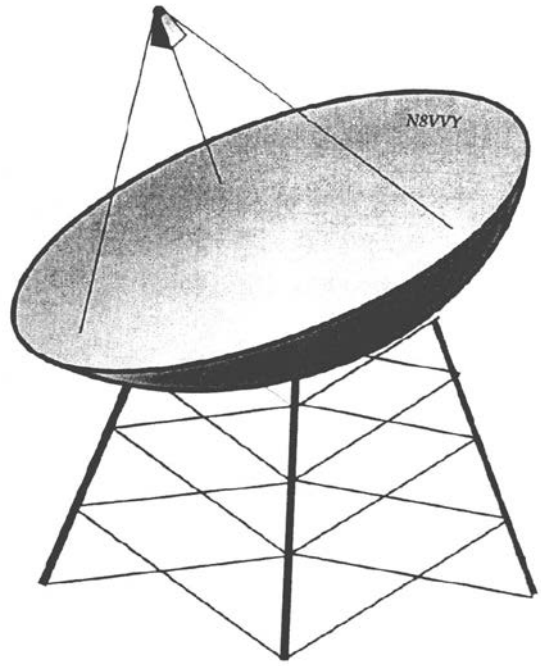
ANOMALOUS PROPAGATION

Newsletter: ***The Midwest VHF/UHF Society***



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MIDWEST VHF-UHF SOCIETY

Vol.31 No.6 www.mvus.org August 2017

Beacons: 1296.079 **W8KSE** EM79ur Dayton, OH---- 2W to Big Wheel at 800' AGL.

Listen for the **K9AYA Beacons** at EM79qk, 2W @ 10,368.000 MHz
both are copied by K4TO daily. 1W @ 5,760.000 MHz

Editor's comment: We are sorry for the delay this month. There were multiple reasons, summer vacation, eclipse, computer problems etc
Hope your summer was fine, have a good laborday!

DE N8 ZM: I am writing this just a few days after Hurricane Harvey and its remnants beat up on SE Texas, Louisiana, and Alabama. There are MVUS folks in that area, and I hope that they have not had serious problems due to the storm. Many volunteers have stepped in to help rescue efforts, which is a silver lining to this disaster. I'm sure that we will soon hear about how ham radio operators contributed their unique abilities to help out as well. Many of our fellow hams down there have no doubt lost homes, cars, and radios to the storm, and have had to deal with those immediate issues, which precludes them from being able to help out with communications support. Our best wishes to all of them.

Getting back to MVUS topics, we had our annual picnic on August 12th, once again at the home of Daun and Karen Yeagley. The weather was very comfortable and we had over 30 people there. The usual testing and troubleshooting went on, along with many conversations about almost anything, and I again managed to cook a lot of meats without burning the house down, although this year was probably the 2nd closest I've come to that. Nothing like fatty hamburger meat to make big flames.

The picnic is also the occasion of our annual election of officers, and there being no volunteers to replace any of the current crew of miscreants, we were all re-elected by acclamation, or maybe it was conscription. So in order by Pres, VP, Sec, and Treas, we are still N8ZM, W8RKO, WB8VSU, and N8QOD. Or Tom, Mike, Jim, and Joe. Or whatever other monikers you'd like to use for any of us.

Moving on to our beacons, real and imagined, we have been getting regularly irregular signal reports on the 1296 beacon from K4TO, who has been logging signal strength almost daily from his QTH east of Lexington, KY. That's about 145 miles due south of the beacon location SW of downtown Dayton, at about 800' AGL. Dave is also keeping tabs on the weather and other conditions and plans a detailed report, probably for MUD 2018 right here in good old Dayton, OH. Sponsored by MVUS. End of shameless plug.

The 2m and 432 beacons are close to being installed on a water tank NW of Dayton, along I-70. W8RKO and I visited the site recently and determined that usable coax cables were already in place that we could use, rather than having to purchase and install new ones. This will save us a lot of effort, and time. But, they look like 75 Ohm aluminum CATV type cables, so we have to work out the connector issues. Damn the SWR, full speed ahead! It's not enough loss to worry about for this application. More to come.

Also at the picnic, we discussed the cost of printing and mailing 50 – 60 copies of this newsletter to mail out each month. This represents about half of MVUS' members, and costs about $1 per copy. The other half gets Anom Prop via PDF file emailed to them. This of course is literally free. We'd like to move as many of you as possible to the email approach. Although we realize that some of you prefer real paper, and believe me, I understand that. But if you can live with the electronic version only and could be taken off the snail mail list, please let me know, making sure to include a good email address. I thank you, and Gerd thanks you, as he is the one who does all the printing, folding, labeling, stamping, and mailing of the newsletter each month. With a little help from K8UD and N8QOD.

Reminder, our picnic was the August meeting, so nothing on the 4th Friday. See you in September on the 22nd at the MCL.

de Tom, N8ZM

This and That 8-17

Constitution. I will not make myself unhappy at what I cannot prevent, nor give up the Constitution or abandon it because a rent has been made in it, but will stick by and repair it, and nurse it as long as it will hang together.

[Pres. Zachary Taylor]

Military. The axe, pick, saw and trowel, has become more the implement of the American soldier than the cannon, musket or sword.

[Pres. Zachary Taylor]

Golden Rule. " I would define liberty to be a power to do as we would be done by."

[Pres. John Adams]

Education. "The preservation of the means of knowledge among the lowest ranks is of more importance than all the property of all the rich men in the country.

[Pres. John Adams]

Lawyers and Judges. The lawyers find the loopholes in the law and a good judge is supposed to plug these. [Gerd]

Tower Height. For every 10 years over the age of 40, consider lowering your tower by 10 feet to a height you can still climb. [L.B. Cebic W4RNL]

Communicating."Really observe your audience, because they are telling you, what to do.

[Alan Alda]

Eiffel Tower. It stretches by more than 6 inches in the heat of summer. That is added to the 1000 feet of nominal height. Proportionally, for your 100 foot tower this would be a mere .6".

[Gerd]

Boom. "Thunder is the sound of angles bowling." [Bliss, 8-3]

Receptionist: "Your appointment with the doctor is for two o'clock….but his appointment with you is for three". [Lockhorns, 8-3]

Law of Mechanical Repair. After your hands become coated with grease, your nose will begin to itch.

[Universal Laws]

Law of Gravity. Any tool, nut, bolt, screw, when dropped, will roll to the least accessible corner.

[Universal Laws]

Calculus. This comes from the Greek for stone...in mathematics it's counting with stones, in medicine it's the mineral build up in the body: kidney stones, tartar on teeth… She teaches me all this as I sit there with my mouth open, looking astonished… [from: Paul Hostowsky, "That's what it is.]

Automotive & Transportation

New Lithium Metal Battery Can Double Your Electronics Power

Nicolette Emmino 17 August 2016

Four years ago, an MIT alumnus and former postdoc Qichao Hu founded a spin-off company called SolidEnergy Systems, dedicated to reinventing the battery. Now that company has created a brand-new rechargeable lithium metal battery that provides double the amount of energy that a traditional lithium ion does for your electronics.

Researchers have been working for years to create these kinds of rechargeable lithium metal batteries, due to their energy capacity. Until now, all groups have been unsuccessful in their attempts.

While Hu was working as a postdoc, alongside MIT professor Donald Sadoway, a well-known battery researcher who has developed several molten salt and liquid metal batteries, he helped make key design and material advancements in lithium metal batteries. This is what SolidEnergy's technology is built on.

SolidEnergy Systems' battery (located at far right) is twice as energy-dense as the lithium ion batteries used in consumer electronics.
(Image Credit: SolidEnergy Systems)

SolidEnergy Systems now plans to commercialize the battery. SolidEnergy has just moved to its headquarters and is setting up for its November launch.

The "anode-free" lithium metal battery comes with several material advances that make it twice as energy-dense—but just as safe and long-lasting—as the batteries that are in your smartphone, electric car, wearables, drones and other electronics.

"With two-times the energy density, we can make a battery half the size, but that still lasts the same amount of time, as a lithium-ion battery. Or we can make a battery the same size as a lithium-ion battery, but now it will last twice as long," said Hu, who co-invented the battery at MIT and is now CEO of SolidEnergy.

How It Works: The battery works by swapping out the common battery anode material, graphite, for a very thin lithium-metal foil, which can hold more ions, and, therefore, provide more energy capacity.

By chemically modifying the electrolyte, typically short-lived and volatile lithium-metal batteries become rechargeable and safer to use. The batteries are made using existing lithium-ion manufacturing equipment, so they are scalable, too. Last October, the company showed off the very first working prototype of a rechargeable lithium-metal smartphone battery with double-energy density, earning over $12 million from investors as a result.

The battery is about half the size of the lithium-ion battery used in an iPhone 6, but offers 2.0 amp hours, as opposed to the 1.8 amp hours in the lithium-ion battery. SolidEnergy has plans to bring the battery technology to smartphones and wearables by early next year, and to electric cars in 2018, but first it will tackle the drone market this November. "Several customers are using drones and balloons to provide free internet to the developing world, and to survey for disaster relief," said Hu. "It's a very exciting and noble application."

According to Hu, the new batteries could have an enormous effect on society by making their way into electric vehicles because the batteries will be half the size and weight but still travel the same distance, or even the same size, with more mileage capacity.

Ultra-fast solid-state EV batteries are right around the corner, Toyota confirms

By Gary Elinoff, contributing writer Electronics Products Magazine

Toyota has committed itself to introducing an all-electric vehicle powered by an "all-solid-state battery," which will charge in minutes rather than in hours, and it will do so by 2022. As originally reported in the Chunichi Shimbun, an important Japanese regional newspaper in an area home to many Toyota facilities, the company hopes that solid-state batteries will overcome a second weakness inherent in today's all-electrics, which is their limited cruising range.

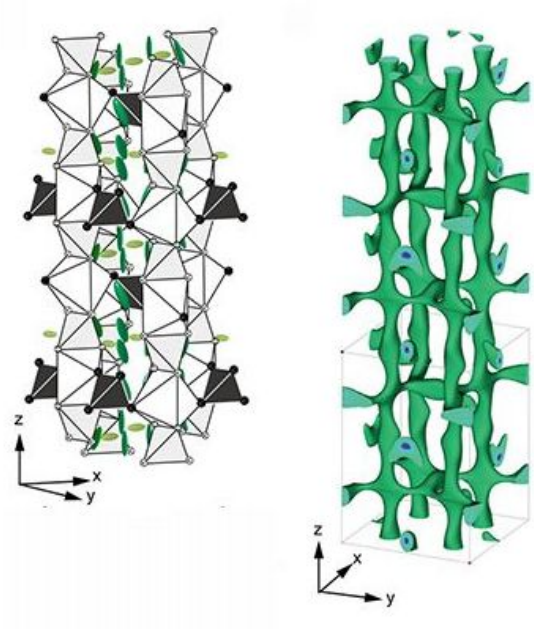
Toyota has also had tremendous global success with its famous Prius hybrids, and, in keeping with Japan's push for what has been described as a hydrogen-based energy economy, the company has previously championed cars powered by hydrogen fuel cells. However, reaching a critical mass of hydrogen refueling stations has been problematic, given the essentially dangerous nature of the very explosive gas.

So what is the reason for the abrupt change of course? In a word, China, Toyota's all-important customer and a nation that sees an all-electric automotive future for itself. Toyota expects to start building electric vehicles (EVs) in China within two years, albeit initially with now "old-school" lithium-ion batteries (LiBs). Significantly, as reported in Reuters, Toyota President Akio Toyoda himself will be spearheading the charge into the all-electric future.

Beyond the potential for greater energy storage capacity and faster charge times that solid-state batteries hold over LiBs, there is also the safety factor. LiBs utilize liquid electrolytes to ferry ions between their cathode and anode, and problems abound, including the well-known tendency for LiBs to overheat and even to explode.

Battery technology as it exists today is major bottleneck in many areas of technology aside from transportation, and there are many efforts being undertaken in academia and industry to find a breakthrough, including an electrode architecture based on MXene. However, as reported to Forbes by Toyota spokesperson Kayo Doi, "Among new-generation batteries, at this stage, solid-state batteries are considered closest to the level of practical application required to equip vehicles for volume production. We are working on research and development, including the production engineering of solid-state batteries, to commercialize them by the early 2020s."

The Forbes article cites a research article summary from the Tokyo Institute of Technology titled "Solid electrolytes open doors to solid-state batteries." In collaboration with Toyota and others, researchers synthesized what they describe as lithium-based "superionic" materials, which "are solid crystal structures through which ions can 'hop' easily, essentially maintaining a flow of ions similar to that which occurs inside a liquid electrolyte." In other words, they have developed what is, essentially, a solid-state electrolyte.



Crystal structure and lithium conduction pathway of a superionic material. Source: Tokyo Tech News (edited).

In addition to being immune to the problems associated with liquid electrolytes already described, early-stage batteries have been developed using superionic materials that operate over a range of −30°C and 100°C with high power densities. In addition, ultra-fast charging was achieved, and significantly, they retained their charge for long periods.

There is a lot of time between now and 2022, and this isn't the first time that "battery breakthroughs" have been touted, but considering that no less an actor than Toyota Motors is involved, there is reason to hope.

Crooket beam.

By Gerd, WB8iFM

We live on a ‘drive’ with trees growing on both sides and they even form somewhat of a canopy. The neighbors refer to this as the “tunnel.” As I approach my QTH, I always look out at certain spots to get a glimpse of my 3 el short wave beam perched on top of my 80 foot tower. This time I had the unusual case of seeing one element crooked. The director had turned from the horizontal to approximate 45 degrees.

Since we had some rough weather the days before, I attributed this tilt to some strong wind gusts. I am presently, this being the sunspot minimum not very alive, so fixing it made it to my list but with low priority.

A week or so later I noticed that the driven element had also rotated although not as much. And since we had no bad stormy weather I was scratching my head and was thinking “birds’. I had bird visits before, in fact, I took a picture one time with something like 20 or so birds sitting on the elements. But after they flew off, there was not the slightest tilting left.

Ergo I got to think, big birds. And then, one of the following days, I noticed that the director, instead of being turned on the right now was turned on the opposite side. Seemed like the birds were using my elements as a seesaw. The weather had still been very nice, quiet, none of these terrible thunderstorm we had in June and July!

Obviously I was now looking up at the tower each time I made it out of the house, and sometimes in between. And this paid off: one morning I finally saw the culprits, two of them, one sitting on the director, on the high spot, the other was on the boom, which, of course was easily accepting his weight!

By now you probably guessed, one of the big birds we have in Ohio is the Turkey Vulture. These get to be 5 pounds in weight and have a 6’ wingspan. I created some ruckus and they quietly and majestically took of. Of course, I got a few pictures before they departed.

Looking at the element situation now, I think, I can almost leave it like it is, the tilt is not too bad. I will make some measurements and run some over the air tests. However, I still plan to climb up and straighten and tighten the boom clamp bolts. Maybe I invest in a torque wrench, as I, at my age, do not nearly have the strength in my hands and fingers as I used to. Having found the culprits and knowing their habits, I think I can handle further problems.

Poor man's spectrum analyzer / using available (cheap) components.

By Bill Eaton, K9AYA , Aug. 2017

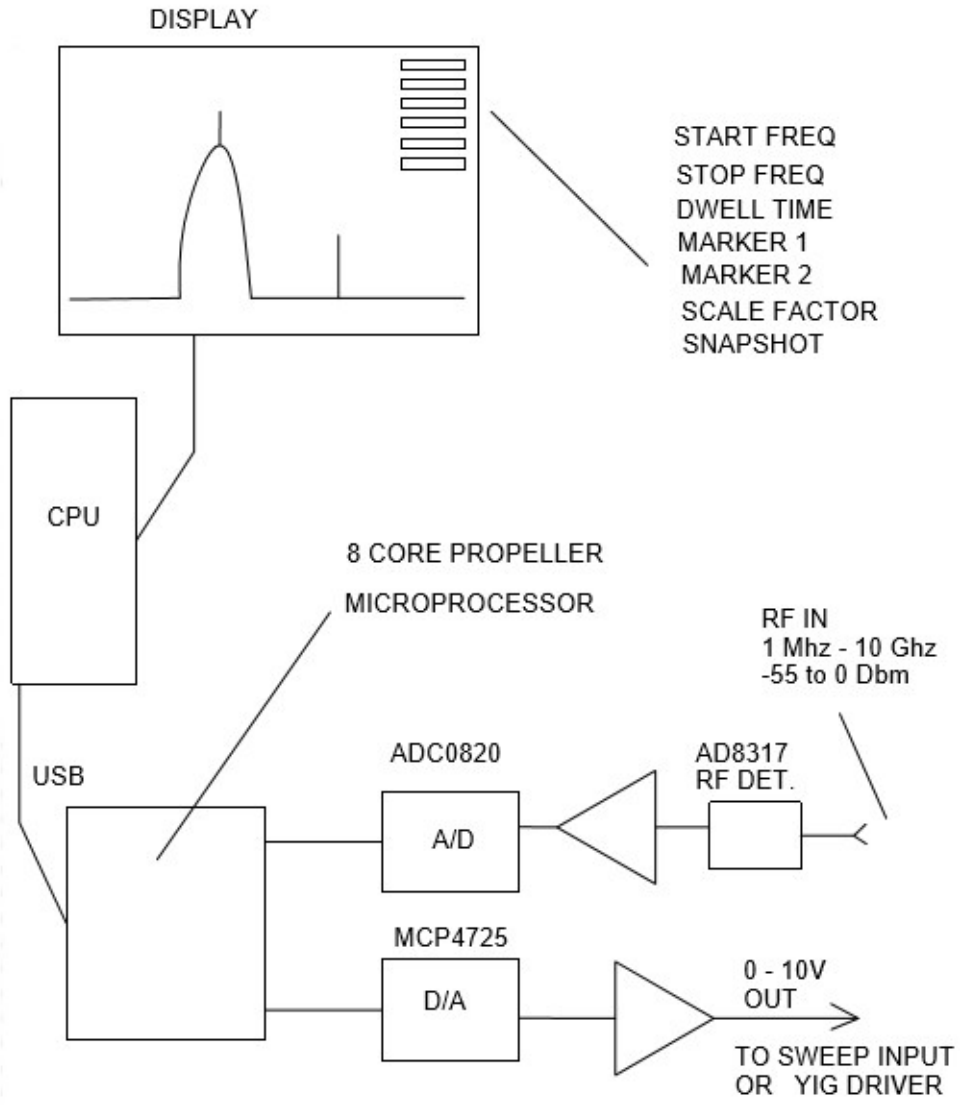
As you have probably noticed, the world of test equipment has changed over the past few years because of microprocessors. Since I am a microprocessor hobbyist, I started a project to build a device that was intended to be a poor man's spectrum analyzer. As the project progressed, the device evolved into a signal generator and network analyzer. See diagram.

The device can supply an output sweep voltage, 0 to 10 volts, or anything between. It can also digitize an input voltage, or an RF signal level from 1 Mhz to 10 Ghz , -55 dbm to 0 dbm.

The device connects to a desktop or laptop via a standard USB port to display a plot of frequency response, reflected signal, etc. The computer interface lets you select: start and stop frequency, dwell time, markers, scale factors, save to disc, take a snapshot, or more...

The device has been tested with several yig oscillators and yig bandpass filters. Also, it has been used with my HP-8350B sweep generator (it has 0 – 10V sweep input) to turn it into a network analyzer.

It is a work in progress, so not for production yet.



Total Solar Eclipse 8-21-2017, Beatrice, Nebraska

By Traudl Schrick

We had quite a memorable experience watching the eclipse on August 21st near Beatrice, Nebraska. Our daughter and family live in Manhattan, Kansas., about an hour's drive south of there. Beatrice was within the 100% eclipse viewing area and is also the location of the Homestead National Monument of America, where TV, radio and NASA, as well as science experts like Bill Nye gathered to inform the public about the momentous event.

Our plan was to find a higher location out in the country nearby, which we managed without too much traffic through the small towns in NE Kansas and Nebraska. Unfortunately, the weather forecast was not favorable for this area. After arriving at a spot (it was our third try) with a nice view all around the horizon, not blocked by high corn fields, a threatening cloud north of us blocked the view of the sun. And then it even started to rain.

There was an official NASA station to the SW of us (at the National monument), and listening to the car radio we heard that people were seeing the sun through the clouds there. Less than 20 minutes before the big event we jumped in our car and headed to that general area, passed the crowded Homestead place (everybody was already situated by that time) and headed back to the Beatrice area.

Our grandson was watching the sky from the rear seat through his special glasses and suddenly shouted "I see it". So we pulled up to the side of the road, got out and stared all at the eclipse in amazement about 5-10 minutes before totality.

Still aiming for a higher location, we got back into the car, turned onto a side road and after a few hundred feet had found our final destination near some impressive radio and TV towers. We put our blanket down and stared towards the sun with our glasses. It got darker and darker, and cooler as well. And then the totality made us jump up and we watched the moon covering the sun totally and displaying a beautyifull corona without our dark glasses.

The most amazing thing though was the horizon around us illuminated by sunshine, looking like a sunset. Street light were visible in nearby Beatrice. My son-in-law and Gerd fumbled with their cameras to record the historic two minutes.

We heard cheers from the other three parties that watched nearby. It sure was an event that united us all as citizen of this planet Earth. It got brighter quickly and with the idea of beating some of the traffic we packed up and left the site.

Hitting the highway we soon were in heavy traffic. So we turned into a side country road bypassing Beatrice. Going south we came through typical sparely populated farmland - corn and soybeans everywhere. Back in Kansas on the main road it was easy driving and we could reminiscence about this wonderful experience.

From the "Lightning Protection Code 1968"

American National Standard-NFPA

Applying Grounds for your station: A (late) lesson learned this past summer. Ed.

(Para) 213. When a stroke is about to take place to earth, the surrounding surface of the ground for a radius of several miles carries an electric charge. As the lightning stroke takes place, this surface charge moves radially toward the ground end of the air path, forming an electric current in the ground. At the point where the discharge enters the ground the current density becomes high, and if the flow takes place through the foundation wall of the building, damage may result. **Ground connections should, therefore, be distributed more or less symmetrically, preferably outside and around the circumference of a structure,** rather than being grouped on one side. With ground connections properly distributed, the current will be collected at the outer extremities, and the flow underneath the building minimized. In every case, **at least two ground connections should be made at opposite extremities of the structure.**

From Tad Cook, K7RA in ARLP-34 of 25 Aug-2017

Did you witness the eclipse on Monday? I found a group of my neighbors gathered on the street corner after 1700 UTC, and they hadone of those taped-together box arrangements for projecting the image. We were in Seattle, north of the band of darkness that spread over northern Oregon. Someone drove by with a box of those special safe eclipse glasses, and they worked very well.

Reports from friends who travelled to Madras, in Eastern Oregon's Jefferson County reported that in the middle of the totality band they saw the sky go totally dark, and stars illuminated the sky.

Scott Craig, WA4TTK of Nashville, Tennessee sent this, along with a link to eclipse photos he took:

"Thought you might like these. They are photos of Monday's eclipse taken here in Nashville. I took them and keep looking at them because I find them fascinating."

http://sc-photo-tn.com/?page_id=2389

For Sale: Fluke 6060B Generator; $250 or OBO

The Fluke Model 6060B Synthesized Signal Generator has a fully programmable,output frequency selectable in 10 Hz steps from 10kHz to 1050MHz. It is designed for applications which require good modulation, frequency, and output level performance with moderate spectral purity. The 6060B is well suited for testing a wide variety of RF receivers (particularly in-band),and RF devices, such as filters, amplifiers, and mixers.

Frequency range: 0.01 MHz to 1050 MHz in 10 Hz steps +13 dBm to -127 dBm level range in 0.1 dB steps ... AM and FM, Internal and External Internal 400 Hz and 1000 Hz modulation oscillator Relative frequency and amplitude
Volts/dBm conversion Stores/Recall Memory

Leo Schaaf,KD8SI,2648 N.Aragon Ave,Kettering,OH 45420 937-294-8425