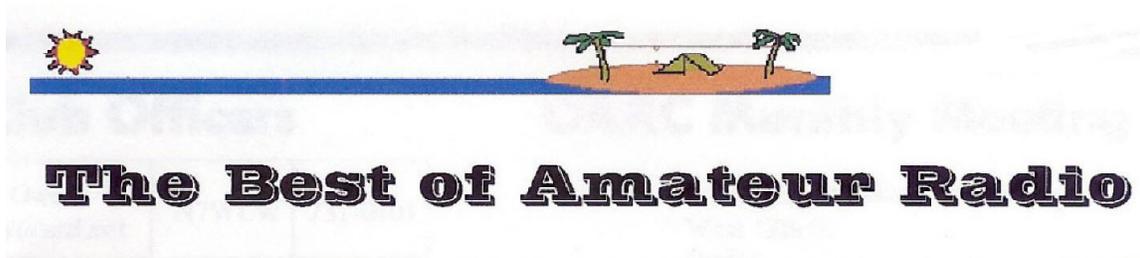




WATTS NEWS



Welcome to the OARC e-Magazine

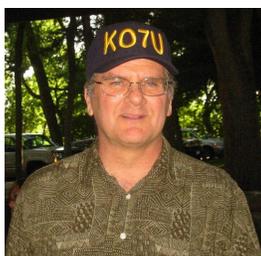
www.OgdenArc.org

DECEMBER 2011

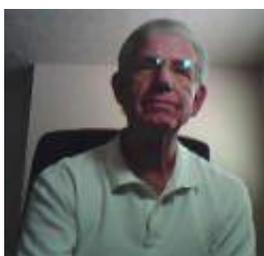
Next Club Meeting/Activity

3rd Saturday 17 December 2011

Topic: OARC Family Dinner



Kim Owen K07U
President



Larry Griffin AD7GL
Vice President



Gary Hudman KB7FMS
Secretary



John Shupe K7DJO
Treasurer



Gil Leonard KF7KPL
Program Director



Dave Woodcock KF7PAV
Activity Director



Val Campbell K7HCP
Webmaster/NL Editor

PREVIOUS CLUB MEETINGS

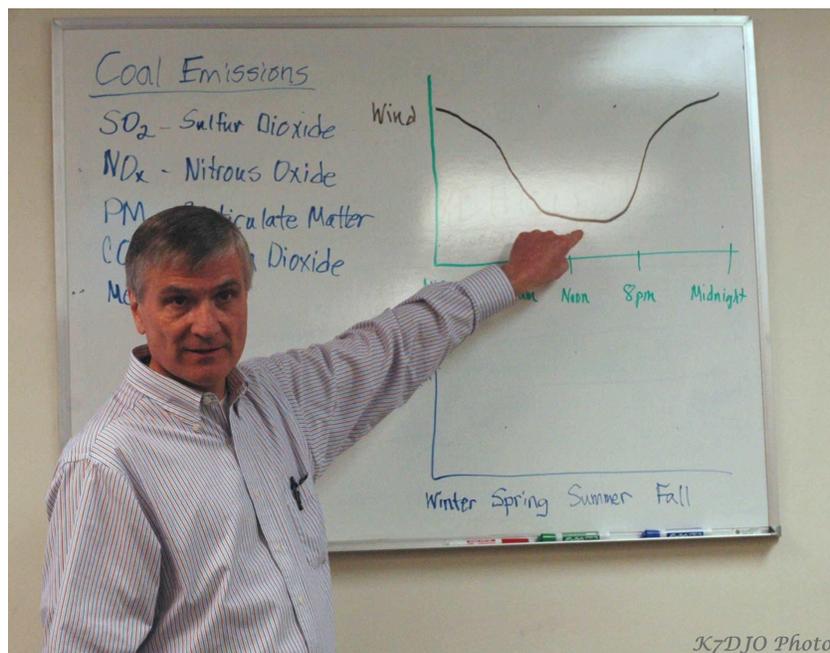
3rd Saturday 19 November 2011

Electricity and the Electric Grid in the US by Chuck Moulton

Chuck has worked for Pacific Corp for the last 34 years and secured special permission to address our Club. Chuck's dad worked as a Hydro Plant Operator.

It was his dad who introduced power generation and transmission when he was just 4 or 5 years old.

His interest in transmission grids and other generation alternatives continues today.





NEXT CLUB MEETING

When: 3rd Saturday 17 December 2011

Time: 5:00 PM

Location: Bella's Mexican Restaurant
2700 N, I-15/I-84 exit # 349

Topic: OARC Family Dinner

GRAND DOOR PRIZE:

- Ham Radio Equipment
- Free Dinners
- Plus more...

(paid-up members only) - you can join/renew at the beginning of the meeting

JOIN OARC

Renew your membership now!

Membership in the Ogden Amateur Radio Club is open to anyone interested in Amateur Radio. You do not need an amateur license to join us. You do not need to join the club to participate with us. Dues are used to operate the club, field day activities, and repeater equipment maintenance.

Joining is easy. Come to a club meeting or [fill out an application form from the club website](#). Instructions for mailing it are on the form.

DUES: Dues are \$15.00 per person and runs September - August.
Additional family members are \$8.00 each.

NOTE: New Hams >>> Membership in OARC is complimentary for remainder of 1st year licensed.

FROM KIM'S SHACK



Kim Owen KOTU - President

CQ ALL Members and Friends of OARC

Our meeting this month is our annual Christmas dinner which will be at Bella's Mexican Restaurant in Far West. See the web page for the time and location. Someone will be taking home some nice prizes from our Christmas dinner. So, make sure that your dues are current so you can participate in the grand door prize drawings. You can pay your dues at the meeting/dinner. I hope to see everyone there. Gil/KF7KPL and Dave/KF7PAV has been a very busy Santa's helper getting everything ready. Thanks guys!

2011 is coming to an end and the start of 2012 is near. That means that there is time to work on your code to be ready for Straight-key Night. Listen for a "good hand" and jump in and say hello.

Last of all and most important, enjoy the holiday season. Spend time with those that you love and if you can give a helping hand to someone in need. There are many opportunities around this time of year for sharing. Have a joyous holiday season!



For now,
73 de Kim/KOTU



From Kim's Shack.....

CLUB NEWS

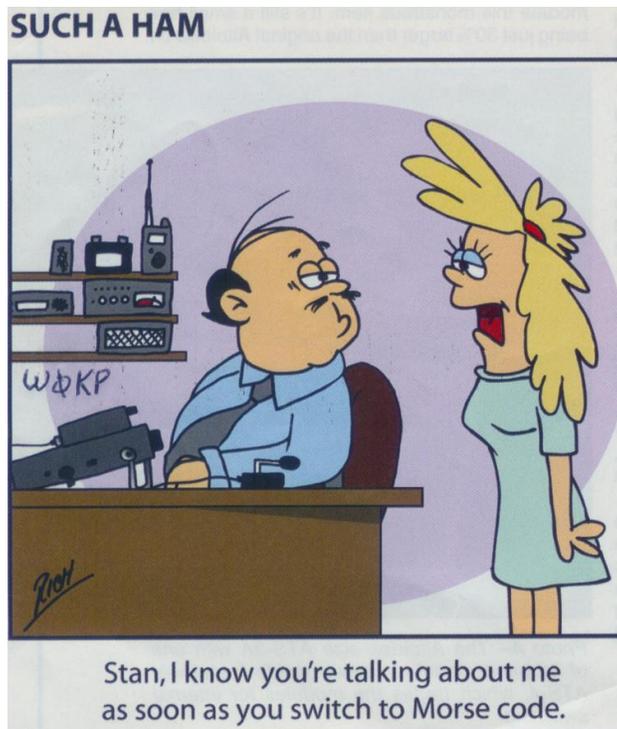
Congratulations to Dave Woodcock KF7PAV. Dave has agreed to be our newest club board appointed Officer/Director of Activities. Dave replaces Jamie Howell KE7LQY mid-term and will direct all of the OARC external activities as follows for the remainder of this 2011-2012 election year.

Family Dinner (December), Golden Spike Special Event (May), Field Day (June), Transmitter Hunt (July), Steak Fry (August).



Dave Woodcock KF7PAV

Thanks Dave.



Club Badges

OARC Club badges are still available for all club members and non-members. The cost is \$8.00 each. You can order the badge with either a "PIN" clip or a "MAGNETIC" clip. Badge includes your Call Sign in large letters and your First Name in a somewhat smaller font in white lettering on a pitch black background. See example below.



Place your order along with \$8.00 in advance for each badge ordered and specify Pin or Magnet style fastener, Call Sign and First Name.

Contact any club officer via email or see them at the next club meeting. See web site www.ogdenarc.org "Club Officers" page.

Club Swapmeet

"SALE" or "WANTED" ITEMS NEEDED

OARC's *O-bay (On-Line Swap-Meet) items needed* for the web site...

Visit <http://www.ogdenarc.org/> then click on **Obay-Swap**.

HOBBY NEWS

FCC LICENSEES BY LICENSE CLASS							
Year	Ending Month	Extra	Advanced	General	Tech*	Novice	Total
2011	Sep	125,661	58,224	159,861	341,658	14,817	700,221
2010	Dec	122,951	59,387	155,781	342,191	15,731	696,041
2009	Dec	119,403	60,795	150,970	334,245	17,084	682,497
2008	Dec	115,625	62,104	144,832	322,860	18,343	663,564
2007	Dec	112,022	65,368	142,680	315,314	20,458	655,842
2006	Dec	108,223	69,915	131,224	323,073	23,633	656,068
2005	Dec	107,440	74,221	135,067	319,125	26,747	662,600
2004	Dec	106,090	77,948	138,292	319,742	29,765	671,837
2003	Dec	104,894	82,034	141,498	322,821	32,812	684,059
2002	Dec	103,257	84,326	139,848	321,805	36,072	685,308
2001	Dec	97,977	86,545	138,625	319,735	40,155	683,037
2000	Dec	93,807	88,783	134,144	319,874	45,632	682,240
1999	Dec	75,392	103,471	110,386	335,768	52,375	677,392

There are now more than 700,000 radio amateurs in the US, the highest number ever. This chart reflects Amateur Radio's growth since 1999. Note that as the number of total licensees grows, so do the number of Technician, General and Amateur Extra class licensees. *The number of new Technicians peaked in March 2011 at 342,572 (Source: www.ah0a.org/FCC/Licenses.html).

MORE HOBBY NEWS

Amateur Radio in Space: AMSAT Announces End of OSCAR 51 Mission



OSCAR 51 was launched in 2004 and became one of the most popular Amateur Radio satellites ever created. [Photo courtesy of AMSAT]

[AMSAT-OSCAR 51](#) -- the popular FM repeater satellite -- has likely reached the end of its operational lifespan. AMSAT-NA Vice President of Operations Drew Glasbrenner, KO4MA, issued the following statement on November 29: "It is with a heavy heart I report that AO-51 has ceased transmission and is not responding to commands. The last telemetry data indicated that the third of six batteries was approaching failure to short, and observations indicate the voltage from three cells is insufficient to power the UHF transmitters. The IHU [internal housekeeping unit] may continue to be operative. Initial tests with the S band transmitter were also not positive, although more attempts are in order. We have tried leaving the satellite in an expected state where if voltages climb high enough, the 435.150 transmitter may possibly be heard. The command team will regularly attempt

communications with the satellite over the coming months (and years). There is always the possibility that a cell will open and we could once again talk to our friend while illuminated. Thanks to all who helped fund, design, build, launch, command, and operate AO-51. Its 7 year mission has been extraordinary."

MORE HOBBY NEWS

On the Air:

The ARRL 10 Meter Contest -- Get On While the Bands Are Hot!

Ten meters -- in case you haven't heard, is alive in a big way! That means that the ARRL 10 Meter Contest -- on the weekend of December 10-11 -- is going to be the one of the best we've seen in years!

During this event, many propagation modes will be available: Sporadic-E will help you work stateside stations, a touch of meteor scatter in the morning will give you split-second chances to work stations -- you'd better be quick, though! -- and DX stations will be plentiful, thanks to the return of F2 propagation.



ARRL Contest Branch Manager Sean Kutzko, KX9X, said that he keeps hearing from numerous hams who have been licensed only three or four years, telling him that they've never experienced a 10 meter opening because they weren't licensed during the last solar cycle peak: "A common phrase I'm hearing is, 'Now I understand what all the Old-Timers in my club were talking about -- 10 meters is great!' With a concentration of activity for the contest, there will be an opportunity for the first time in several years to experience the beauty of a wide-open 10 meter band.

With so much excitement worldwide over the great conditions, the 2011 ARRL 10 Meter Contest could see the highest level of participation in a very long time!"

MORE HOBBY NEWS

A Technician's Holiday - the ARRL 10 Meter Contest

For the past few years, Technician licensees may have been wondering what all the fuss is about on HF. After all, the 10 meter band has been mostly inert and receiver hiss just isn't that interesting to listen to! As of about two months ago, however, the sunspot cycle has kicked into high gear and solar ultraviolet is bathing the upper layers of the ionosphere, opening the 10 meter band to worldwide propagation!

Just in time, there is an operating event coming up that is just made for Techs to enjoy - the ARRL 10 Meter Contest. (www.arrl.org/10-meter) It runs beginning late on Friday, Dec 9th (7 PM EST - which is 0000 UTC on Dec 10th) ending 48 hours later on Sunday. You can operate for 36 hours during that time - warning, once you start, it's hard to stop working station after station!

How do you operate? Just answer stations calling CQ by giving your full call sign once using standard phonetics on phone. If they respond, give them a signal report (usually "59" or "5NN" on CW) and your State or Canadian province or Mexican state. The DX stations you'll hear will be giving out serial numbers (the number of the contact in the contest for them) instead. That's all there is to it!

You can operate using phone (USB) or CW and work stations once on each mode. If you are just getting your feet wet on CW, try listening at the upper edge of the CW action - usually approaching 28.100 and in the old Novice band from 28.100-28.200. Call CQ ("CQ TEST DE your call") at a speed you're comfortable with and see if you get an answer. If you're unsure of your technique, just listen for a while and "sing along at home" until you've got the hang of it. Listen until you're sure of the CQing station's information. Then jump in! The CQing stations will be glad to help you through the contact.

There are categories for both single-operator and multiple-operator stations, so buddy up with a friend or a more experienced "Elmer" and enter in whatever category you prefer. If you use the Internet or some other source of information to find stations, you'll enter in the "multi-op" category. Perhaps your club can organize an operation from a member's station or set up a club station.

Once you're done, you should submit your log as described on the contest's website (www.arrl.org/10-meter). There are paper log sheets available - that's often the easiest way to start if you aren't keeping a computer log. You may submit the paper log with a summary sheet or use WA7BNM's handy website (b4h.net/cabforms/) to enter your contact information and submit the log electronically. The results of the contest will be printed in the July issue of *QST* and a little before that on the ARRL web site.

Sound like fun? You bet! Don't miss this opportunity to enjoy some of the best 10 meter conditions in years and learn a lot about HF operating, too!

FCC Releases New Rules for 60 Meters

Submitted by John Shupe K7DJO

11/21/2011

On November 18, the FCC released a *Report and Order* ([R&O](#)), defining new rules for the 60 meter (5 MHz) band. These rules are in response to a *Petition for Rulemaking* ([PRM](#)) filed by the ARRL more than five years ago and a June 2010 *Notice of Proposed Rulemaking* ([NPRM](#)). **In the R&O, the FCC replaced one of the channels in the band, increased the maximum authorized power amateur stations may transmit in this band and authorized amateur stations to transmit three additional emission designators in the five channels in the 5330.6-5406.4 kHz band (60 meters).**

The Amateur Radio Service in the United States has a secondary allocation on 60 meters. Only those amateurs who hold General, Advanced or Amateur Extra class licenses may operate on this band. Amateur stations must not cause harmful interference to -- and must accept interference from -- stations authorized by any administration in the fixed service, as well as mobile (except aeronautical mobile) stations authorized by the administrations of other countries.

Here is a summary of the changes. Please note that these changes have not yet taken effect. These new rules will take effect **30 days after they are published in the *Federal Register***. The ARRL will announce on its website when the rules are published.

- The frequency 5368.0 kHz (carrier frequency 5366.5 kHz) is withdrawn and a new frequency of 5358.5 kHz (carrier frequency 5357.0 kHz) is authorized.
- The effective radiated power limit in the 60 meter band is raised by 3 dB, from 50 W PEP to 100 W PEP, relative to a half-wave dipole. If another type of antenna is used, the station licensee must maintain a record of either the antenna manufacturer's data on the antenna gain or calculations of the antenna gain.
- Three additional emission types are authorized. **Data** (emission designator 2K80J2D, for example, PACTOR-III), **RTTY** (emission designator 60H0J2B, for example, PSK31) and **CW** (150HA1A, i.e. Morse telegraphy by means of on-off keying). For CW, the carrier frequency must be set to the center frequency. For data and RTTY the requirement to transmit "only on the five center frequencies specified" may be met by using the same practice as on USB, i.e. by setting the suppressed carrier frequency of the USB transmitter used to generate the J2D or J2B emission to the carrier frequency that is 1.5 kHz below the center frequency.

Automatic control on data and RTTY is not permitted; a control operator must be in a position to exercise either local or remote control over the transmitter. The FCC noted that "amateur operators must exercise care to limit the length of transmissions so as to avoid causing harmful interference to Federal stations." This is a very important caveat: If a Federal station requires amateurs to cease using a frequency, the amateur station must be able to do so without delay.

A reasonable person might wonder what the difference is between data and RTTY. According to former ARRL Chief Technology Officer Paul Rinaldo, W4RI, there used to be a difference, but there's not much of one today. "Years ago, a B designator (telegraphy for automatic reception [i.e. narrow-band direct-printing telegraphy emissions]) meant decoding and display on a teletypewriter (TTY) or other mechanical machine," he explained. "A D designator signified transmission of data, telemetry or telecommand intended for data processing or just storage for possible future use. When computers or computer-like devices were introduced to emulate RTTY transmission and/or reception, the line between telegraphy and data transmission blurred to the point of little or no practical distinction."

PACTOR-III and PSK31 are cited in the new rules as examples of data and RTTY emissions, respectively, that will be authorized; however, in paragraph 28 of the *R&O*, the Commission states that amateur stations will be permitted to use "any unspecified digital code, subject to the requirements of Section 97.309(b)." Therefore, as a practical matter it appears that any J2D data emission is to be permitted up to a bandwidth of 2.8 kHz, provided that care is exercised to limit the length of transmissions.

Amateur Radio and the 60 Meter Band

The 60 meter band is part of the larger 5.060-5.450 MHz band, which is a federal/non-federal shared band that is allocated to the fixed service on a primary basis and to the mobile (except aeronautical mobile service) on a secondary basis. The 5.060-5.450 MHz band is primarily used by federal agencies for ship-to-shore and fixed point-to-point communications. Non-federal use of the 5060-5450 kHz band includes state government licensees and licensees in the Industrial/Business Pool that operate standby and/or backup communication circuits for use during emergency and/or disaster situations, entities prospecting for petroleum and natural gas or distributing electric power, coast stations and aeronautical fixed stations.

The Commission added the Amateur Radio Service as a secondary allocation after determining that such frequencies could be useful to the Amateur Radio community for completing disaster communications links at times when existing frequencies in the 3.500-4.000 MHz (80 and 75 meter) and 7.000-7.300 MHz (40 meter) bands are not available due to ionospheric conditions. It concluded that such an allocation represented the best compromise available to give the amateur service access to

new spectrum while assuring the federal government agencies that their use is protected.

At the request of the National Telecommunications and Information Administration (NTIA), the Commission restricted amateur stations operating on the five channels in the 60 meter band to upper sideband (USB) voice transmissions (phone emission 2K80J3E), and to a maximum effective radiated power (ERP) of 50 W peak envelope power (PEP). The Commission adopted these operating restrictions to decrease the interference potential between amateur stations and federal stations.

In October 2006, the ARRL filed a *Petition for Rulemaking* with the FCC, requesting that the Commission amend Parts 2 and 97 of its Rules to replace one of the allocated center frequencies (5368 kHz) with a less encumbered frequency (5358.5 kHz), to increase the maximum ERP from 50 to 100 W PEP and to authorize the use of additional emissions types, limited to emission designators 150HA1A, 60H0J2B and 2K80J2D. In its *Petition*, the ARRL pointed out that its proposals were designed to facilitate more efficient and effective use of the secondary Amateur Radio Service allocation in the 60 meter band. As part of its petition, the ARRL attached a letter from NTIA, indicating that it would "look favorably" on the ARRL's proposed modifications.

HEATHKIT RETURNS TO THE KIT BUSINESS

Heathkit Educational Services, well-known to all Amateur Radio operators of a certain age, re-entered the kit business in late August. Heathkit announced a couple of kits, including the Garage Parking Assistant (GPA). This kit lets you build your own system that uses ultrasonic sound waves to locate your car as it enters the garage. The system signals to the driver using LED lights mounted on the wall when the car is detected and in the perfect spot for parking. Next on the market will be a Wireless Swimming Pool Monitor kit, followed by many more.

On its website, Heathkit asked kit builders to submit their suggestions for kits. Even

though Heathkit wasn't initially interested in re-entering the Amateur Radio kit market, the overwhelming response from hams convinced the company to change its mind.

"When we made the announcement on our web page, we had no intention of entering the Amateur Radio kit market," Ernie Wake, Heathkit's Director of Marketing and Sales, told the ARRL. "The response was really overwhelming, exciting and scary. The scary part is that the brand name has so much loyalty that we don't want to disappoint the people who have such fond memories. We are working on developing a few Amateur Radio kits. Initially, the kit line will include a few



'accessories' like kits for a Dual Watt Meter, Antenna Tuners and the

Cantenna. Once we are a little more 'settled,' I think we will develop a QRP receiver. We won't rush to market just to get there. We want to develop a line of kits in the tradition of Heathkit. I'm hoping to have one or two kits by the end of the year."

After several decades of successful kit manufacturing, Heathkit left the kit business in 1992. Heath sold Amateur Radio equipment, at first only kits and later its own line of non-kit products, from 1954 to 1992. The company has been sold a number of times since its founding back in 1912 as an aircraft company.

QST

GUEST ARTICLE

Carving Out Time for Ham Radio

BY Dan Romanchik, KB6NU

On a recent episode of This Week in Tech (www.twit.tv), Leo Laporte, W6TWT, mentions ham radio, and a guest asks him how much time he is spending on the air. Leo, who just recently got his Tech license says "Zero!" and laughs.

This is not uncommon. Lots of people seem to get a ham radio license and then do very little with it. I think one reason for this is that they don't take into account how much time the hobby really can eat up.

They get their ticket because it seems like a cool thing to do, but then they have to carve out some time to actually be a ham radio operator. Even if you don't make any of your own gear, setting up a station takes time, and then there is the operating time, of course. Carving time out of busy schedules—and I would guess that Laporte has a pretty busy schedule being the owner of TWiT—is a challenge.

I see things like this all the time. At one ham radio club meeting that I attended, the club vice president asked, "OK, here's the question of the month. How many of you actually got on the air in the past month." Less than half of those in attendance raised their hands. Geez, I thought to myself, why do they even bother to come to meetings if they don't get on the air?

Making time for ham radio

So, if you're a busy person, how do you make time for ham radio? Well, being the Internet geek that I am, I Googled, "making time for things you love." I got a lot of links to sites that talked about work-life balance and some new-age blogs, but none of them offered much in the way of concrete advice.

Then, I Googled "make time for hobbies" and right off the bat, I found two good articles—7 Creative Ways to Make Time For Your Creative Hobby! (<http://www.exploringwomanhood.com/homelife/hobbies/maketime.htm>) and 5 Ways to Make Time for Your Hobby (<http://o5.com/5-ways-to-make-time-for-your-hobby/>). Both articles offered very similar advice. Here are four points that both made:

1. Schedule it. Set aside a specific time during which you're going to do ham radio. Don't let that time get pre-empted.
2. Designate a place in your home for ham radio. Having to set up your radios or dig out your tools every time you want to operate or build something is not much fun and wastes a lot of time. Having a "shack" and a workspace designated for your projects will let you spend more time on the fun stuff.
3. Partner up. Arranging to work with another ham will make it harder to blow off ham radio for some other activity. Besides, it's a lot of fun to do things with other hams. If you're a newly licensed ham, find an Elmer. There really are plenty around who would be willing to help you.
4. Create a project plan. Setting up an amateur radio station is no small feat. Breaking it down into smaller chunks will make it seem more doable, and you'll get a feeling of accomplishment when you meet your in-between goals.

There's so much to learn and do in amateur radio that it can seem quite overwhelming. I think that's one reason why so many Techs never really get into the hobby and why some experienced hams drift away. I think if you follow the advice above, though, you'll not only find the time to pursue amateur radio, but get a lot more out of it.

FEATURE ARTICLE

As Sun Storms Ramp Up, Electric Grid Braces for Impact

Submitted by John Shupe K7DJO



Electric transformer failures, like this dramatic one, are a risk if solar storms create extra electrical currents in the Earth's magnetosphere. Below, a loop of plasma erupts from the sun on March 19, captured by [NASA's Solar Dynamics Observatory](#) spacecraft.

For [National Geographic News](#) Published August 3, 2011

Storms are brewing about 93 million miles (150 million kilometers) away, and if one of them reaches Earth, it could knock out communications, scramble GPS, and leave thousands without power for weeks to months.

The tempest is what's known as a solar storm, a flurry of charged particles that erupts from the [sun](#). Under the right conditions, solar storms can create extra electrical currents in Earth's magnetosphere—the region around the planet controlled by our magnetic field.

The electrical power grid is particularly vulnerable to these extra currents, which can infiltrate high-voltage transmission lines, causing transformers to overheat and possibly burn out.

"The concern is if the electric grid lost a number of transformers during a single storm, replacing them would be difficult and time-consuming," said Rich Lordan, senior technical executive for power delivery and utilization at the [Electric Power Research Institute](#) (EPRI).

"These power transformers are very big devices, and the lead time to get a replacement can be two months— *if* there's a spare one stored nearby. If a utility has to order a new one from the manufacturer, it could take six months to up to two years to deliver."

The danger is becoming more critical, as the sun is approaching what's known as solar maximum—the high point in our star's roughly 11-year cycle of activity. Scientists anticipate stronger storms around solar max, in 2013.

Using the latest sun-watching satellites and computer models, scientists have been trying to improve solar storm predictions. At the same time, electricity operators are developing plans for how to respond to solar storm warnings and determine what the consequences for the grid might be in a worst-case scenario.

"Geomagnetic storms are low-probability, high-impact events," Lordan said. "When assessing the risk to the grid, one has to ask, What's the level of storm intensity that the grid system should be prepared for?"

"Based on the data and the scenarios we can reasonably expect, I believe the power-delivery system can operate through a solar storm."

Listening for the Solar Whistle

Earth is being constantly bombarded by charged particles from the sun, which emits material in all directions. This is known as the solar wind. But sometimes the sun ramps up magnetic activity on its surface, triggering huge flares of plasma.

(Related: ["Solar Flare Sparks Biggest Eruption Ever Seen on Sun"](#))

Such "solar flares are like the whistle on a freight train," said Joe Kunches, a space scientist for the [National Oceanic and Atmospheric Administration's Space Weather Prediction Center](#) (SWPC). The big impacts come from coronal mass ejections (CMEs), cloud-like bundles of plasma that are sent racing off the sun's upper atmosphere, or corona, during periods of intense surface activity.

That's not to say every CME is a harbinger of doom—the clouds are highly directional and can miss Earth entirely or strike only glancing blows.

"The sun doesn't give a hoot about us," Kunches said. "It erupts and produces lots of energy, and sometimes we get a direct hit and sometimes we don't."

(Related: ["Huge Solar Storm Triggers Unusual Auroras"](#))

However, said Antti Pulkkinen, a sun researcher with [NASA Goddard Space Flight Center](#), "if these clouds do move toward Earth's near-space environment . . . they can carry billions of tons of matter moving at 2,000 kilometers [1,242 miles] a second."

When the cloud reaches our magnetosphere, its charged particles become electromagnetically coupled to Earth's magnetic field, generating large electrical currents millions of amperes strong, Pulkkinen said. The sprawling electrical grid on Earth's surface then acts like an antenna, allowing these currents to flow into transmission lines.

"These storms are by their basic nature global," Pulkkinen added. But the risks to electrical grids are greatest at higher latitudes, since the largest electric currents are funneled toward Earth around the Poles.

For instance, in 1989 the transmission system for Canada's Hydro Quebec electricity provider collapsed during a solar storm, leaving millions of people without power for nine hours or more. And the "Halloween storms" of 2003 triggered blackouts in the city of Malmö, Sweden, and likely caused transformer failures in South Africa.

"Because they are located closer to the magnetic North Pole, Canadian utilities are deeply involved in monitoring geomagnetically induced currents, modeling impacts for vulnerability, and refining their operational protocols," EPRI's Lordan said.

European utilities and the South African electricity provider ESKOM also are preparing for the upcoming solar maximum, in part with advice and data from NASA.

(Related: ["What If the Biggest Solar Storm on Record Happened Today?"](#))

The AC/DC Problem

Technically, geomagnetically induced currents aren't that strong compared with the currents that normally flow between power plants and electricity consumers. For electricity to travel long distances, it needs to be transformed to high voltage and back again, to limit energy loss due to resistance in the transmission wires.

Trouble arises because the extra currents from solar storms are direct current (DC) flows, and the electricity transmission system is used to handling alternating current (AC) flows, said EPRI's Lordan.

(Related: ["Upgrading the Electric Grid With Flywheels and Air"](#))

The extra DC flows saturate transformers, which start to overheat, causing their insulation to break down and their parts to experience accelerated aging. Above a certain temperature, a transformer will fail.

At the same time, the saturated transformer starts to consume what's known as reactive power.

"When you look at power in the system, there's real power—like that in incandescent light bulbs—and then there's 'imaginary' power called reactive power, measured in vars," Lordan said.

Reactive power is produced when the current and voltage are out of phase. This type of power flow needs to be carefully managed to keep the voltage steady in transmission lines.

During a solar storm, however, any saturated transformers draw on more reactive power than what normal control equipment can handle. This can lead to voltage collapse, when it's no longer possible to push the needed power through transmission wires.

Even without a full collapse, fluctuating voltage in the transmission system can cause the grid to become unstable, which can impact transformers, relays, capacitors, and even the generators at power plants.

A Satellite Shield

In 2007 NASA Goddard began a collaborative effort with EPRI called the [Solar Shield Project](#), which uses monitoring data from several sun observatories to run state-of-the-art computer simulations and make solar storm predictions.

Solar Shield first collects a constant stream of data from satellites such as the Solar and Heliospheric Observatory (SOHO) and the Solar Terrestrial Relations Observatory (STEREO).

(Related Video: ["Solar Eruptions Captured in 3-D"](#))

"When an operator sees an eruption on the sun, he or she will derive the three-dimensional parameters of that eruption, such as size, speed, and direction," NASA's Pulkkinen said. The resulting model can provide one- to two-day warnings of incoming solar storms to EPRI, which then disseminates the alert to participating utilities across the North American power industry.

"If operators know a couple days beforehand that there's a good likelihood of a storm, they can postpone maintenance of critical lines," Pulkkinen said. This step maximizes the amount of the grid available, reducing strain if localized portions fail.

"Operators can also bring in more reserve power to the system to make it as stable as possible," he said. If particular transformers start showing signs of trouble, operators can reduce their load or disconnect them.

If the storm is expected to be severe enough, "the most dramatic action is to close down the entire grid," Pulkkinen said. "If the system is turned off, the extra DC currents alone won't harm the transformers."

But such a move would be "the last mitigation measure in the toolbox," he said, because switching the system off intentionally would result in temporary blackouts.

"The industry's goal is to provide safe, reliable, and cost-effective power," EPRI's Lordan said. "Utilities would be watching the system closely and would attempt to operate through the storm."

"If the utility system did go down because of a voltage collapse, utilities would have to wait for the storm to pass and then activate procedures to bring the system back up," Lordan said.

"If transformers are lost, the system can operate around a certain number of failed units. But if it's hundreds of transformers, then the industry would quickly get together and move the spares where they are most needed."

The European Union is working on a similar solar-storm alert project called [SPACECAST](#), which is projected to be operational by March 2012.

Trying to Avoid Surprises

As with other natural disasters, the ability to react to a solar storm depends first on the accuracy of monitoring and prediction efforts, which in turn need to be based on real-world physics.

But unlike hurricane predictions, for instance, "we have a tougher nut to crack, because the space weather system is so vast," NOAA's Kunches said. "If you were to make the sun the size of a basketball, Earth by comparison would be like a pinhead. Then you put the basketball at one end of a full-size court and the pinhead at the other end."

In addition, space weather forecasters don't yet have all the pieces of information needed to say for sure whether an incoming storm is going to be the type that will create geomagnetically induced currents.

"The strength of a CME is a function of the polarity of the embedded magnetic field in the plasma," Kunches said. "Polarity dictates whether the storm will be short-lived, very strong, etcetera, and stronger storms are more likely to induce geomagnetic currents. But we don't have that information until the storm is very near Earth."

What's more, even with a host of sun-watching instruments and monitoring centers, sometimes the sun simply "throws us a curveball," he said.

Between SOHO, STEREO, and NOAA's GOES satellites, "we're looking like crazy back at the sun, and we still get one out of ten or twenty surprise CMEs that just don't show up very well in the imagery," Kunches said.

Not only do the satellite-watchers miss some events, they also run the risk of false positives. The forecasters were recently duped just a few weeks ago, on June 21. "All our instruments saw what

appeared to be an Earth-directed CME as plain as the nose on your face, so we put out a warning," Kunches recalled. "And it turns out nothing happened."

New Era in Space-Weather Forecasts

Answers may come from recently launched satellites such as NASA's Solar Dynamics Observatory (SDO), which is now watching the sun around the clock in high resolution, taking pictures every tenth of a second in multiple wavelengths.

"One of the goals of SDO is to provide us with the keys to unlock the physics of solar eruptions," NASA's Pulkkinen said. "The SDO team can't predict when the eruptions will happen, but it can observe them and help us predict from there."

Overall, he added, "from a space-weather forecasting viewpoint, we're living in a very exciting time. This is the first time in history we're able to make one- to two-day predictions. It's the first time we have the observation capacity via satellites, and the first time we have full-scale models and the computational power to run those models."

(Related: ["Sun Headed Into Hibernation, Solar Studies Predict"](#))

According to NOAA's Kunches, perhaps the most vital aspect today in space weather forecasting and mitigation is well-coordinated communication.

"It's important to be as well-educated about the sun as possible," he said. "There's a recognition in the emergency management community and other levels of government that, as best we can, we need to communicate about space weather.

"If something does happen, even if we didn't predict it very well, the idea is that we can get the word out quickly, and people will know what to do."

ANNOUNCEMENTS

Next Club Meeting:

3rd Saturday 17 December 2011

- The Ogden Amateur Radio Club meetings are usually held on the **3rd Saturday** of each month.

- **Time: 5:00 PM**
- **Location: Bella's Mexican Restaurant**
- **Topic: OARC Family Dinner**
- **Talk-in: -146.90 (pl 123.0)**

Check OARC web site for details

www.ogdenarc.org

- Please invite a friend to join you. You do not have to be a member of the club to participate in our club meetings or activities. We invite all to join us.
- If anyone is interested in doing a presentation on something or just have something unique to show at the meetings. - Please get a hold of any of the officers and let us know.

Next Weber Co VE Test Session:

1st Wednesday 01 February 2012

- Exam sessions are held in Ogden every few months, *usually* the first Wednesday in February, June, and October.

Time: 05:00 PM *Walk-ins allowed*

Location:

**Weber County Sheriff Office
(Training room)
721 W 12th Street Ogden UT**

Contact: VE Liaison:

Mary Hazard

w7ue@arrl.net (801-430-0306)

Rick Morrison

morrisonri@msn.com
(801-791-9364)

Cost: \$ 14.00

Two forms of **ID**, one of which must be a **picture ID**.

For "Upgrades" bring current **license** and a **copy** of current license, and any **CSCE's**

Most **calculators** allowed. Calculator memories must be cleared before use.

Club Web Site

Be sure to visit our club web site.

- www.OgdenARC.org

Club membership is open to anyone interested in Amateur Radio. You do not need an amateur license to join us. Dues are used to operate the club, field day activities, and repeater equipment maintenance.

You do not need to join the club to participate with us.

Club Call Sign

Listen to the club repeaters for this very familiar CW ID. You do know Morse Code don't you?

- **W7SU**

ARRL Field Day is held on the last full weekend of June every year.

Location may vary each year so watch this notice for details as time draws near.

See you there.

OARC REPEATERS			
FREQ	CLUB	ZONE	LOCATION
146.820-	OARC	123.0	Mt Ogden
448.600-	OARC	123.0	Mt Ogden
146.900-	OARC "Talk-in"	123.0	Little Mtn (w/auto patch)
448.575-	OARC	100.0	Little Mtn (w/auto patch)

OTHER AREA REPEATERS			
FREQ	CLUB	ZONE	LOCATION
146.620-	UARC	none	Farnsworth Pk
147.120+	UARC	100.0	Farnsworth Pk
449.100-	UARC	146.2	Farnsworth Pk
449.500-	UARC	100.0	Farnsworth Pk
ATV	UARC	Ch-58	Farnsworth Pk
147.040+	DCARC	123.0	Antelope Isl
447.200-	DCARC	127.3	Antelope Isl
449.925-	DCARC	100.0	No Salt Lake
145.290-	UBET	123.0	Brigham City
145.430-	UBET	123.0	Thiokol
448.300-	UBET	123.0	Thiokol
146.640-	BARC	none	Logan
146.720-	BARC	103.5	Mt Logan
147.260+	BARC	103.5	Promontory Pt
449.625-	BARC	103.5	Mt Logan
145.250-	WSU	123.0	* coming soon
449.250-	WSU	123.0	* coming soon
145.490-	K7HEN	123.0	Promontory Pt
146.920-	N7TOP	123.0	Promontory Pt
449.775-	N7TOP	123.0	Promontory Pt
448.825-	IRLP/Echo	123.0	Clearfield City
449.950-	IRLP	123.0	Clearfield City
449.425-	IRLP	100.0	Nelson Peak
147.360+	Summit County	100.0	Lewis Peak

AREA CLUB MEETINGS & WEB SITES

CLUB	WEB SITE	DATE/TIME	LOCATION
Ogden ARC	ogdenarc.org	3 rd Saturday 09:00 am	Check OARC web site ...
WC ARES	ogdenarc.org/join.html#ares	2 nd Thursday 06:30 pm	Weber Co. Library Ogden Utah
WC Sheriff Comm-O		1 st Saturday 10:00 am	Weber Co. Sheriff Complex West 12 th Street Ogden Utah
Barc	barconline.org	2 nd Saturday 10:00 am	Cache Co. Sheriffs Complex 200 North 1400 West Logan Ut
CSERG	dcarc.net/ares.htm/	Last Wednesday 8:30pm	Clearfield City Hall Clearfield Utah
Dcarc	dcarc.net	2 nd Saturday 10:00 am	Davis Co. Sheriff Complex Farmington Utah
NU Ares	home.comcast.net/~noutares/	3 rd Wednesday 7:00 pm	Cache Co. Sheriff Office Logan Utah
Uarc	xmission.com/~uarc/	1 st Thursday 7:30 pm	UofU EMC Bldg Room 101 Salt Lake City Utah
Ubet	27meg.com/~k7ub/	4th Thursday 6:30 pm	BE-Thiokol: 24 East 100 South Brigham City Utah
Utah DX Association	udxa.org	3 rd Wednesday check web page for details	check web page for details Salt Lake City area
UvhfS	ussc.com/~uvhfs/	Each Tuesday 8:00 pm (refer to web site)	Weekly 2 meter net (no eye ball meetings)
WD Arc	westdesertarc.org/	1 st Tuesday 7:00 pm	Tooele County Courthouse Tooele Utah
WsuArc	arcweber.edu	3 rd Thursday 5:30 pm	WSU Blding #4 Room ? Ogden Utah

LOCAL AREA NETS

DATE	CLUB	FREQ
Daily @ 12:30 PM mt	Utah Beehive net HF	7.272 Mhz HF LSB
Daily @ 07:30 PM mt	Utah Code net HF	3.570 Mhz HF CW
Daily @ 02:00 UTC	Utah Farm net HF	3.937 Mhz HF LSB
Sunday @ 8:45 AM	Ogden Old Timers HF net	7.193 Mhz HF LSB
Sunday @ 7:30 PM	UBET ARC	145.430 - 123.0 (training net)
Sunday @ 8:30 PM	SATERN Net	145.900 - 123.0
Sunday @ 9:00 PM	Morgan Co Net	147.060 = simplex
Sunday @ 9:00 PM	UARC Info net	146.620- no PL tone required
Monday @ 9:00 PM	2-meter SSB net	144.250 Mhz 2-meter USB
Tuesday @ 8:00 PM	Weber ARES	448.600 - 123.0
Tuesday @ 8:00 PM	VHF Society Swap	147.120 + 100.0
Tuesday @ 9:00 PM	Bridgerland ARC	147.260 + 103.5
Wednesday @ 8:00 PM	UBET ARC	145.290-, 145.430-, 448.300- (all 123.0)
Wednesday @ 8:30 PM	CSERG	145.770 simplex
Wednesday @ 9:00 PM	No. Utah 10m HF net	28.313 Mhz HF USB
Wednesday @ 9:00 PM	6-meter SSB net	50.125 Mhz 6-meter USB
Thursday @ 6:30 PM	Davis Co Elmers Net	147.040 + 123.0 New Hams
Thursday @ 8:00 PM	Weber State ARC	146.820 - 123.0 (coming soon)
Thursday @ 8:00PM	State RACES VHF/IRLP	145.490 - 123.0, 146.680 - 123.0 3 rd Thursday - even months only
Thursday @ 8:30 PM	Davis ARES	147.420 = simplex
Thursday @ 9:00PM	Wasatch Back Net	147.360 + 100.0
Saturday @ 8:00AM mst	RACES State HF	3.920 Mhz HF LSB 3 rd Saturday – odd months only
Saturday @ 11:00AM mst	QCWA net HF	7.272 Mhz HF LSB

OARC OFFICERS

President: Kim Owen KO7U

Vice Pres: Larry Griffin AD7GL

Secretary: Gary Hudman WB7FMS

Treasurer: John Shupe K7DJ0

Program Director:
Gil Leonard KF7KPL

Activity Director:
Dave Woodcock KF7PAV

"WATTS NEWS" e-Magazine

NL Editor: Val Campbell K7HCP

OTHER CLUB APPOINTMENTS

Webmaster: Val Campbell K7HCP

Historian/Librarian: Kent Gardner WA7AHY

Advisor: Kent Gardner WA7AHY

Advisor: Stan Sjol WOKP

Photographer: John Shupe K7DJ0

QSL Manager: John Shupe K7DJ0

Equipment Manager: Val Campbell K7HCP

Repeater Engineer: Mike Fullmer KZ7O

VE Liaison: Mary Hazard W7UE and
Richard Morrison W7RIK

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www.OgdenArc.org