The *Microvolt*

May, 2022

Robert Gunnell, KI7FUJ of Standard Supply Electronics presented *Soldering Basics*

The Elmer's Corner presentation titled *NETS: What they are and why we love them* was presented by Mike Mc Ainsh, KI7MTI

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Deadline for submissions is the 24th of each month prior to publication. Submissions by email are preferred (k7hfv@arrl.net), but other means including diskettes and typewritten submissions can be mailed directly to: Gordon Smith, 632 University St., Salt Lake City, UT 84102-3213. Reprints are allowed with proper credits to *The Microvolt*, UARC, and authors. Changes in mailing address should be communicated to the Club Secretary: Tom Kamlowsky, 4137 Clover Lane, Salt Lake City, UT, 84124-2711.

Club: The Utah Amateur Radio Club was organized under its present name in 1927, although its beginnings may date back as early as 1909. In 1928, it became affiliated with the American Radio Relay League (club #1602) and is a non-profit organization under the laws of Utah. It holds a club station license with the call W7SP, a memorial call for Leonard (Zim) Zimmerman, an amateur radio pioneer in the Salt Lake City area.

Meetings: The club meets each month except July and August. The meetings are held on the second Thursday of the month at 7:30 PM in the University of Utah's Warnock Engineering Building, generally in room 1230 or 2230, sometimes in 2250 or 105.

Membership: Club membership is open to anyone interested in amateur radio; a current license is not required. Dues are $20 per year, including a *Microvolt* subscription. *The Microvolt* and membership cannot be separated. Those living at the same address as a member who has paid $20 may obtain a membership without a *Microvolt* subscription for $12. Send dues to the Club Secretary: Tom Kamlowsky, WA7ZRG, 4137 Clover Lane, Salt Lake City, UT 84124-2711. Let the Secretary know if you prefer the electronic edition of *The Microvolt* instead of the printed version.

Contributions: Monetary contributions are gladly accepted. Send directly to the Club Treasurer: Chuck Johnson, 1612 W. 4915 S. Taylorsville, UT 84123-4244. For in-kind contributions, please contact any board member to make appropriate arrangements.

Repeaters: UARC maintains the 146.62- and 146.76- repeaters. The repeaters are administered by the UARC Repeater Committee. Comments and questions may be directed to any Committee member. The Lake Mountain repeater (146.76-) is IRLP node 3352. Instructions for IRLP use are on the club website.

Ham Hot-Line: The Utah Amateur Radio Club (UARC) has a Ham Hotline, 583-3002. Information regarding Amateur Radio can be obtained, including club, testing, meeting, and membership information. If no one answers leave your name, telephone number and a short message on the answering machine, and your call will be returned.

The *Microvolt, May, 2020*

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IRLP Information

For information on using the club's IRLP node on the 146.76 repeater, check http://www.utaharc.org/irlp.

For late breaking news listen to the UARC Information Net Sundays at 21:00 on 146.62 or set your browser to: http://user.xmission.com/~uarc/announce.html

We are grateful to the management of XMission, our Internet Service Provider (ISP), for the donation of this Web-Page service.

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Gordon, near Swazey Peak in 2007, enjoying several of his favorite things, Hiking, Ham Radio and Electronics while making preparations for a 173-mile light-beam contact.
Photo: Clint Turner, KA7OEI

A great friend and Elmer to Utah hams has become a silent key

It is with great sadness that the Utah Amateur Radio Club announces the passing of Gordon R Smith, K7HFV. For most of his life Gordon was a stalwart member and constant voice of reason for the Utah Amateur Radio club. During this time, he helped design and build the club's repeaters, which, thanks to his skill are able to survive harsh mountaintop environments.

Almost since its inception, Gordon was also in charge of the club's efforts in the Volunteer Examiner's Program where he and other volunteers administered amateur radio exams to thousands of people - and when many of those people got on the air themselves, they probably found Gordon, willing to give encouragement and advice.

In recognition of his decades of service and generosity, Gordon was awarded the lifetime achievement award that bears his name by the ARRL Utah section on April 13, 2022. Henceforth, this award will be given to deserving hams who show a love of amateur radio, and service to new and aspiring hams in the spirit of this great man.

There will be a service for Gordon on Sunday, May 15 at 2 PM at the Mt. Tabor Lutheran Church at 2nd South, 7th East. Space at the church is limited, but the service will be streamed live on the church's Facebook page.

Gordon will be greatly missed. The June, 2022 edition of the *Microvolt* will be dedicated to his memory.

Noji Ratzlaff, KN0JI presents on SWR at May's meeting

In radio engineering and telecommunications, **standing wave ratio** (**SWR**) is a measure of impedance matching of loads to the characteristic impedance of a transmission line or waveguide. Impedance mismatches result in standing waves along the transmission line, and SWR is defined as the ratio of the partial standing wave's amplitude at an antinode (maximum) to the amplitude at a node (minimum) along the line. [from Wikipedia]

In his presentation, "Too Low of an SWR Can Kill You," Noji Ratzlaff, KN0JI "…discusses the basics of SWR through the complex topic of how to burn up your rig's finals." He continues, asking, "Did you know that reflected power coming back to your antenna will not burn up your finals, contrary to popular belief?

Also, did you know that the only signal power that you transmit, that ever gets lost, is lost through your coax?"

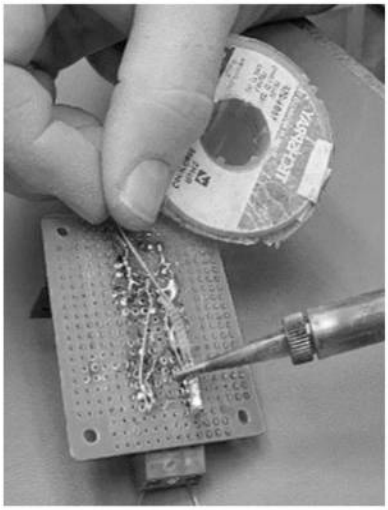
"So, if your transmission line (coax, etc.) was lossless (which open-wire line is nearly), then all of your transmitted power will be sent out through your antenna, no matter what the SWR is. This means your tuner will never heat up, if it's doing its job, except for the tiny amounts in the wires, which should be the only resistive components presented to the transmission line."

Noji will also be presenting the night's *Elmer's Corner* topic, on duplexers.

In physics, a **standing wave**, also known as a **stationary wave**, is a wave that oscillates in time but whose peak amplitude profile does not move in space. [Wikipedia]

Soldering Basics explained

Robert Gunnell, KI7FUJ was the featured speaker at last month's meeting held on-line via our YouTube channel. The topic was "Soldering Basics," and Robert, who is the owner of Standard Supply Electronics, gave us a thorough introduction to soldering; starting out with the various soldering irons and guns available, he pointed out the uses and limitations of those tools.



In this still from the video, Robert Gunnell demonstrates the proper way to use de-soldering wick when removing components from a project board

Next, Robert talked about the various types of solder available, pointing out the strengths and weaknesses of each. He then talked about rosin flux, explaining what it is and the importance of using plenty of flux when soldering. Various types of rosin products are on the market, and Robert explained the pros and cons of each. He explained that, "It's basically tree sap…That's what makes solder stick."

After showing a couple of products that are used for cleaning the board of flux after soldering, Robert moved into explaining how to solder a PL 259 connector to coax. I paid rapt attention as many of my previous efforts at attaching a connector to cable were disastrous! He showed how to properly prepare the coax before soldering, and how to check for shorts afterwards, using a multimeter.

Next, Robert demonstrated de-soldering. Using a project board that he wished to re-work he showed how to use a de-soldering wick that absorbs the solder as it's melted, and afterwards demonstrated a tool that sucks the hot solder into a tube.

Robert also showed us how to replace a connector on a wall wart, beginning with identifying the positive and negative wires, and advancing to proper preparation of the wire for soldering to prevent shorts in the finished product. This segment of the video is essential watching for inexperienced practitioners of soldering. Proper technique for joining two wires rounded out the soldering demonstration portion of this video.

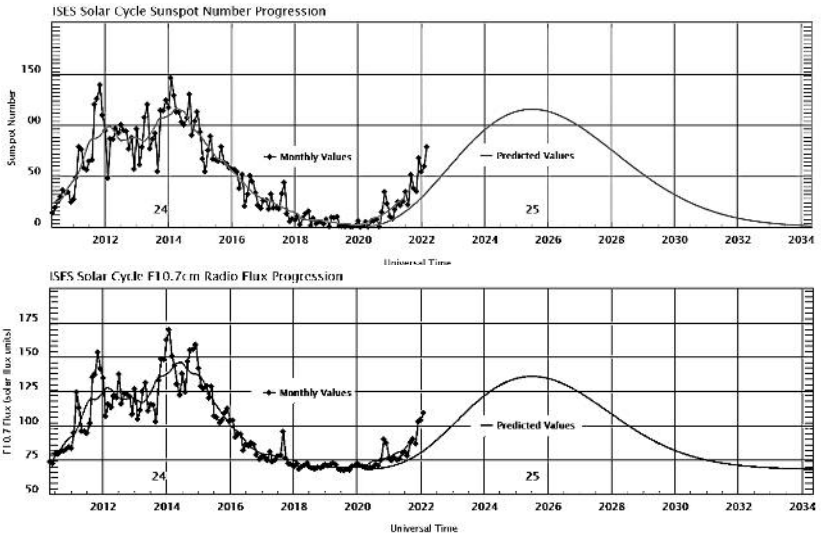
UARC thanks Robert for preparing this video, and we hope that he will join us again as we present topics to help new hams better understand ~~the nuts and bolts~~ good solder joints of amateur radio.

In the *Elmer's Corner* segment of the meeting, Mike Mc Ainsh, KI7MTI gave an overview on the topic of NETS: What they are and why we love them.

You can view the meeting presentations, as well as past presentations on UARC's YouTube channel by going to: **https://www.youtube.com/c/UtahAmateurRadioClub/videos**

What the Numbers Mean, and Propagation Predictions- a brief introduction to propagation and the major factors affecting it.

By Carl Luetzelschwab, K9LA



The sun emits electromagnetic radiation and matter as a consequence of the nuclear fusion process. Electromagnetic radiation at wavelengths of 100 to 1000 Angstroms (ultraviolet) ionizes the F region, radiation at 10 to 100 Angstroms (soft X-rays) ionizes the E region, and radiation at 1 to 10 Angstroms (hard X- rays) ionizes the D region. Solar matter (which includes charged particles--electrons and protons) is ejected from the sun on a regular basis, and this comprises the solar wind. On a "quiet" solar day the speed of this solar wind heading toward Earth averages about 400 km per second.

The sun's solar wind significantly impacts Earth's magnetic field. Earth's magnetic field is compressed by the solar wind on the side facing the sun and is stretched out on the side away from the sun (the magnetotail, which extends tens of earth radii downwind). While the sun's electromagnetic radiation can impact the entire ionosphere that is in daylight, charged particles ejected by the sun are guided into the ionosphere along magnetic field lines and thus can only impact high latitudes where the magnetic field lines go into the Earth.

Additionally, when electromagnetic radiation from the sun strips an electron off a neutral constituent in the atmosphere, the resulting electron can spiral along a magnetic field line (it spirals around the magnetic field line at the electron gyrofrequency). Thus Earth's magnetic field plays an important and critical role in propagation.

Variations in Earth's magnetic field are measured by magnetometers. There are two measurements readily available from magnetometer data--the daily A index and the three-hour K index. The A index is an average of the eight 3-hour K indices, and uses a linear scale and goes from 0 (quiet) to 400 (severe storm). The K index uses a quasi-logarithmic scale (which essentially is a compressed version of the A index) and goes from 0 to 9 (with 0 being quiet and 9 being severe storm). Generally an A index at or below 15 or a K index at or below 3 is best for propagation.

Sunspots are areas on the sun associated with ultraviolet radiation. Thus they are tied to ionization of the F region. The daily sunspot number, when plotted over a month time frame, is very spiky. Averaging the daily sunspot numbers over a month results in the monthly average sunspot number, but it is also rather spiky when plotted. Thus a more averaged, or smoothed, measurement is needed to measure solar cycles. This is the smoothed sunspot number (SSN). The SSN is calculated using six months of data before and six months of data after the desired month, plus the data for the desired month. Because of this amount of smoothing, the official SSN is one-half year behind the current month. Unfortunately this amount of smoothing may mask any short-term unusual solar activity that may enhance propagation.

Sunspots come and go in an approximate 11-year cycle. The rise to maximum (4 to 5 years) is usually faster than the descent to minimum (6 to 7 years). At and near the maximum of a solar cycle, the increased number of sunspots causes more ultraviolet radiation to impinge on the atmosphere. This results in significantly more F region ionization, allowing the ionosphere to refract higher frequencies (15, 12, 10, and even 6 meters) back to Earth for DX contacts. At and near the minimum between solar cycles, the number of sunspots is so low that

higher frequencies go through the ionosphere into space. Commensurate with solar minimum, though, is less absorption and a more stable ionosphere, resulting in the best propagation on the lower frequencies (160 and 80 meters). Thus, in general, high SSNs are best for high-frequency propagation, and low SSNs are best for low-frequency propagation.

Most of the disturbances to propagation come from solar flares and coronal mass ejections (CMEs). The solar flares that affect propagation are called X-ray flares due to their wavelength being in the 1 to 8 Angstrom range. X-ray flares are classified as C (the smallest), M (medium size), and X (the biggest). Class C flares usually have minimal impact to propagation. Class M and X flares can have a progressively adverse impact to propagation.

The electromagnetic radiation from a class X flare in the 1 to 8 Angstrom range can cause the loss of all propagation on the sunlit side of Earth due to increased D region absorption. Additionally, big class X flares can emit very energetic protons that are guided into the polar cap by Earth's magnetic field. This can result in a polar cap absorption event (PCA), with high D-region absorption on paths passing through the polar areas of Earth.

A CME is an explosive ejection of a large amount of solar matter, and can cause the average solar wind speed to take a dramatic jump upward--kind of like a shock wave heading toward Earth. If the polarity of the sun's magnetic field is southward when the shock wave hits Earth's magnetic field, the shock wave couples into Earth's magnetic field and can cause large variations in Earth's magnetic field. This is seen as an increase in the A and K indices.

In addition to auroral activity, these variations to the magnetic field can cause those electrons spiraling around magnetic field lines to be lost into the *magnetotail*. With electrons gone, maximum usable frequencies (MUFs) decrease, and return only after the magnetic field returns to normal and the process of ionization replenishes lost electrons. Most of the time, elevated A and K indices reduce MUFs, but occasionally MUFs at low latitudes may increase (due to a complicated process) when the A and K indices are elevated.

Solar flares and CMEs are related, but they can happen together or separately. Scientists are still trying to understand the relationship between them. One thing is certain, though--the electromagnetic radiation from a big flare traveling at the speed of light can cause short-term radio blackouts on the sunlit side of Earth within about 10 minutes of eruption. Unfortunately we detect the flare visually at the same time as the radio blackout, since both the visible light from the flare and the electromagnetic radiation in the 1 to 10 Angstrom range from the flare travel at the speed of light--in other words, we have no warning. On the other hand, the energetic particles ejected from a flare can take up to several hours to reach Earth, and the shock wave from a CME can take up to several days to reach Earth, thus giving us some warning of their impending disruptions.

Member of the Month

By Linda Reeder, N7HVF

Max Walker AI7LG

This month we are featuring Max Walker AI7LG. Max grew up in North Carolina. He was exposed to radio communications when he was 10 years old. He and his friends liked to talk to one another on walkie talkies. Some people who he knew had CB radios in their cars.

Max earned a degree in business before he came to Utah to finish his education at BYU. He met his wife Wendy in Provo. They have 5 grown children,

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2 girls and 3 boys. He presently works for Nova Fiber. as a Fiber Security consultant.

About 10 years ago Max stumbled across Amateur radio on the internet. It looked to him at the time as too much work. In 2021 Max got involved with a citizen response communications group.

It was through his involvement with this group that Max met his first Elmer, Lonnie Sutton N0INC. Lonnie encouraged Max to get his technician license. Max received his technician license in March 2021. Lonnie was an excellent instructor. He told Max about the different types of radios he could get. After Max received his technician license he purchased his first radio, a Baofeng, for 25 dollars.

A neighbor gave Max a Kenwood TS440s. That was his first low band rig when he first got in to the hobby 36 years ago. The only bad thing about that rig is that the memory battery has to be changed every 5 years. It is a major operation to take the old battery out and put a new battery in.

Lonnie talked to Max about emergency communications and encouraged him to join ham radio clubs. Max decided to join several clubs and learn all about them. He joined UARC, ARES, the ARRL, The Utah VHF Society, as well as a club in Sandy and a club in Layton. Max said that being involved with the local ham radio clubs has really been the magic he needed.

Max was determined that he was not going to get his general and extra class licenses. That seemed like too much work. Through ARES and his involvement in emergency communications, Max learned the importance of having a low band radio for emergencies. Having decided to get his general and extra class licenses he studied hard and used the study aids at hamstudy.org.

As soon as Max got his general license, he decided he was going to go for his extra class ticket. In February of this year Max obtained his general and extra class licenses.

Max says that he is not a tinkerer. The thought of putting up an antenna intimidates him. He is excited because he can put up any type of antenna that he wants but he knew he would need lots of help for this task. At least he owns his own house and he doesn't have to answer an HOA.

Max loves learning. He learned to play the organ. He also loves to bake bread and pecan pies.

Max, congratulations on all of your accomplishments in amateur radio in one year. 73! N7HVF, Linda Reeder