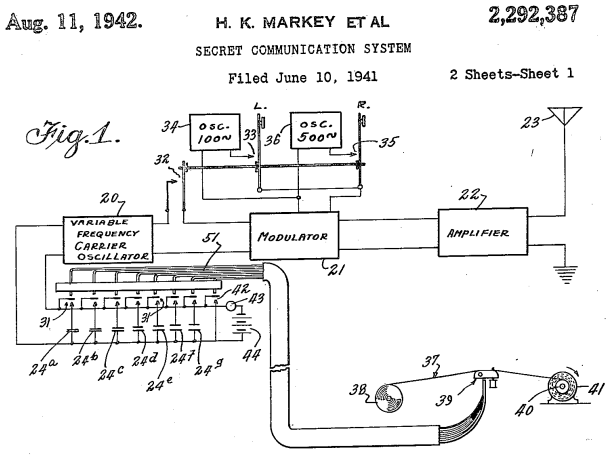
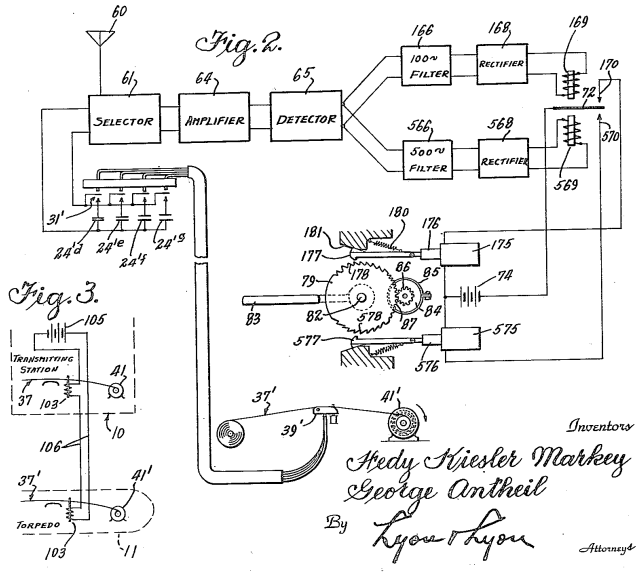




Wavelengths

Feb 2018

Xenia Weather Amateur Radio Net
XWARN (W8XRN)

147.1650+ (123.0) (Analog Only)
443.1000+ (123.0) (Analog + System Fusion)

Meetings: 2nd Monday, 7:30PM,
Greene Memorial Hospital (1141 N Monroe Dr, Xenia, OH) Herman Menapace Auditorium
Online Newsletter: Not available this month

President's Message

The Wilmington office of the National Weather Service will be presenting, in Greene County, a training seminar for severe weather spotting on Monday, February 5, from 6:00 PM to 8:00 PM. The training will be held at 541 Ledbetter Rd, Xenia OH 45385. I encourage all to attend. *Editor's Note: A schedule (https://goo.gl/u7uQSm) of spotter training classes is available from the National Weather Service.*

Ham radio license classes will be offered in Greene County starting on Sunday, Feb 11. Classes run for ten sessions on successive Sunday evenings from 7:00--9:00, except Easter Sunday (Apr 1). There is no charge for the class, but the ARRL license manual will be used as the textbook and participants will need to obtain one. One can be ordered at the first class session ($30). The entry-level Technician class will be held at the Bellbrook ARC Clubhouse, General class at Beavercreek Fire Station 61, and the Extra class at Fairborn Fire Station 2. The last session for all three groups is

(Continued on page 2)

Hedy Lamarr

Hedy Lamarr was widely known as a Hollywood star and the most beautiful woman in the world. But did you know she invented a technique now known as frequency hopping for Navy torpedoes during WWII? "Bombshell: The Hedy Lamarr Story" explores how Lamarr's true legacy is that of a technological trailblazer. The film premieres nationwide May 18, 2018, at 9 p.m. on PBS and will be available to stream the following day via pbs.org/americanmasters (https://goo.gl/MsyRRQ).

Club Contacts

- President, Bob Baker , N8ADO President@xwarn.net
- Vice President, Brett Boggs, NV8I Vicepresident@xwarn.net
- Secretary, Jason Bowman secretary@xwarn.net
- Treasurer, Steve Mackey, N8ILR Treasurer@xwarn.net
- Repeater Guru, Jim Simpson, WB8QZZ Technical@xwarn.net
- Web Master John Seitz, N8ACU webpresence@xwarn.net
- Membership, Phil Verret, KA8ZKR membership@xwarn.net
- XWARN Trailer / Public Service, Mike Crawford, KC8GLE trailer@xwarn.net or publicservice@xwarn.net
- Newsletter, Jason Bowman, WG8B newsletter@xwarn.net

Calendar of Events

- April 8. Sunday. All Day. Ohio River Road Runners Club Marathon. Xenia to Cedarville and back. Large event. Need many operators especially bike mobile. [N8ADO]
- May 18-20. Hamvention.

President's Message

(Continued from page 1)

the license exam to be held April 22 at 6:00 PM at Beavercreek FS61. If you plan to attend a class, please let Henry W8HJR know that you're interested. (email: henry dot ruminski at wright dot edu). XWARN is a sponsor of these classes.

If you would like to teach a session or two for one of the ham license classes, please discuss with me.

Another training opportunity exists and it's FREE. The National Incident Management System has become the standard system for managing disasters and emergency situations. All hams are encouraged to complete basic training on NIMS. Participation at a FEMA coordinated command center will likely require that the following FEMA courses have been completed: IS-100, IS-200, IS-700, IS-800. If you complete these courses, please register with the Ohio Section ARES as they keep a database of hams with this training. To find out more about the training, Google "fema courses" and the rest should be apparent.

Finally, Hamvention is just 109 days away, as I write this. XWARN plans to do our usual shirt sale and we hope that all of the members will help with that. Mark your calendars for May 18, 19, 20. Another hat that I wear is as a member of the Hamvention Committee. Hamvention is an all-volunteer show. If you would like to become involved, I can help you find a spot on the team.

Amateur Astronomer Discovers Zombie Satellite

After a successful 2-year mission, NASA's IMAGE satellite suddenly went dead in 2005. IMAGE's mission was to survey the Earth's magnetosphere. In mid-January, amateur astronomer Scott Tilley was hunting (https://goo.gl/fBN8PP) for the recently lost and highly secretive ZUMA satellite when he found another radio signal. He says, "A quick identity scan using 'strf' (sat tools rf) revealed the signal to come from 2000-017A, 26113, called IMAGE (https://goo.gl/hcbXyb). Then, on Jan 31, NASA confirmed that he had indeed found IMAGE. Not only was the carrier visible, but there appeared to be data sidebands beyond basic telemetry.

Ultimately what happened is, one of the power control modules failed. NASA determined that, if IMAGE was eclipsed by the Earth, which would happen every few years, its batteries would completely deplete. And then a power reset would occur when IMAGE reemerged into sunlight. Having gotten 2 years of good data, NASA simply gave up on the mission and may have forgotten to check back on IMAGE after one of these eclipse events.

Although the Voyager spacecraft discussed in last month's newsletter never lost contact with Earth, NASA has had to find ways of using 21st century technology to communicate with early 1970s technology. In a similar vein, NASA has been scrambling to dig up old software and get it running on new systems in order to determine IMAGE's status. Scott Tillery states,

> *"NASA has a lot of hard work ahead of them. They need to get a temporary tracking and control terminal up to carry on with determining the status of IMAGE. Based on the health of IMAGE they will need to recreate a mission control center from 13 years ago, obtain staff and procure funds to carry on with a post recovery extended mission…*
>
> *One thing is for sure, no one ever planned backward compatibility for a mission believed to be dead. Perhaps this is the beginning of a new way of thinking about archiving mission hardware and software when failures seem to have a probability of being recovered in the distant future. Humanity's future in space will require us to think about compatibility with hardware that we let slip away for long periods of time and somehow finds its way home and also listening for that hardware so we know when wayward missions come back to us.*
>
> *One major win was NASA's foresight to publish a very detailed and honest failure review. In my opinion, it saved IMAGE. NASA left a guide to prepare a mind to see IMAGE again.*

XWARN Mission

The mission of the Xenia Weather Amateur Radio Net (XWARN) amateur radio club is to conduct weather spotting nets during severe weather and other communication services for the City Of Xenia and all other Greene County communities.

In this capacity, we are set up to provide communication services as required to the Greene County Ohio Public Service Agencies and other local government entities. The communications services provided to the supported agencies may be for emergency purposes or to simply enhance their communications abilities. On an as needed basis XWARN provides similar services to various government entities of our surrounding counties.

Additionally, XWARN provides communications support to various community organizations in support of marathons, 5K runs, 10K runs, bicycle events, etc. to provide health and safety assistance to the participants and sponsors of said events.

In support of these goals, XWARN operates and maintains amateur radio repeaters and other equipment in Greene County.

Minutes: January 8, 2018

The meeting was opened 1930. November 2017 Minutes were approved with 1 Nay.

Treasurer's Report. The motion to approve the Treasurer's Report was accepted.

Public Service

Resolution Run occurred Dec 31, 2017. No trailer. 13 volunteers. Lots of dark areas. Need more volunteers next time.

Ugly Sweater in early Dec. It was short and sweet.

Mid-east regional invitational in Nov. It was an easy event to support.

We ran out of magnetic signs. New magnetic signs on the way. Probably $15.

Trailer report. Still there, no changes.

Repeaters. Repeater trustees not present. However, members indicated no problems. XWARN repeater worked well for Resolution Run.

Website. The President was going to discuss updating the website with the webmaster due to it being very out-dated.

Membership. 28 members for 2018 membership year so far.

Newsletter. Editor questioned if there were any pics from Resolution Run. There were none.

Skywarn Greene County: Mon Feb 5, 6PM. Assumed Ledbetter Rd at usual location

Upcoming Events

Skywarn training for Greene County on Monday, Feb 5, at 6PM. Training for Montgomery County is on Mar 10 at 9AM.

XWARN received a "Thank You" letter for having the XWARN trailer at the Beavercreek Open House on Oct 14.

Techfest. Feb 17-18 @ Sinclair 9-5 Sat, 9-3 Sun

Old Business

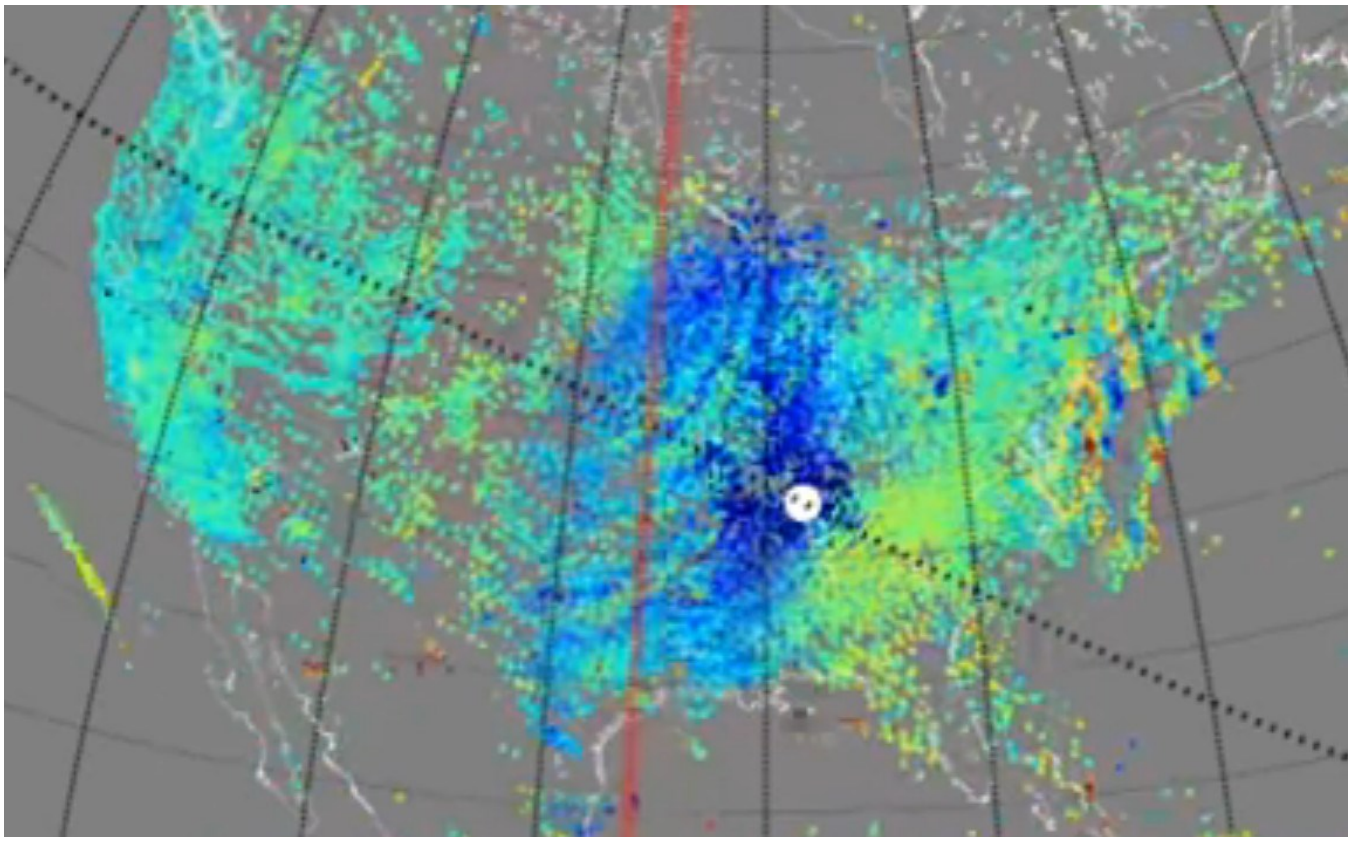
Jason is investigating how to transfer XWARN property from the for-profit association to the new domestic non-profit. Also need to finish the financials for the IRS.

Still hoping for space on a tower to share with DARA.

Hamvention hoodies and shirts still available

Program. Dave Kalter Memorial Youth DX Adventure. XWARN made a donation of $500.

Eclipse Last Fall Causes Ionospheric Bow Waves



Excerpts from Sky and Telescope (https://goo.gl/apiBmP)

Remember the "Great American Eclipse" last year? There were multiple ionospheric experiments going on. One of them identified a long-theorized but never observed phenomenon — an ionospheric bow wake.

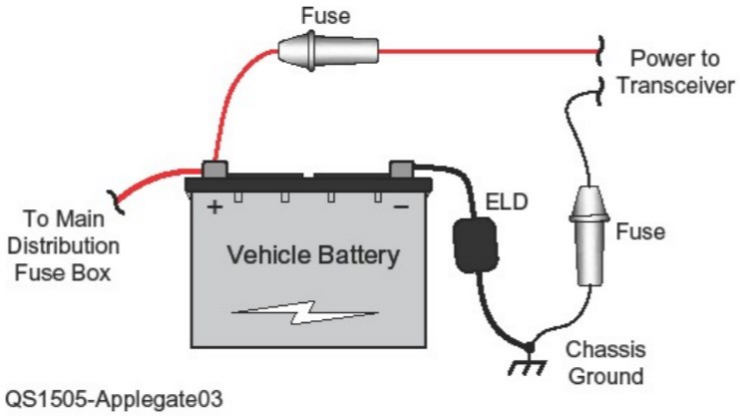
The ionosphere experienced a drastic shock as the Moon's umbra came along and briefly shut off its one source of energy: the Sun.

Ultraviolet light from the Sun is what breaks apart molecules in the outermost layer of Earth's atmosphere. Even though these molecules are few and far between at such high altitudes, when they're ionized they have measurable effects, such as bouncing radio waves back to Earth.

While total solar eclipses are far from unique celestial events — occurring on average about once every 18 months somewhere on Earth — last August's coast-to-coast totality path across the contiguous U.S. was the first such circumstance since 1918. It was this unusual shadow trajectory that allowed researchers at MIT's Haystack Observatory and the University of Tromsø, Norway, to make definitive observations of eclipse-induced bow waves.

The eclipse generated clear ionospheric bow waves in electron content disturbances resulting from totality, observed most clearly over the central and eastern U.S.

Grounding a Mobile Radio Installation



QS1505-Applegate03

Here I am almost three months after buying an F150, and I still don't have a mobile radio capability. There are numerous things to consider — power runs, antenna location and coax runs, where to put the radio if the head separates, and where to put an accessory speaker so you can hear audio, for example. I am just going to talk about one — power — and further limit the discussion to connecting power leads to the vehicle's battery.

As I am not a electrical engineer, and, while I have a lot of experience running power leads through road vehicles and aircraft, I really don't understand ALL of the issues. So off the internet I went in search of answers.

To be honest, when I started I was only vaguely aware of the key debates — whether to connect the negative lead directly to the negative battery post or chassis ground, and whether to fuse the negative lead. And debates there are. It took me a while to sort through all of the opinions. I still can't decide if the installation in my previous car was safe or not.

Let's start with what everyone AGREES on. First, don't bother with connecting your radio or other after market accessories that will pull larger currents to existing wiring. Run the positive lead all the way to the positive battery post and fuse it as close to the battery as possible. That's basically what everyone agrees on!

Although there is debate over where to attach the negative lead and whether to fuse it, it appears that the consensus is, do NOT connect to the negative battery post rather connect to a chassis ground , and do NOT fuse the negative lead.

Why? The people who say this invariably say the same thing — something plugged into the radio, usually the antenna feedline, became very hot and almost caused a fire. What's going on? Either the battery-to-chassis or engine block-to-chassis ground failed. Or, more likely the case, one or both of these grounds had increased resistance due to age or corrosion. This leaves the radio ground, which is directly connected to the battery, as the low impedance path. That's fine unless the fuse on the negative lead blows. Then the current will find another path, typically through the coax or other (grounded) accessories attached to the radio.

Modern vehicles add another, more definitive reason to connect negative to chassis instead of directly to the negative battery post. Due to federal regulations and the need to increase fleet fuel efficiencies, there may be a device called the Electronic Load Detector (ELD) on the negative lead, especially in vehicles that use Engine Idle Shutoff (EIS) technology. See QST (https://goo.gl/ypU9RR) May 2015 "The Modern Mobile". Note that the author is in the minority by recommending a fused negative lead. The only safe way to connect the negative power lead on these vehicles is on the load side of the ELD at a chassis ground. If you connect directly to the battery negative post, you risk the vehicle's computers getting confused and the car becoming immobile.

For further reading, the best overall sum-

(Continued on page 7)

(Continued from page 6)

mary of the issue can be found in a thread (https://goo.gl/hj4hqJ) at eHam. Another good thread (https://goo.gl/5Q8iJ8) is over on RadioReference.com. One of the dissenters (https://goo.gl/nN4aUc) is K0BG. Some crude diagrams (https://goo.gl/V1Eb4q) explaining the main issue can be found on W8JI's website. Finally, the UK's Federal of Communication Services has issued FCS1362 (https://goo.gl/oSnS6E) "UK Code of Practice for the Installation of Mobile Radio and Related Ancillary Equipment in Land Based Vehicles". On pages 30-31, they clearly state do NOT fuse the negative lead and do NOT connect to the negative battery post directly (always a chassis ground).

ARES E-Letter: DOD COMEX 17-4

Excerpt from the Jan 2017 ARES e-Letter (https://goo.gl/mCLHeG)

From November 4-6, 2017, the Dept of Defense (DOD) sponsored a communications exercise that focused on interoperability between DOD elements, other federal agencies, and the Amateur Radio community. While the DOD exercise began two days earlier, the Amateur Radio portion of the exercise kicked off again with a high power information broadcast on 60 meters channel one (5,330.5 kHz) from a military station on the east coast and the Fort Huachuca HF gateway station located in AZ.The high power broadcasts gave exercise information and requested amateur stations to make contact with Military Auxiliary Radio System (MARS) stations on 60 meters. New for this exercise, planners divided the US geographically and assigned each region to one of the five 60-meter channels. Planners roughly divided the US into northeast, southeast, northwest, southwest, and central regions.

Also new for this exercise, military planners incorporated a daytime broadcast on a DOD 13 MHz frequency to continue the exercise outreach to the amateur community.

Amateur Radio support for these DOD interoperability exercises continues to grow. For the November exercise, the military received a total of 738 broadcast reception reports. The 60-meter broadcasts were received by stations in Canada, Spain and Switzerland. Included in the reception reports were several from the shortwave listening (SWL) community.

Leaders from the supported DOD headquarters as well as the Chiefs of both the Army and Air Force MARS programs appreciated the nearly 2,000 Amateur Radio stations that trained during this exercise.

Back to Basics — Battery Capacity and Charging

In my volunteer work with the local Beavercreek robotics club, I've had to become the resident expert in batteries. The FIRST robotics competition limits the battery you can use — no more than 18 amp-hour (Ah), sealed lead acid, and charge according to the manufacturer's recommendations, usually limited to a 6A charge rate for the 18Ah batteries.

The last one was a little bit odd to me. Usually for lead acid, the maximum charge rate should roughly be 0.1C. "1C" is the current in amps obtained by taking the amp-hour rating and dividing it by 1 hour. So 1C of current for an 18Ah battery is 18A. The maximum safe charge rate for these batteries is actually 0.33C. Unusually high for lead acids but not unheard of. However, it may that these batteries use absorbed glass mats (AGM). Sealed batteries such as AGMs can typically handle the increased hydrogen off-gasing of the higher charge rate, and they have a recombination capability since they are sealed.

But there's another aspect I wanted to discuss briefly, the amp-hour rating and what it means for battery capacity. In a perfect world, 18Ah would mean that you could draw 18A for 1hr, 9A for 2hrs, etc. However, the very real world of internal battery resistance comes into play. Essentially, the more current you pull out of the battery, the more of the battery energy is wasted as heat in this internal battery resistance. Batteries will never achieve their full amp-hour rating except when running under the rated load. Unless otherwise specified, the rated load is the current that gives the rated capacity over 20hrs.

This effect was first characterized by Wilhelm Peukert in what's known as [Peukert's Law](https://goo.gl/KhF97s) (https://goo.gl/KhF97s). I won't go into any of the math here, but it's a fairly simply equation to determine a battery's effective capacity.

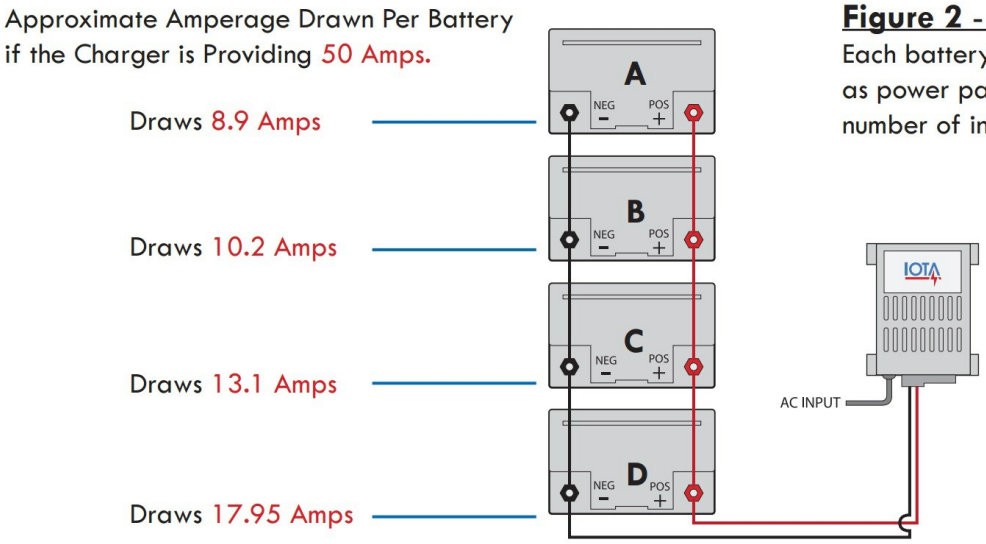
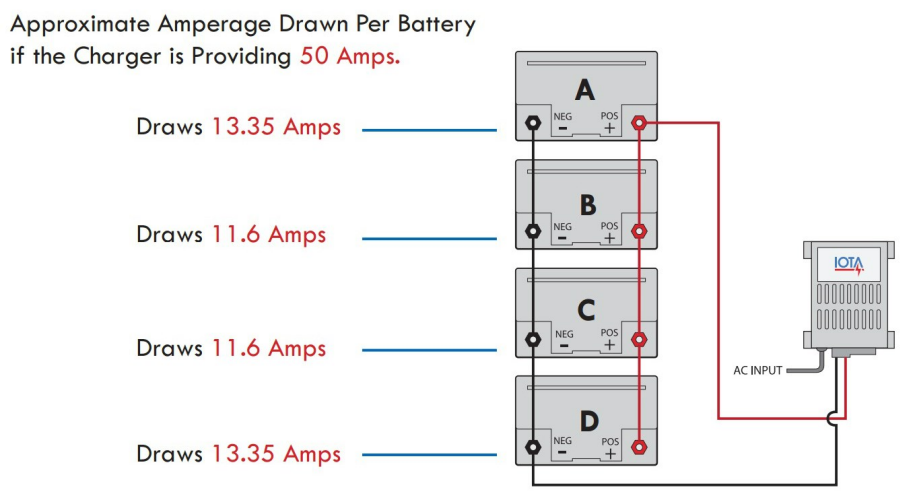
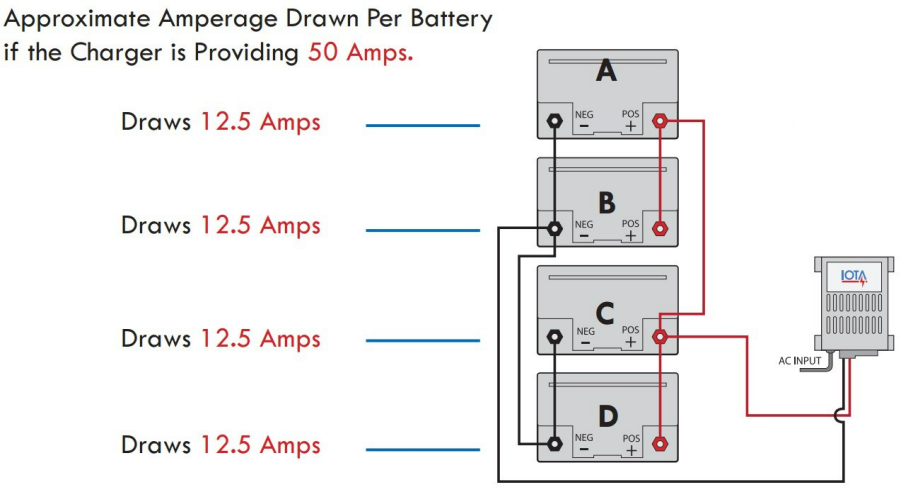


Figure 2 - Unbalanced Charging
Each battery draws less amperage as power passes through an increasing number of interconnecting leads.

Finally, there was some debate in the robotics club about how to handle battery charging. Being a new club and having to buy or have everything donated, we weren't sure if just buying a bunch of battery chargers was the best approach or to charge the batteries in parallel.

Eventually we found some used Schumacher smart chargers on eBay, but before that we were going through the design requirements for





a parallel charging system. Parallel charging can be dangerous if a cell in one of the batteries goes bad and the positive leads aren't fused. The good batteries will try to push current into the bad battery due to the difference in voltage. Usually this current is very high and will result in the charging harness creating a fire hazard or a battery exploding. This situation can also occur when one of the batteries in parallel is at a much lower state-of-charge than the other batteries.

The smart way to avoid this is to add a diode to each positive lead that only allows current to pass into the battery. Using this approach, the most discharged battery in the string will receive all of the charge current until reaching the state-of-charge of the next most discharged battery. Those two batteries will charge in parallel until reaching the state-of-charge of the next highest charged battery and so on.

You can use fuses alone, and the batteries and charging harness will be protected. But if any of these conditions are met, the fuse will blow and the batteries won't charge. A reliable parallel charger will therefore use diodes and maybe fuses as a backup.

Parallel charging also can lead to [unbalanced charging](https://goo.gl/kwjvnN) (https://goo.gl/kwjvnN). If the charging leads are connected to a single battery, typically at the end of a string, the small amount of resistance in the leads from battery to battery will cause the first battery to get the bulk of the charging voltage and the last battery to get the least. Good practice is to charge (and discharge) parallel strings with the positive lead connected to one end of the string and the negative lead to the other end. This still doesn't lead to perfect balancing, but it is definitely much better. For an even number of batteries, it is possible to construct a charging harness to perfectly balance the entire string.

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Wavelengths

Wavelengths is published monthly by the Xenia Weather Amateur Radio Net. Our meetings are currently held on the 2nd Monday of each month at **7:30 pm** at the Greene Memorial Hospital Auditorium. You can find additional information about our organization at www.xwarn.net . We welcome new and experienced Amateur operators and those interest in becoming an Amateur operator to attend our meetings.