sprites then would transmit on 437.240 MHz at 10 mW, communicating with each other via a mesh network and with command stations on Earth. The Sprites would reenter Earth's atmosphere within weeks. As for releasing the Sprites, Manchester

told ARRL, "We're working on it... Stay tuned."

Recently, the FCC imposed a \$900,000 penalty on a commercial concern, Swarm Technologies, for launching similar tiny satellites after the FCC had denied permission.

"These spacecraft are...below the size threshold at which detection by the Space Surveillance Network can be considered routine," the FCC told Swarm Technologies.



Zac Manchester, KD2BHC, with the original KickSat in 2014. [Photo courtesy of Cornell University]

A 2018 NASA Early Career Faculty Award recipient, Manchester had been trying without success to convince the FCC to allow him to deploy the Sprites from KickSat-2, but the agency denied permission at the last moment.

Once NASA adopted KickSat-2 as its own mission, however, the applicable regulatory body shifted to the National Telecommunications and Information Administration (NTIA), and the launch went

Volunteer Monitors Cont.

phase will involve identifying the geographical locations where volunteer monitors will be most needed, soliciting applications, and screening applicants. Current Official Observers will be invited to apply for appointment as Volunteer Monitors (VMs). The ARRL Board has expressed its appreciation to the OOs for their dedicated volunteer service over the years.

Implementation will involve having the volunteers provide field reports, and ARRL staff offering guidance to volunteers to ensure that the information gathered meets FCC requirements. Continuing education will be provided to the volunteers as part of the program.

Hollingsworth has committed to ensure training adequacy for new VMs, to review the quality and utility of Volunteer Monitor submissions to the FCC for enforcement action, and to advocate for rapid disposition of cases appropriately submitted to the FCC.

ARRL officials estimate that it will take 9 - 12 months before the first Volunteer Monitors begin filing reports. - ARRL Letter, 2/14/2019 - S

forward.

In the Swarm Technologies proceeding, the FCC argued that satellites smaller than 10 centimeters on any side were too small. KickSat-2's Sprites are 3.5 centimeters on a side and just 0.2 centimeters thick. - ARRL Letter, 2/21/2019 - S

Origin of Ohm's Law

Today, Ohm's Law stands as one of the most powerful and commonly used laws of electricity and electronics. It states that the amount of current flowing through a conductor (or resistor) is equal to the applied voltage divided by the resistance of the conducting material. In mathematical terms, the equation generally reads $I = E/R$. What seems simple and obvious today, however, took a great deal of genius, courage and effort to propose for the first time in 1825. Georg Simon Ohm, a German physicist and mathematician, was a man who had the right kind of genius and courage.



Georg Simson Ohm

Scientists were aware of a "galvanic fluid" (electrical current) that played some mysterious role in their studies; but the elusive and short-lived nature of currents in static electricity made them a difficult subject for any kind of meaningful study. Alessandro Volta completely changed all this in the early months of 1800 when he formally announced the discovery of his

electric generating cell. His "hydro-electric battery," forerunner of modern wet-cell batteries, gave scientists their first source of current that could flow continuously. For nearly twenty years, however, all the studies of galvanic currents suffered from one serious disadvantage - there was no way to measure the amount of current flow.

The breakthrough came in 1820 when Oersted showed that a current passing through a wire produces a magnetic field. A year later, Schweigger and Poggendorff used Oersted's findings to invent the galvanoscope - a crude sort of galvanometer made of hundreds of turns of wire wrapped around an ordinary compass. Current flowing through the wire produced a magnetic field that deflected the compass needle by a proportional amount.

Georg Ohm, then a high school mathematics and physics teacher in Cologne, saw the possibility of combining Volta's hydro-electric battery with a galvanoscope to study the nature of electrical current flow.

Using equipment he constructed himself, Ohm set out to find the exact relationship between applied potential, the length of a conductor, and the amount of deflection of the needle in a galvanoscope. His procedure was to connect the galvanoscope directly to the battery and carefully note the position of the compass needle. This gave him a reference reading. He then inserted a wire of known composition and length into the circuit and

noted the new position of the needle. This was his experimental reading. Of course, the resistance of the test wire made the needle show a smaller amount of deflection in the experimental condition.

In 1825, Ohm reported his first findings in a paper titled "Preliminary Notice of the Law According to which Metals Conduct Contact Electricity." Publishing this paper turned out to be a mistake that plagued Ohm for the next sixteen years.

Technically speaking, the equation Ohm presented in the paper was incorrect. It stated that $v = m \log(1+x/r)$; where v was the decrease in the needle's deflection, x represented the length of the conductor, r represented the resistivity of the conducting material, and m stood for the amount of applied potential.

Just before his paper was scheduled to appear in print, Ohm repeated a few of his experiments using a different kind of power source. The results didn't agree with his original findings, and Ohm immediately saw he could develop a much simpler equation that didn't contain a logarithmic term. By the time he contacted the publisher, however, the paper was already in print, and the best he could do was publish a short letter promising to run a new series of experiments. Ohm stated he would show that the amount of current flowing through a circuit goes to zero as the length of the conductor approaches infinity. This bit of mathematical talk constituted his

(Continued on page 7)

Ohm Cont.

second mistake - a political one in this case. His letter infuriated most scientists of the time because they firmly believed the only proper scientific procedure was to gather mountains of data before playing with any kind of equation.

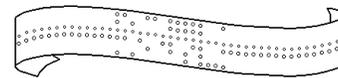
Ohm's incorrect equation was the result of a widespread lack of knowledge about the basic theory of batteries. After it was too late to stop publication of his paper, Ohm realized he had used an unstable power source - one whose output voltage varied with the amount of loading.

Poggendorff, one of Ohm's few allies in the scientific community, suggested he use a Seebeck thermoelectric battery rather than Volta's hydro-electric battery.

The thermoelectric battery was the first practical device to take advantage of the thermoelectric effect discovered by Seebeck in 1821. The Seebeck effect makes two unlike, tightly bonded conductors produce an electrical potential when one of them is heated. The output voltage is small, but so is the internal resistance. So, Ohm repeated all his experiments using the stable thermo-electric battery and galvanoscope. The equation we now know as Ohm's Law fit the data from his new series of experiments.

In 1826, Ohm was ready to show the world he knew what he was talking about. His second paper was entitled "Determination of the Law According to which Metals Conduct Contact Electricity, Together with the Outlines of a Theory of Volta's Apparatus and the

RYRYRYRY...



DE KA7TTY

It is time for me to type something here again. You know, this is sometimes the toughest part of putting out this newsletter. The whole thing is done except this column. Oh, well. I better grt going.

What a bummer last month. Four of us showed up at Stan's last month. (None of us had seen the IARC Google Group email.) After a good dinner, we walked over to the Senior Center and read the notice on the door. I guess that will learn us to check our email.

Well we are ready to do it again. But this time I will be sure to check my email. This time we have a program by John K7JRO that follows up on his program last year on Summits-On-The-Air. If you missed his program last year, here is a chance to catch-up. I am looking forward to the program.

Hang in there everyone. I still have snow in my yard, so the reminder is still there. Take care and see you at the meeting, John KA7TTY

Schweigger Galvanoscope." The corrected equation read, $X = a/(b + x)$; where X represents the amount of current flow through the conductor, a stands for the exciting voltage, x is the resistance of the conductor under test, and b is the combined internal resistance of the power source and galvanoscope.

In the early part of 1827, Ohm published yet a third milestone paper in the history of science called "The Galvanic Battery Treated Mathematically." He then believed he had completely vindicated himself for proposing an incorrect equation and was confident that his colleagues would finally accept his law of electrical conduction.

The scientific community, however, was still not ready to accept Ohm and his works. For one thing, the equation seemed too simple - far too simple to explain a phenomenon that had been challenging the best minds of Europe and

America for nearly thirty years. Then, of course, there was Ohm's widely misunderstood statements in the letter following his first paper. Most reputable scientists still considered Ohm a quack. Bitter and disappointed, Ohm returned to his teaching profession.

Six years passed before a few influential scientists began taking serious looks at Ohm's work. The incident that touched off this mild renewal of interest was a paper published by Pouillet in 1831. Pouillet had unwittingly repeated Ohm's work, and he had arrived at exactly the same results. Pouillet believed he was the founder of the law of electrical conduction, and so did most of the scientists of the time. Several scientists, however, noted a strong similarity between Ohm's work and Pouillet's paper.

In 1841, sixteen years after Ohm announced his law of electrical conduction, the British Royal Society presented him the Copley

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SQUAKBOX

This newsletter is published monthly for the members of the Issaquah ARC W7BI. Items for publication must be received by the 15th day of the month preceding publication. Send items to:

SQUAKBOX Editor
John MacDuff, KA7TTY
620 S.E. Bush St.
Issaquah, WA 98027-3909

Material may also be sent via E-Mail at editor@w7bi.com.

The IARC is affiliated with the American Radio Relay League (ARRL). Visit our WEB page at: <http://www.w7bi.com>

Membership is open to anyone regardless of age, sex, race, national origin, religion, or amateur radio license status. Dues are \$15 per year for a family membership, free for those under 19 years of age.

A two-month courtesy mailing of this newsletter will be made to meeting visitors and others upon request.

Original material may be quoted without prior permission provided ISSAQUAH ARC SQUAKBOX is credited.

- Coming Events -

- **March 6** - Monthly Issaquah ARC meeting at the Issaquah Senior Citizens Center, 75 NE Creek Way, Issaquah. Doors open at 6:45 PM, the meeting begins promptly at 7:00 PM and the program begins at 8:00 PM. Refreshments are provided.
- **March 9** - Mike & Key 38th Electronics Show & Fleamarket. Puyallup fairgrounds exhibition hall, Puyallup, WA. <http://www.mikeandkey.org/index.php>
- **March 23** - MicroHams Digital Conference. Redmond, WA. *Stay tuned for possible date change.* <https://www.microhams.com/mhdc/>
- **March 24** - Issaquah Communications and Support Team meeting, Issaquah Public Works, Issaquah, talk-in 146.56 MHz at 6:45 PM, Meeting at 7:00 PM.
- **April 3** - Monthly Issaquah ARC meeting. See Mar. 6th for time and location.
- **April 13** - Yakima Hamfest. Yakima, Washington <http://yakimaamateurradioclub.com/yakima-hamfest/>
- **April 13 -14** - Communications Academy. South Seattle Community College, Seattle, WA. <http://commacademy.org/>
- **April 22** - Issaquah Communications and Support Team meeting, Issaquah Public Works,

Dues Are Due

After the March meeting we will be compiling our 2019 Roster of dues paying members. So if you haven't done so already, you need to see our Treasurer and pay your 2019 dues. [*Ed.*]

Ohm Cont.

gold medal for "the most conspicuous discovery in the domain of exact investigation." Ohm thus received proper credit for his work, a formal apology for the delay, and a well-deserved round of applause from his peers.

Ohm died in 1854; and, exactly ten years later, the British Association for the Advancement of Science adopted the ohm as the

unit of measure for electrical resistance. Thus Ohm (like Ampere and Volta) is now immortalized in the everyday language of modern electrical engineers and technicians everywhere.

By David L. Heiserman -
 Thanks to Rod Johnson, WE7X,
 2/14/2019 - S

Ab Things Cont.

Abcoulomb	10 coulombs
Abfarad	10 farads
Abhenry	10 henrys
Abmho	10 mhos
Abohm	10 ohms
Abvolt	10 volts
Abwatt	10 watts

Being a low-tech person I haven't the foggiest idea what to do with an absomething. If anyone reading this has some advice on the topic our editor would like to hear from you.

Pete Petersen WY7Z (SK)