Western Reserve Amateur Radio Club
W8WRC
FOUNDED 2010
KC8SPF

The Wave Bender

Ohio Section

November 2018

Award Winning Newsletter

SKYWARN

MAHONING COUNTY FALL SKYWARN
NEW LOCATION BOARDMAN UNITED METHODIST CHURCH
6809 MARKET ST.
YOUNGSTOWN, OHIO 44512
November 14, start time 6:00 p.m.

Time to get back to Standard Time 2:00 A.M. Sunday November 4

2018 Officers:

President: Brian Lewis, AB8BL ab8bl@wrarc.net

VP: Maureen Stein, KD8NXS kd8nxs@wrarc.net

Secretary: Stan Adamski, KB3WPD kb3wpd@wrarc

Treasurer: Rose Marko,KD8TII kd8tii@wrarc.net

Past President: Bob Mitzel,N8RCM n8rcm@wrarc.net

Trustees:

Darrin Cannon, N8DMC n8dmc@wrarc.net
Roy Haren, KD8IJF kd8ijf@wrarc.net
Steve Fabry, KC8SOY kc8soy@wrarc.net

Appointed Positions:

Social: Maureen Stein, KD8NXS
kd8nxs@wrarc.net
Publicity: Joe Wojtowicz, W0JO
w0jo@wrarc.net
Nets: Steve Fabry, KC8SOY
kc8soy@wrarc.net
Classes/Testing: Bob Mitzel, N8RCM
n8rcm@wrarc.net
Newsletter/Web: Jane Avnet K8JAA
k8jaa@wrarc.net
Historian: Rose Marko,KD8TII
kd8tii@wrarc.net
Badges: Darrin Cannon, N8DMC
n8dmc@wrarc.net

Officer's Meeting:

November,13 2018, 7:00 P.M. At Eat 'n Park,
Austintown, Eat 'n Park,
5451 Mahoning Ave
All members welcome

Members **Meeting: Elections**

November 20, Davidson's
3636 Canfield Rd.,Cornersburgh
Speaker: Anthony Luscre, K8ZT
Topic: Software for Amateur Radio

http://www.wrarc.net/

In This Issue

Other Important Web Sites

The ARRL Exam Search Page
<http://www.arrl.org/find-an-amateur-radio-license-exam-session>

Ohio Single Sideband Net
<http://www.ossbn.org/index.html>

Antenna Height Above Average Terrain (HAAT) Calculator
https://www.fcc.gov/media/radio/haat-calculator

From Our VP

Greetings. Here we are coming up on November. By the time you all read this, our major public service events for 2018 will be behind us. As I write this, we are a few days away from our last event for the year, the 2018 Peace Race on Sunday, October 21. We are preparing diligently now and hopefully this will be a good event with no emergencies occurring. The only down side might be Mother Nature. The weather forecast doesn't look too good right now. We'll see how that part turns out. Many thanks in advance to all who have participated in any way. You are appreciated! For anyone who would like to do one more event, there will be the annual Christmas Parade in downtown Youngstown in early December. This is another fun event and Dave Brett, KD8NZF, will soon be looking for volunteers. While this is not an official event of WRARC, it is nice to help out when needed. Please think about signing up when the call comes.

Also, this month is our election of a 3-year trustee position. The election will be at the November 20 general meeting. Nominations will be taken right up to the election that night. If you haven't yet served in any area of the club officer or board positions and are thinking about getting started, please come forward to nominate yourself. Remember, it takes all of us, and our various strengths and talents, to make it all run smoothly. Don't be afraid to come forward. We are all here to help.

Dues renewals for the upcoming year continued to be taken. Please contact Rose, KD8TII if you still need to do that.

Our November speaker will be Anthony Luscre, K8ZT, giving a presentation on software for Amateur Radio. In closing, I wish you all a very Happy Thanksgiving. The season is upon us!

73, Maureen,,KD8NXS
WRARC/vp

A Word from our Treasurer

Here we are at the end of the year, 2018, and looking forward to 2019. Time has really flown by. We just finished our last major event, the Youngstown Peace Race on Sunday, October 21. It was something our club and the promoters of the event look forward to every year. I would like to thank all those who volunteered and their very helpful participation during the race. It was greatly appreciated.

This month we are voting for a TRUSTEE POSITION which is currently being held by Darrin Cannon, N8DMC. He has given three years to this position, and although he is more than willing to continue as trustee, the club would like to see a new face on our board. It's not too late to put your name in the hat. We are always looking for new faces and new ideas, to keep our club going into the new year.

Ladies, we are starting our YL breakfast club on Saturday, November 3. I have suggested The Landmark Restaurant on Market Street in Boardman, but I have not committed to it. Maureen, KD8NXS, has recommended TJ'S Restaurant located inside the Holiday Inn Hotel in Boardman. I think it would be a nice place to try to start out the new season. As of now, those planning on attending are: Maureen Stein, KD8NXS; Shirley Boles, KD8SSB; Liz Beatty, KD8DWV; Donna Haren and myself. Jane Avnet, K8JAA, sends her regards and regrets that she will not be able to attend. We will certainly miss her. I'm hoping to have more ladies join us this season.
And as an afterthought, I still am and will be collecting dues up to January 31. 2019.

I hope everyone had a Happy Halloween and I look forward to seeing you at our general meeting on Tuesday, November 20.

73, Rose, KD8TII
WRARC/Treasurer

What's coming up?

Nov. 03	YL Breakfast 9:00 A.M. - LandmarkRestaurant Boardman
Nov. 13	Board Meeting - Austintown Eat 'n Park
	Members welcome
	Ham Community Breakfast - Boardman Eat 'n Park
Nov. 14	Fall SkyWarn
Nov. 20	Members meeting 7:00 P.M. - ELECTIONS
Nov.22	Thanksgiving - Eat, drink, and be thankful
Dec. 01	YL Breakfast - PTBD
Dec. 11	Board Meeting - Austintown Eat 'n Park
	Members welcome
	Ham Community Breakfast - Boardman Eat 'n Park
Dec. 18	Members meeting 7:00 P.M.
January TBD	After the Holidays Annual Dinner

Make sure you attend the November WRARC Members meeting and vote for your new 3-Year Trustee

Contact WRARC Elmers with your Questions - *questions@wrarc.net*

Beatty, Dave KC8WY	anything	kc8wy@zoominternet.net
Fabry, Steve KC8SOY	Yaesu FT8900, FT8800, Mobile	kc8soy@yahoo.com
Haren, Roy KD8IJF	???	harens@juno.com
Williams, Russ NR8W	Electrician, tele-data, Amateur Extra	rwiliams@neo.rr.com
Wojtowicz, Joe W0JO	ICOM radios, D-Star	w0jo@arrl.net

He who is afraid of asking, is afraid of learning

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Articles from members for the Wave Bender are encouraged. They must be received by the editor by the 20th each month. Please send your articles to: *k8jaa@arrl.net*, and put WRARC on the subject line of your email. You may also send your articles to the editor: Jane Avnet, 1440 Skyhawk Pl., Wright City, MO 63390

Join us for the WRARC Friday night Net 9:00 P.M.
KD8DWV - 145.270, PL -110.9
Upcoming Net Control Operators

Nov. 02 Ray K8NVY
Nov. 09 Dave KE8ALR
Nov. 16 Ray K8NVY
Nov. 23 Rose KD8TTI
Nov. 30 Bob KE8HHH

Dec. 07 Darrin N8DMC
Dec. 14 Aiden W0TIS
Dec. 21 This could be you
Dec. 28 This could be you
Dec. 31 Aiden W0TIS - TBA

If you don't see your name on this list
Contact Steve, KC8SOY to take a turn at Net Control
330-774-6346

WRARC Simplex Frequency 146.565

Mahoning County ARES® Nets
1st Monday 8.40 PM ET W8QLY Repeater - 146.745 (PL 110.9)
&
3rd Monday 8.40 PM ET W8QLY Repeater - 146.745 (PL 110.9)
ARES thanks MVARA for the use of their repeater

W8SGT is facilitating The Ohio HF net every Tuesday - 7:00 PM
The net is run from the State of Ohio EOC on the
Ohio ARES Admin frequency 3875 kHz LSB
moves to 7240 Khz after 20-min.
All are welcome to check in.

The Ohio ARES/OES Digital Emergency Net held every Tuesday at 8:00PM.
held on 3585 kHz USB.
Please note all digital communications are Upper Side Band.
http://www.http://ohden.org/ for net details. Net Manager Gary NJ8BB

Thanks & 73 to all of our members (and others) look forward (hopefully) to getting this newsletter every month, so keep sending those articles, jokes, and suggestions! sending those articles, jokes, and suggestions!

Thanks goes out to this month's contributors; KD8TII, KC8UNR, N8SY, W5YI, the ARRL, FaceBook, and the World-Wide Web.

2018 Peace Race is History

On Sunday, October 21, WRARC did our last public service event for this year, the 10K portion of the 44th Annual Peace Race. It was terribly cold and my dashboard thermometer said 36 degrees to start out. At least the rain that was predicted held off, and it was dry. We had no actual emergencies and only one instance where a runner had to drop out due to a knee problem. It was called in and the race organizers sent a car out to pick him up. There was a slight course change near the beginning of the race where the runners entered Mill Creek Park. This was due to a bridge closure. It didn't present any problem for our coverage, but I later heard from one of our ice skaters who did the race that the hill that was added with this change was extra tough.

"The 10k course that starts in Mill Creek Park and ends in downtown Youngstown had to be tweaked due to the Idora Bridge closed for repairs." - the Vindicator

A big thank you goes out to all who came out to work this event and to all who did some extra tasks along the way to get ready for it. Those attending were: Rose Marko KD8TII, at net control; Donna Haren did the job of scribe; David Eardley KE8JTS, new member who buddied with John Ricci, KT8TAT; Maureen Stein, KD8NXS; Srian Lewis, AB8BL; Ted Filmer, KD8IJE; Bob Mitzel, N8RCM; Bob McCully, AB8OP; Stan Adamski, KB3WPD; Aiden Divelbiss, W0TIS, and his mom who drove him; Jo Wilms, KD8SNW; Dave Wilms, KD8SNZ; Devon Wilms, KD8SNV; Brandon Benson, KD8NXP; Rocky LeRoy, W8RKY; Joe Wojtowicz, W0JO; Ray Lashure, K8NVY; Marilyn Ramuno, Ray's wife; Roy Haren, KD8IJE; Dave Ruck , N8YMZ; Steve Fabry, KC8SOY; Darrin Cannon, N8DMC; and Mark Stein, KD8YMK. We couldn't have done it without all of you. Much appreciated.

We had many who did extra "behind the scenes" tasks to make it all come together. Thank you also for all of these things. They are as follows: Dennis, KA8DJM, for making copies of course maps for us; Roy, KD8IJF, for providing a course map for each person with their assignments marked on it with our tactical call signs, then giving them out in the morning; Roy, KD8IJF, and Brian, AB8BL, putting out the flags the day before to help us find our spots; Kevin, KD8NXR, for printing out our "volunteer" car dashboard car signs; and Marilyn Ramuno for bringing us delicious muffins to start us out with (Yum!). In addition, this year we had two presentations from Steve, KC8SOY, Darrin, N8DMC, and Bob, N8RCM, on the proper ways to do these events. Steve, KC8SOY, for placing the club banner in prominent places for the public to see, and he and Darrin, N8DMC, have been the contact persons on race days with event organizers to send out assistance to persons on the courses as needed. This past summer Joe, W0JO, stepped forward to do the organizational work of coordinating our part of the Panerathon coverage while I was gone. It really is a total team effort for all of this to happen to make it all run smoothly. Kudos to all who have gone the extra mile, no pun intended. We are looking forward to a good 2019 season too!

73, Maureen, KD8NXS

#GIVINGTUESDAY

You've heard of Black Friday and Cyber Monday, but have you ever heard of #Giving Tuesdsay? Now, we have a day for giving thanks, we have #GivingTuesday, a global day dedicated to giving back. #GivingTuesday is always the last Tuesday in November a special holiday created to celebrate America's proud tradition of charitable giving. It's a day when people around the world come together to give back, make the world a better place and prove that the holidays can be about giving and giving back.

Please consider making a donation on November 27, this year's #GivingTuesday. As you take advantage of holiday season bargains, we hope you will consider giving to support the work of your favorite charity. They gratefully accept the contributions of individuals and organizations who wish to support our mission to provide assistance to needy individuals/families in our area.

If you would like to give back to the community, contributions can be made by mailing a check to one of these fine charities:

- FullCircle Giving, Inc. 11209 Sharon Drive, Parma, Ohio 44130
- Second Harvest Food Bank, 2805 Salt Springs Rd., Youngstown, OH 44509
- The Salvation Army, 1501 Glenwood Ave. Youngstown
- Rescue Mission of the Mahoning Valley,POBOX 430 Youngstown OH 44501-0430
- Your favorite charity

They thank you in advance for your support!

Monthly Ham Community Breakfast Second and Fourth Tuesdays 9:00 A.M. at Boardman Eat'n Park Join Us!

How I got into Ham Radio

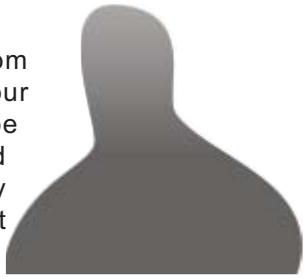
Dad was in the Air Force in TX about 1952, and got bored. He thought Ham Radio looked interesting and picked up a copy of the Handbook. When my mom and sisters (and I) got there to stay with Dad, after about three months with him in TX, and us terrorizing my grandparents here, I found it. A seriously expensive book at about $3.00, but dad figured I'd destroy it. I didn't, but I did read a good bit, and enjoyed the catalog pictures in the back . . . Downhill from there, but it took until 1958 to get my Novice license and about 1960 to get the Technician class, I still have.

Aiden's just a little older than I was in 1960. Amazing kid....

Regards,
Stu, K8LEA

Tell us how you got interested, or how you got started. Maybe you had an Elmer you'd like to tell us about. *-ed*

Could this be You?



Could this be YOU? This is the Wave Bender YOUR Newsletter. We have plenty of room for YOUR article(s)! If something is of interest to you, odds are that we all will enjoy your thoughts and activities! Have a favorite radio? Have some reminiscing to do? maybe you have a question for one of our Elmers. OR, a Tip or Trick you learned that would help one of YOUR WRARC friends. You are warmly invited to contribute! Don't worry about writing or formality - we can help you with that. Your article could go in this spot next month, or one larger!!

Use Your License to Serve the Community - Volunteer

"The dues are due" anytime between now and January 31, 2019.

The dues are $20.00 for the initial person joining in the household if that person is under 65, and $5.00 for each subsequent member who is in the same household.

The senior dues for the initial person joining in the household who is 65 years of age or older is $16.00 with $5.00 for each subsequent member from the same household.

Interesting Story

Vi Barrett sits in the living room of her Fullerton (CA) home with her Ham Radio equipment and related memorabilia on Tuesday, September 15, 2018. She received her ham radio license on February 14, 1948, and worked as a dispatcher in the Los Angeles office of the FBI for over six years. Barrett placed dots on the world maps on the wall where she has talked with people on her radio over the years.(Photo by Mark Rightmire, Orange County Register/SCNG)

Walk into Vi Barrett's living room and you walk into an era when FBI guys were called "G-men," women were "dolls" and a "dame with good gams" might be favored over other "skirts." At least that's the stereotype.

Fortunately, Barrett was around in the 1940s to set people straight and continues to explode stereotypes today. But these days, it's more about blowing up perceptions over age – she's 89 – than busting gender barriers.

On a desk in a corner of her living room in Fullerton, there is a contraption the size of a fist made of chrome and two tiny Lucite paddles. Barrett reaches out and with her thumb and forefinger and bats the little paddles back and forth. Instantly, the unmistakable dit-dit-dit-dah-dah-dah of Morse code fills the room.

Next to the ultra-modern chrome gizmo, Barrett picks up a little brass, steel and wood machine called a "straight key" that her father gave her more than 70 years ago. Barrett, you see, is a long-time expert in Morse code, can still tap 15 words a minute. And when you discover her background, it all makes sense.

As a teenager in Los Angeles, Barrett fell in love with ham radio and became one of the few women to enter what was then considered a man's world of electronics. After much conversation, I discover Barrett also was a G-man of sorts.

Electric avenue

When her uncle first showed off his ham radio, Barrett was a 14-year-old Girl Scout and music major growing up in South Central. Back then, she didn't give a whit about the dials, knobs and meters that attracted some guys to ham radio. What Barrett saw was a way to communicate with the world.

"I thought it was so exciting to be able to talk to someone in a different city or a different state," Barrett recalls, her eyes dancing at the memory. "Right away, I started saving my babysitting money. I wanted to buy a receiver so bad."

Barrett heard about amateur radio's annual event where hams gather, set up antennas and invite the public. In 1946, Dad agreed to take her to Baldwin Hills where ham operators carried their rigs.

"Are you a ham?" one gentleman asked.
"No," Barrett confessed.
" Would you like to be?"
" Oh, would I!"

At that moment, Barrett found her first mentor. Then she found another. And another. The teenager studied theory, how to operate a receiver, how to use a transmitter. She mastered Morse code. In 1947, she sat next to the ham radio operator who patched Thor Heyerdahl's location aboard the Kon-Tiki to Washington, D.C.

The following year, at age 17, she made her way to the Federal Building in downtown Los Angeles and took her ham test. She was the only female in the room. A few hours later, she also was the only female to walk out with a ham radio license, call letters "W6CBA."

A few days later, Dad climbed onto the roof and set up an antenna. Barrett's first call went to Colorado Springs. As far as Barrett was concerned, it felt like reaching Antarctica.

Inside the FBI Wrapping up her senior year in high school, Barrett took a ham radio class. Soon, *Continued page 10*

Story - continued from page 9

the instructor asked Barrett to teach Morse code she was so good. After high school, Barrett heard the FBI was hiring and convinced her mother to take her back to the Federal Building. She was hired for the clerical pool and sat before a big Underwood typewriter. But that was only the beginning of what became a meteoric rise with the FBI.

Word got out that the young typist was a speedster with Morse code, that she had a ham radio license and was fast and efficient with radio voice communication. Soon, she was called to the office of the big boss, the agent in charge. Unsure what the meeting was about, Barrett stood her full 5-foot-1 height and waited for the chief to talk.

“Would you,” he asked, “like to try the radio?” Barrett knew the offer meant she would become one of the first female FBI dispatchers in history. She remembers, “Those were wonderful words for me.

“A bank robbery is a lot different than chatting with somebody. It was a wonderful, exciting job.”
Her favorite case was the Max Factor extortion scam in which the suspect demanded money in exchange for not blowing up a store. The blackmail money was left in an orchard by an agent who resembled the tycoon. When the suspect grabbed the dough, agents jumped down from trees and nabbed the man. Barrett recalls the perp walk in the hallway and laughs, “He was a pipsqueak.”

Global connections
After getting married in 1954, Barrett left the FBI, but not her beloved ham radio. Like his father-in-law before him, soon her husband was on the roof erecting an antenna. “Don knew that if he married me, I was going to have my ham radio station,” Barrett chuckles. “He knew he was getting a double package: wife and radio operator.”

While her husband ran his and his dad’s service station in Los Nietos, Barrett worked as switchboard receptionist for the East Whittier School District and raised the couple’s two sons and daughter (today, there are four grandchildren, all boys).

For two decades, the couple also volunteered with the Whittier Police Department while Barrett continued to volunteer as a ham. In Whittier, she allows, “I did everything but carry a gun.”

During the 1984 Olympics, she used her ham radio to help agencies connect. During the 1987 Whittier Narrows earthquake, she ensured hospitals coordinated. “They call us a backup communication system,” she allows, “but we often end up being the primary with our radios.”

She’s helped thousands of patients aboard hospital ships connect with relatives. She’s helped soldiers talk to their parents.

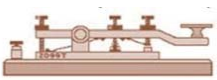
She’s also shared grief. Barrett recounts the time one young man aboard a hospital ship in the South China Sea talked to his parents. “They were so thrilled to hear from their boy in Vietnam.” Later, Barrett called back the parents and asked if they’d like another patch to their son. The father quietly answered, “Our son was killed in action.” Still, for Barrett service never stops.

In her living room, she has her transmitter, receiver, microphone and that chrome Morse code key ready. But it’s what’s hidden above that impresses. It’s no coincidence that Barrett is on the top floor of her building, just as it’s no coincidence that there’s a 62-foot wire antenna strung in the attic.

Today, perhaps Barrett will connect to places she’s already electronically visited, countries such as Greenland, Tanzania, Laos. Or maybe she’ll check out Antarctica. Mind you, talking to Antarctica is no longer just a dream. With 194 countries documented, Barrett already has chatted with hams on the world’s coldest continent.

Accordingly, I’ll leave you with this: Dit-dit-dit-dah-dit-dah. Morse code for “end of contact.”

Lloyd Colston, KC5FM
Ark City, KS



Hams Helping Hams

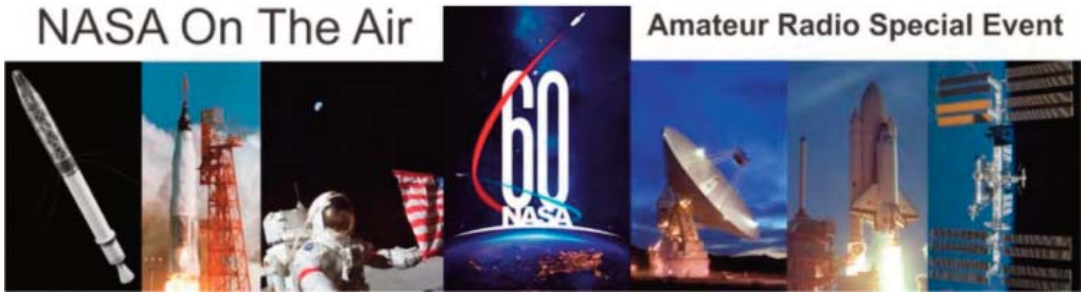
10-14-18 - Today, at K8NVY's home QTH. A few Hams came over to help Ray cut down a Tree located in the front yard, as well as remove a tree limb in which recently had fallen onto his wheel chair ramp. Thanks goes out to Steve Petro, KB8VGX, his wife Nicole, and daughter Haley, who is also a Ham, KE8KNF. Great job - Nice skills behind that chainsaw, those ladies really got their workout lifting all the wood into the bed of the truck... small and mighty I'd say!

Darrin, N8DMC
WRARC/Trustee
Stolen from Facebook

Congrats to James Beal, N8RAK, member of SAARA who won the ARRL Handbook for being the top man on hours recorded in the new system! *N8SY*

ITU Standard Phonetic Alphabet

ALPHA	NOVEMBER
BRAVO	OSCAR
CHARLIE	PAPA
DELTA	QUEBEC
ECHO	ROMEO
FOXTROT	SIERRA
GOLF	TANGO
HOTEL	UNIFORM
INDIA	VICTOR
JULIET	WHISKEY
KILO	X-RAY
LIMA	YANKEE
MIKE	ZULU



2018 is a big year for NASA anniversaries and we'd like for you to help us celebrate. NASA was created in 1958, the first manned lunar mission was in 1968, and the first elements of the International Space Station (ISS) were launched in 1998. The club stations at the various NASA centers and facilities plan to be on the air with special events to celebrate these milestones and some may be offering commemorative QSL cards.

There will be a special certificate indicating how many centers you worked on various bands and modes that may be downloaded. QSL instructions are available on the QRZ.COM site for each individual club station. We have a web-based system for you to check your points total and download a certificate at the end of the event in December 2018. Visit the Scores section for a link to that system.

Points will be awarded for each center worked on each band and mode (phone, CW, digital). The event runs from December 2017 through December 2018. Note that any contact with a NASA club station during the full time frame will count toward your points total.

The following events will have more NASA club participation:
- Apollo 17 45th anniversary – 11-19 December 2017, beginning of event
- NASA founded 60th anniversary (act signed by President Eisenhower) – 29 July 1958
- ISS First Element Launch 20th anniversary – 20 November 1998. We are planning a joint event with the European Space Agency. See https://sites.google.com/site/esahamradio/home Check back for further details.
- ISS Node 1 Launch 20th anniversary – 4 December 1998
- 50th anniversary of Apollo 8 – launch 21 December 1968, splashdown 27 December, end of event

Note that there may be other special event operations by the various centers commemorating specific events but those listed above will include participation from all the centers. All operating modes are fair game including satellites, repeaters, EME, ISS APRS, etc. We hope to be on the air for casual contacts and contests as well. Please check back on our website: https://nasaontheair.wordpress.com/ for updates as the program is developed. (note.. ***they have a really cool QSL Card that I'm sure that you'll want to have for your wall!!!)***

Ham Radio is...Awesome

What is Ham Radio? Out of the many exciting characteristics of ham radio...Ready, Out of This World, Mentoring, The Game, Friendship, Education, Adventure, Social, Service, Discovery, Exploration, Global, and On the Go.

The razor blade is sharp, but can't cut a tree; the axe is strong, but can't cut hair.
Everyone is important according to his/her pwn unique purpose . . .
Never look down on anyone unless you ar admiring their shoes . . .

What Is The Maximum Voltage A Human Can Withstand?

First, let me say this for everyone's sake.. Don't try this to see if it's wrong or right. It needs to be considered as subjective information, and your safety is worth more than proving any article wrong!!!

VOLTAGE, CURRENT, AND POWER

Voltage is related to the electric force between two points. More specifically, it is the gradient of the electric field, which in turn is a description of electric force. It is a description of electric potential energy, the ability of the electric field to force a charged particle and move it (i.e. the ability to do work).

Because electric force exists between electric charges, voltage can also be interpreted as related the difference in charge between two points. Any time there is a voltage between two points, there must also be an electric field, though the electric field will actually depend on the physical distance between the two points.

When an electric field exists in an imperfect conductor, a current will flow in the conducting medium. Current is the movement of charged particles (electrons, ions, etc). In order for charges to circulate in a loop, a power source is required which might maintain the potential difference (the voltage) between two points by, we could say, 'rearranging' the charges: a voltage source. It could also maintain a constant flow of current: a current source. Either way, a potential difference (voltage) in an imperfect conductor will always cause a current. In imperfect conductors, the current will have many, many interactions with the conductor's atoms. It's like playing Plinko. This will then give more kinetic energy to the conductor's atoms, and heat is generated. So, any time a current flows in an imperfect conductor, heat is generated.

With these simplified definitions of voltage and current, we can look at some scenarios that will help clear up some of the confusion. If there is a voltage between two points, it means there is a difference in the quantity of charge between those points. This applies anywhere. If the charge difference is between two conductors, say a human hand and a doorknob, the charge difference will cause an "equalization". Many charges will be moved very quickly because they are under a great force (by nature of there being a voltage). This is a current, but it is limited to the difference in charge between the two points. Once all the charges are moved, there's no more current.

The voltage in this scenario is only dependent on the difference in the quantity of charges, but it can get into the thousands of volts, the kilovolts (kV). The limited quantity of charge that can possibly be moved, however, means this voltage is reduced to 0V very, very quickly, and the current flow is quite brief.

If, on the other hand, you have a power source, such as a voltage source, the potential difference will be maintained. The current that flows will be proportional to the resistance of the path, as long as the power source can supply enough current. That is key: Every power source can only supply current *up to a point*, called the **rated current**. So, an AA battery, for example, can supply currents up to, maybe, 1A (1 ampere).

You have to put it across a resistance that will not exceed this. If the "load", the conductive/resistive path between the + and the -, is too low resistance, the battery's internal resistance will limit any more current from flowing.

Voltage sources are much more common for the average consumer, so current sources we'll leave by the wayside. Voltage sources include things like batteries and wall outlets. You can have constant voltage, which produces constant current, or *direct current* (DC), or voltage that changes continuously from a positive value to a negative value, producing a current that moves forwards and then back, over and over - an *alternating current* (AC). This is really only included in this description for completeness.

Anyway, all voltage sources have a rated current. If you exceed it, the voltage will simply get lower instead of the current increasing any more. For the voltage of the source, V, and the maximum supply current, Imax, we say the **power** of the source is P = V*Imax.

The power of a source is constant. Or at least ideally. If you convert the voltage to a higher voltage, the maximum current must decrease. If you want to convert the output to get more current, the voltage output will go down. Whatever you do, the product of the voltage and the max current will stay constant.

Continued page 14

Max Voltage - continued from page 13

For example, a given AA battery with a voltage of 1.5V and a rated max current of 1A, the power is 1.5*1 = 1.5W. We can know "step up" the voltage from the battery (using a clever circuit called a switch mode convert) from 1.5V to as high a voltage as we want. Let's put the voltage to 5kV (5,000 V) because that's a very high and seemingly dangerous voltage. But we know the power is constant, at 1.5W, so the maximum possible current our circuit will be able to supply will be 1.5/5000 = 0.0003 = 300uA (300 microamps). After 300uA, the supply voltage will simply drop instead of supplying any more current, just as before.

This is a failure of the *power supply*, and the actual applied voltage will drop, so the load isn't actually seeing the 1.5kV after you try to pass 300uA. Power supplies with higher power ratings will be able to source more current, supplies with lower ratings will be able to generate still less current, before they all hit their limit.
Side note: switching converters, or any voltage converter for that matter, will always have an efficiency rating. If you supply it with 1.5W, it might only be able to supply 85% of that, 1.2W.

MAN VS ELECTRICITY

	Required Voltage			
Current	1,000 Ω	100,000 Ω	Comments	
1 mA	1 volt	100 volts	Threshold of feeling, tingling sensation.	
15 mA	5 volts	500 volts	Maximum current level a human can withstand before sustaining injury.	
15-20 mA	10 volts	1000 volts	Beginning of sustained muscular contraction ("Can't let go" current.)	Extreme Pain
100-300 mA	100 volts	10,000 volts	Ventricular fibrillation, fatal if continued. Respiratory function continues.	Burns, Permanent Damage, or Death
6 A	6000 volts	600,000 volts	Sustained ventricular contraction followed by normal heart rhythm (defibrillation). Temporary respiratory paralysis and burns.	

8

Now we can talk about what happens when current flows through a person. As was mentioned, current flow always generates heat. The more current, the more heat. The human body has a fairly high resistance, but not as high as one might think. To get current to flow requires a power source with a voltage that is fairly high, because we're forcing the current through a lot of resistance. Here's a familiar chart of what happens to a person at different currents.

The current passing through your body will be generating a lot of heat, enough to burn your insides. It will also mess with your nervous system, limiting your ability to control your muscles. The amount of current that can kill is rather low, at around 100mA+. The resistance of the human body is roughly between 100k and 1k, or 100,000 and 1,000 ohms. In the chart you can see the voltage required to get the corresponding current levels to pass through a human body at either side of the spectrum.

Now, knowing what we know about power, we see that a deadly amount of current will pass at between 100V and 10kV at 100–300mA, which would require a power supply that is not only at a voltage of 100V–10kV, but is also capable of supplying between 10W and 1kW (1,000W). If the power supply satisfies both conditions, you will be in danger.

If it has a rated power of <10W, you'll never be at risk, because either the voltage will drop (and thus the force causing the current is reduced, and the current will reduce) or the current will simply be too low to cause death. Assuming you fit in the 100mA part of the current survival threshold, anyway.

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Max Voltage - continued from page 14

CONCLUSION AND OTHER CONSIDERATIONS

So what voltage can a person survive? Well if we're considering death from heat, burning, and tampering with vital organs, it's going to be between 100V and 10kV, as long as the power supply can actually produce the current that would kill you. An ideal, limitless power supply will always be deadly between 100V and 10kV, but in the real world there are always power limits.

This seems to imply that the human body can withstand any voltage, as long as the source of the potential difference (e.g. a difference in amount of charge) can't produce currents high enough to burn you and disrupt your organs. Even if you have a voltage of 100MV (100,000,000V) between you and something else, you should be perfectly alright as long as no current can flow through you. Right?

This is actually interesting because I can't say for sure that the human body will always be alright as long as the voltage difference is caused by something that can't really supply current. If, for example, there are two 10ft square plates with a voltage of 100MV between them, and there's no arcing or anything, and you're between them, your body resistance should allow for a significant potential difference across you from the side facing one plate to the side facing the other. When that happens, the charges in your body will naturally want to reorient themselves, and I don't know what risks you would face when this happens. Maybe you would see no change, maybe you would lose brain function and your heart would stop, but I would think the former to be more likely. I'd have to really think about it.

Anyway, let's finish up by replacing "It's not the voltage that kills you, it's the amps!" with "Death by electrocution requires a high voltage power supply that has a rated power which allows for 100mA or more of current to flow under load." It's catchy, I guess.

From the Ohio Journal, Halloween edition

The Ohio Section Journal (OSJ) is produced as a comprehensive look at all the programs within the Ohio Section. It has the latest news and information about the Ohio Section, and from around the world! I urge all of you to make sure that everyone, regardless of whether they are a League member or not, get signed up to receive these weekly Newsletters. You can always "Opt-Out" at any time if you feel this is not what you were expecting. It's fun and very informative. Got questions, concerns or would just like to sit and chat awhile? Heck, I'll even buy the coffee!! Give me a call at (419) 512-4445 or email me at: n8sy@n8sy.com

Thank You From *Ye Ed*

Just a sort note thanking those of you, who took the time to write an article this month, or take a picture. You are what makes your newsletter a winner, and my job so much easier. Now that I'm not there to participate in all the fun things you all are doing, so I can tell you all what a good time I had doing them with you. I have to rely on all of you to tell those fun stories. Please don't be shy. Those stories are more important than ever. So proud to be a member of WRARC! Thanks in advance.

73, Jane K8JAA
WRARC/NL Editor

ARRL, FCC Discussing Issue of Uncertified Imported VHF/UHF Transceivers

FCC ENFORCEMENT ADVISORY

ARRL has taken a minor exception to the wording of a September 24 FCC Enforcement Advisory pertaining to the importation, marketing, and sale of VHF and UHF transceivers and is in discussion with FCC personnel to resolve the matter. The Enforcement Advisory was in response to the importation into the US of certain radio products that are not FCC certified for use in any radio service, but identified as Amateur Radio equipment.

"While much of this equipment is actually usable on amateur bands, the radios are also capable of operation on non-amateur frequencies allocated to radio services that require the use of equipment that has been FCC certified," ARRL said. "Such equipment is being marketed principally to the general public via mass e-marketers and not to Amateur Radio licensees."

ARRL said the upshot is that the general public has been purchasing these radios in large quantities, and they are being used on the air by unlicensed individuals.

"Radio amateurs have complained of increased, unlicensed use of amateur allocations by people who are clearly unlicensed and unfamiliar with Amateur Radio operating protocols," ARRL said. But while it supports the general tenor and intent of the Enforcement Advisory, ARRL said it disagrees with the FCC on one point.

"In several places, the Enforcement Advisory makes the point that 'anyone importing, advertising, or selling such noncompliant devices should stop immediately, and anyone owning such devices should not use them,'" ARRL pointed out. "The Advisory broadly prohibits the 'use' of such radios, but our view is that there is no such prohibition relative to licensed Amateur Radio use -- entirely within amateur allocations -- of a radio that may be capable of operation in non-amateur spectrum, as long as it is not actually used to transmit in non-amateur spectrum.

ARRL has had extensive discussions about this issue with FCC Wireless Bureau and Enforcement Bureau staff, and those discussions are ongoing.

"It is important to protect the flexibility of the Amateur Service as essentially an experimental radio service, but it is also very important to stop the unlawful importation and marketing of illegal radios in the United States and the use of those radios by unlicensed persons," ARRL maintained. "We will keep our members informed as our discussions with FCC on this subject continue."

Joan Twaddle, KB8UCZ
Jo Wilms, KD8SNW
Dave Brett, KD8NZF
Mike Stein, KD8YMK
Ted Filmer, KD8IJE
Rose Marko, KD8TII

Amateur Radio Operator **"Amateur means we're simply professional volunteers"** ARRL reflector

FAA Reauthorization Act of 2018

FAA Reauthorization Act of 2018 Overhauls Marking Requirements for Short Rural Towers

(from arrl bulletins)

Thanks to ARRL efforts on Capitol Hill, language in the 2018 Federal Aviation Administration (FAA) Reauthorization Act, just signed by President Donald Trump, resolves the issue of problematic or preclusive rules affecting some rural Amateur Radio towers. The previous FAA Reauthorization Act of 2016 had instructed the FAA to enact tower-marking requirements, similar to those in some state statutes, aimed at improving aircraft safety in the vicinity of meteorological evaluation towers (METs). These towers are typically between 50 and 200 feet and set up in rural areas, often on short notice.

In the wake of fatal crop-dusting aircraft collisions with METs, the National Transportation Safety Board (NTSB) had recommended that states institute laws, sometimes called “crop duster” statutes, requiring marking and registration of METs. While some state crop-duster laws exempted ham radio towers, federal regulations dating to the 1996 FAA Reauthorization Act did not, and ARRL had expressed its concerns since. “There is no evidence whatsoever that even one Amateur Radio antenna below 200 feet has ever been involved in an aviation accident,” ARRL General Counsel Chris Imlay, W3KD, said.

“To impose painting and lighting requirements on Amateur Radio antennas between 50 and 200 feet tall would preclude many, if not most, of the exurban, rural, and, in some cases, suburban Amateur Radio antennas that are and will be sited outside incorporated towns and cities. This would ironically defeat the entire reason such antenna facilities are sited in those environments: because rural and exurban areas are where such antennas are permitted and the few areas where antennas are not precluded entirely by private land use regulations.” Prior to 2017, per long-established FAA regulations, unless such short radio towers were located within the glide slope of airports or heliports, they were not required to be painted or lighted.

After attempting to address the issue through the FAA, ARRL’s legislative team met with staff members of Senator Jim Inhofe (R-OK) and other lawmakers and their staffs associated with the congressional committees of jurisdiction. Senator Inhofe — himself a pilot — was of the view that the 2016 legislation was excessive and that exemptions should exist for both broadcast and Amateur Radio antennas and support structures. “We worked with our close allies at the National Association of Broadcasters (NAB), [who were] afraid that this legislation would have a large adverse effect on short broadcast towers,” Imlay recounted. “We also worked with the Association of American Railroads, which has hundreds of short towers along rail lines in rural areas that would have been affected.”

Imlay said Section 576 of the large 2018 FAA reauthorization now requires that the only towers less than 200 feet tall that have to be painted and lighted are meteorological aids and those within the glide slope of an airp ort or heliport. The remainder of such towers in rural or agricultural areas lower than 200 feet need to only be included in an FAA-maintained database, which will be updated by the owners of such towers.

Imlay credited members of the ARRL Legislative Advocacy team, as well as Senator Inhofe and ARRL’s broadcast and land mobile association partners for getting the language revised in the new, 5-year Reauthorization Act. “We consider this a big success for Amateur Radio,” Imlay said, “and it would not have been possible but for the visibility that has been achieved for ARRL through our active Capitol Hill advocacy for the Amateur Radio Parity Act.”

ARTIFICIAL INTELLIGENCE IS NO MATCH FOR NATURAL STUPIDITY.

TiPS® & Tricks

Tech Tips: Mag Mounts an Issue with More Vehicles With Non-Steel Roofs

More vehicles have non-steel roof panels constructed of fiberglass, aluminum, or carbon fiber.This makes placing a temporary mag-mount antenna on the roof difficult. We have run into this issue several times in the past when our radio operators were riding in Support And Gear (SAG), sweep, or pace vehicles during special events or riding along with a Jeep Patrol in the mountains. Recently, I was assisting a neighboring ARES region with a special event and was riding in a new law enforcement vehicle that had an aluminum roof panel.The solution was to use an HT Window Mount Clip from MFJ (MFJ-310). They make a BNC, SMA, and female SMA version of this clip so you can easily attach an HT antenna and get it outside of the vehicle. It is small enough to throw in a ruck sack if you know you will be operating from a vehicle other than your own. Operators may find other uses for this mount such as to get an antenna outside of a room with Low-E window treatment, to get some extra height for an HT antenna, etc. It may not have the same ground plane effects of a mag-mount, but it definitely works. --

John Bloodgood, KD0SFY, Emergency Coordinator and Public Information Officer, Region 2 District 2, Colorado ARES (Pikes Peak ARES); follow Pikes Peak ARES at: https://www.facebook.com/PikesPeakARES

US Ham-Astronaut, Russian Cosmonaut Safe in Wake of Soyuz Launch Failure

A Russian Soyuz spacecraft crew launch to the International Space Station (ISS) suffered a booster failure that resulted in an emergency flight abort shortly after lift-off from Kazakhstan on October 11, but the crew is safe. On board the Soyuz MS-10 were US Astronaut Nick Hague, KG5TMV, and Russian Cosmonaut Aleksey Ovchinin. NASA Administrator Jim Bridenstine promised "a thorough investigation."

"Shortly after launch, there was an anomaly with the booster and the launch ascent was aborted, resulting in a ballistic landing of the spacecraft," Bridenstine said. "Search-and-rescue teams were deployed to the landing site. Hague and Ovchinin are out of the capsule and are reported to be in good condition." The pair has since been transported to the Gagarin Cosmonaut Training Center in Star City. This was Hague's first launch and Ovchinin's second.

Early this month, NASA issued a statement regarding the late-August discovery of a 2-millimeter hole in the wall of the Soyuz capsule that is now docked to the ISS. The resulting air pressure leak has since been repaired. There is no indication the launch failure and the mystery hole in the last Soyuz launched are connected.

Roscosmos said the hole was not drilled by accident, and posited that it may have been drilled by a technician on the ground. Roscosmos Director General Dmitry Rogozin earlier had ruled out a manufacturing defect.

"[This] indicates that this is an isolated issue which does not categorically affect future production," the NASA statement said. "This conclusion does not necessarily mean the hole was created intentionally or with mal-intent."

NASA and Roscosmos launched an investigation, and a November spacewalk was planned to gather more information.

In the wake of the Soyuz failure, operations to transport ISS crew members have been suspended. The current ISS crew of cosmonaut Sergey Prokopyev and astronauts Serena Auñón-Chancellor, KG5TMT, and Alexander Gerst, KF5ONO, is scheduled to return to Earth in December.

A Brief History of Your New Radio

The little radio you hold in your hand is the result of thousands of people's work and ideas. There are a lot of "histories" that could be written about it, here's one of them. I hope you enjoy it.

First, we learned about radio...
In 1887, Heinrich Rudolf Hertz (1857-1894), a German physicist, performed an experiment to test the predictions of two other scientists, James Clerk Maxwell (1831-1879) from Scotland and Michael Faraday (1791-1867) from England the electromagnetic waves should be able to travel through space, and not just through wires.

His experiment was a success, and he was able to show that you could send "radio waves", as they later came to be known, through empty space. At the time it was really only interesting to scientists, no one expected to actually do anything with it.

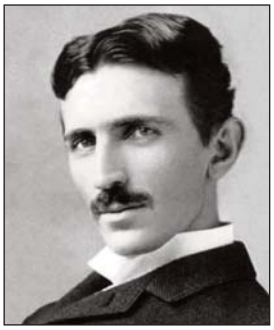
Then, we figured out a use for it...
Pretty quickly, though, people started to see that you could do something with radio waves. In particular, you could use them to send information. At the time, the way you sent messages great distances was using the telegraph, developed commercially by Samuel Finley Breese Morse (1791-1872), an American. Telegraphy used long wires stretched between cities and depended on "morse code" (actually invented by his assistant, Alfred Lewis Vail (1807-1859) , which is a way to spell with long and short pulses.

Usually, those pulses were the result of a "code key", a kind of switch which caused an electromagnet on the other end go the wire to attract an arm on a device called a "sounder" which makes a click. The operator learns to understand the meaning of the clicks, and can "copy" the code. The telegraph was used to report on the battles of the American Civil War, and changed the way people got news and information, but it was very limited.

About the same time, many people began thinking about "wireless telegraphy". (In fact, while we refer to "radio", the name "wireless", shortened from "wireless" telegraphy is used to talk about the technology, though "radio" is still what we call the stuff we actually listen to.)

The idea of not needing wires to send telegraphic messages was very attractive to businessmen. Scientists are happy with experiments but "inventors" usually want to sell things; and "wireless" looked like it could make someone a lot of money!

Then, we found a way to sell it...
So, right around the turn of the twentieth century, a lot of people were trying to figure out how to make Hertz waves useful and "wireless" possible. People like Nikola Tesla (b. 1856, d. 1943), a brilliant Serbian-born American inventor. Tesla was one of the first practical experimenters in wireless, but, tragically, in spite of his amazing insights and abilities, he died poor and alone, in a hotel room. His life was very interesting, and worth reading about.



Even right here in South Bend in 1899, an Electrical Engineering professor at Notre Dame named Jerome Green made what may be the first long distance radio transmission in the United States. "Long distance" is relative, and his transmission was from the Notre Dame campus to the Saint Mary's campus, about two miles. He used a very long antenna hung from the side of the basilica, and managed to send the morse code for the letter "S", which is three dots. His attempts to repeat his experiment in Chicago failed, and he blamed the mass of overhead wires used for telephone and telegraph for interfering with the signal. Today, there is an Amateur Radio station called "the Jerome Green Amateur Radio Station (JGARS) which uses the call sign "ND1U" It is part of the College of Engineering. Amateur Radio operators (called "hams") use radios for experimentation, public service, and fun. Becoming a ham is very easy with a little study, and it's a great hobby.

Another inventor early on in radio was Guglielmo Marconi (1874-1937). Marconi was not the brilliant inventor that Tesla was, but he was a far better businessman. Marconi is sometimes considered "the inventor of radio", but this is misleading. He *Continued page 20*

A not so brief History - continued from page 19

commercialized radio, that is, he found a way to sell it. His experiments and inventions were not necessarily as clever as others, but because he managed to get something built he could sell before others, he was successful. His product was wireless telegraphy, and once he managed to sell his version to the U.S. Navy, he was sure to be a commercial success. But, even with this commercial success, wireless was still just telegraphy, and expensive, and only used when you really needed it (in particular, by ships at sea, where wires just won't do).

Then, we made it talk...

By this time, the telephone was also in regular use, having appeared as a device for local use (it couldn't compete yet with the distance that the telegraph could manage). But it didn't take much to imagine "wireless telephony" as the next step. Making it work, though, was another matter. One of the very little known inventor-heroes of radio is a man named Jozef Murgaš (1864-1929). He was a Slovak, and a Catholic Priest who came to America and lived in Wilkes-Barre Pennsylvania. He was also a prolific and brilliant inventor, particularly of radio devices. His story is something like Tesla's because he wasn't a very good businessman and so he gets little credit for his work, but, unlike Tesla, his end was not tragic. He was happy with what he accomplished, even if he never became famous.

Father Murgaš started with wireless early on, and right away he invented a twotone system of telegraphy far more effective than the morse code. This system allowed people who knew it to transmit text about five times faster than the morse code used by Marconi's system. Even though it was far better, Marconi had locked in his system by selling it to the U.S. Navy who wasn't willing to throw away the equipment they'd spent so much on. So, outside local enthusiasts, Murgaš' system was never adopted.

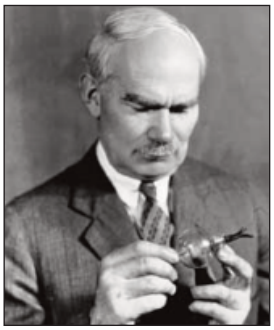
Murgaš may also have been the first in the United States to make a voice transmission. He holds U.S. Patent 1,196,969 on a device that helped make this possible. While he never managed to successfully sell his work, it didn't bother him, he was happy with his life. However, others were watching him very carefully because they saw something they could use to make themselves rich (and famous, which, it turns out, is just as important to that sort of person). Thomas Alva Edison (1847-1931) was one of those people. You might know Edison as "the inventor of the light bulb". This isn't quite right. Once again, like Marconi, Edison was a commercializer. Edison was a prolific inventor in his own right, and he is worth reading about. But the main part of his genius was recognizing and selling good ideas. Edison watched Murgaš carefully, and even spoke with Marconi about what he was up to. Murgaš may not get the credit, but he was a very important inspiration to other inventors who eventually managed to sell his ideas in various forms, and so get both the credit and the money. But, all of efforts to make radio "talk" were hampered by a big problem: tiny signals. To make wireless telephony useful, some way to was needed distinguish between "signal" (the information, in this case human speech) and "noise" (all of the "non-information" which came from many sources, natural and man-made, remember Professor Green's trouble in Chicago).

Different things were tried, which mostly involved "tuning" the "wireless set" (receiver) better. Making it listen to a smaller portion of the electromagnetic spectrum was the first problem that was tackled. The knob on your radio that allows you to "choose a station" is all about that. It moves a little "window of listening" up and down the band, and the stations each have their spot. This was a very new idea back then, and much more crude, but it helped. It wasn't enough, though, to really make things work well. Somehow, the signal had to be "amplified", that is, made stronger so it could be heard. Then, we found that the light bulb had a secret...

Edison's method of invention was what we would call today, "brute force" (or, if you want to be all scientific about it, "empirical"). When he was commercializing the light bulb, (it had already been "invented", he was trying to make one he could sell), he made hundreds of different versions using all sorts of materials for the "filament" (the glowing part). He tried everything from burnt string to, eventually, tungsten metal which is what he settled on, and what "incandescent" lamps use today (they may be gone in your lifetime as new technologies like CFL (Compact Fluorescent), LED (Light-Emitting Diode), and even more exotic, efficient technologies replace them).

Somewhere along the way, for reasons that aren't clear, he included a piece of wire in the bulb *Continued page 21*

A not so brief History - continued from page 20



above the glowing filament and sticking out of the top. When he touched it, accidentally he got a shock. This surprised him since the wire wasn't touching the filament. Edison kept meticulous notes, so he wrote it down. It didn't mean anything to him, though, so he also forgot about it. Lee de Forest (1873-1961) noticed it, though. De Forest was an American inventor, something like Edison, in that he was an empiricist. He managed to make useful things without really understanding them well. He wasn't brilliant, like Tesla, but he was persistent, and very interested in personal and commercial success. De Forest realized the there was electrical current flowing from the filament to the wire (in what is called a "thermionic stream"). If a smaller voltage (like the weak radio signal that was a voice) could somehow control that flow, to would be possible to "amplify" it. The small signal could be used to make a bigger copy of itself.

De Forest invented what he called the "Audion" which was just this sort of amplifier. By putting a "grid" between the filament and the wire, he could put a small signal on the grid and influence the flow from the filament to the wire. This was a huge advance, even if he didn't really understand how it worked, other people figured out how to use it. In particular, the telephone companies found it very useful because, remember, they couldn't make phone calls go very far, and "repeaters" that amplified the signal made Long Distance possible. De Forest got quite rich from this, but, he still didn't understand his own work.

On the other hand, Edwin Howard Armstrong (b.1890, d. 1954) did understand it. He was a truly brilliant American electrical engineer who saw the real power of the Audion (technically called a "triode" because it has three elements). His deep insights into the operation of the triode allowed him to develop something called the "regenerative receiver", which made broadcast radio (the kind you like) practical.

He also invented FM (Frequency Modulation) which is far more pleasant for broadcasts than the AM (Amplitude Modulation) that was used until then. We still use it today, but for talk radio where "fidelity" isn't important, while FM is used for music because it is quieter and can reproduce a wider range of sounds.

Armstrong got into a legal fight with de Forest over the patent on this new circuit. Unfortunately, Armstrong was an ideologue, that is, he believed that if something was "right" he should fight for it to the end. So, instead of making a deal with de Forest, which would have still allowed him to profit from his invention, he felt he needed to "win". He fought de Forest (who had a lot of money to spend and an even bigger idea of how important he was) in the courts, and eventually, he lost the case on a technicality. It was devastating to Armstrong, who lost his marriage, and eventually his life over it. A great tragedy which once again showed how the commercially successful can keep the truly brilliant from contributing.

While Armstrong's life reads like a tragedy, ending in his dramatic suicide, it is a fascinating one, and one of the more fascinating events concerns his wife, Marion McInnis (1898- 1979). Though they had split up when Armstrong became so unstable because of the stress of the lawsuits, and hit her with a fireplace poker. After his death, she pursued and won every one of the suits for her husband even though they only a matter of "moral" victory. A more pleasant connection to your radio is that Armstrong made the first portable radio as a gift for McInnis when they were married.

Armstrong's work revolutionized radio and made commercial broadcasting possible. The creation of the first radio "networks" and the rise of RCA (Radio Corporation of America) is another fascinating story (in which Armstrong figures). But I will leave you to find out about it if you are interested since it is yet-anotherhistory's worth of information. (That's worth learning about!)

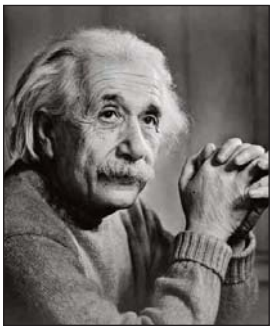
From the time that Armstrong's wonderful circuit made radios a practical household item developments in vacuum tubes (the British called them "valves", because the controlled the flow of electrons) developed steadily. Tubes became more powerful and smaller. The advent of World War II brought even more capable and much smaller tubes (called "acorn tubes" because that's what they looked like); but the war also brought something else, something directly connected to your little radio.

Continued page 22

A not so brief History - continued from page 21

Then, we got rid of the tubes...
Of course, even the tiniest "acorn" tubes were much bigger than could fit in your radio. And, not only were they big, they were hot. The filaments in them had been carefully designed to produce more electrons than photons (light waves/particles), which is, of course the idea of a light bulb.
But they still had to get hot enough to glow, because it was the heat (therm- from thermionic) that produced the electron stream (-ionic). Heat means power, too. So the batteries that ran portable radios had to be very big, and the voltages required were very high. Your radio runs from 3 volts, these required 45 volts, and even that had to be converted even higher.

So, tubes weren't very practical for something really portable, and they were inefficient, since a lot of the power needed to run them went into heat. They also didn't last all that long; they burned out just like lightbulbs.



So, what to do about it? Well, in 1905, long before World War II, Albert Einstein (1879-1955) had his "Annus Mirabilis" which means "miracle year" in Latin. It's called that because he wrote four scientific papers which were so far-reaching it took hundreds of scientists decades of work to really understand all the implications of them. Part of the focus was on something called the "photoelectric effect".

This was an observation that when light fell on certain combinations of metals, electricity was produced. This effect was very confusing to scientists because they had concluded that light (which is electromagnetic radiation, just like radio only vibrating a lot faster) travels as waves. Just how waves could do this was quite a mystery. Einstein solved it, but it was very upsetting to the scientists of his time. His solution was to say that light was both waves and particles at the same time. This didn't go over very well because it seemed crazy; but the more it was looked at, the more clear it was that he was right!

These papers began the investigation into Quantum Mechanics, the study of things so small that they are smaller than particles of light itself. You can't see things that are at the quantum level, and they act in very strange ways indeed. In fact, they act so strangely that a prominent scientist declared, "if Einstein is right, science itself is impossible!" Thankfully, he was wrong about that. Einstein was right, and scientists worked it out.

By the time World War II was nearing its end, the people at a really amazing place called Bell Labs, which was the research part of the AT&T's Bell System telephone monopoly, had been working on a project for replacing vacuum tubes in those "repeaters" that first made the Audion tube a commercial success. They needed something more reliable, and lower power. Some of their repeaters were built into the transoceanic cables that ran across the atlantic from America to Europe. Changing a bad tube in a place like that is just a little inconvenient, and powering them meant everything got hotter than they'd like.

So, they were investigating something called "semiconductors". These were materials that were neither conductors nor insulators, but seemed to do some of both.

Conductors allow electric current to flow easily. Most metals are excellent conductors, copper is usually used in wire because it is both a good conductor and not too expensive. It's not cheap either, but it's practical to use. Silver is a better conductor but it costs too much. It is used in special cases, like certain connectors.

Insulators are don't allow electric current to pass; things like rubber, dry wood, and glass are examples. Today, most insulators are man-made materials. Different plastics are very good insulators for low voltages. But if you look up on the poles that carry the power to houses and businesses you will still see glass (and ceramic) insulators for the very high voltages that are used. (In your neighborhood, before the power gets to your house, it is probably around 15,000 volts, but the receptacles on the walls are only about 1/100 of that, at 120 volts.) Semiconductors, though, are able to conduct sometimes. The first devices made were "diodes" (remember, the Audion was a "triode"). Di- in diode means two. The -ode part is each of the parts (an anode and a cathode). The diode is like a "check valve" used to keep water from backing up in drains, it lets current flow one way, but not the other. The diode is a very useful component, but the real goal was a semiconductor triode, that could act like the tubes and be an amplifier.

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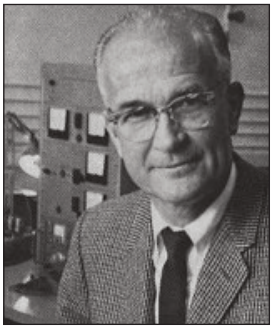
A not so brief History - continued from page 22

Julius Edgar Lilienfeld (1882-1963), who was an Austro-Hungarian born American physicist, received a patent on something he called "Amplifier for electric currents" in 1928. In theory this was what the people at Bell Labs was looking for, a semiconductor triode. In practice, it didn't work. The idea was right, but it couldn't be made. Still, he'd anticipated the work of the team that did make the practical version but more than 20 years.



John Bardeen (1908-1991) and Walter Brattain (1902-1987) were physicists who worked at Bell Labs' Solid State Physics Group under the supervision of William Shockley (1910-1989). Shockley was a brilliant theoretician, but he was also a very greedy man. He wanted fame and fortune, and believed he deserved it. From November to December 1947, Bardeen and Brattain performed practical experiments on the semiconductors in a successful effort to create a working semiconductor amplifier. Shockley, meanwhile, was working on something much more like Lilienfeld's amplifier, all on paper.

Bardeen and Brattain had come to their experiments by a fortunate accident, as is often the case in invention. The materials that were needed for this work had to be very pure. In fact, purifying them was one of the biggest challenges. One of the scientists had gotten a sample of germanium, an early material used in semiconductor production for some tests. He'd connected it to a voltmeter for other reasons, but noticed that if he shined a light on the sample, it produced a very large (relatively speaking) voltage. This was Einstein's photoelectric effect in action, but a much stronger one than they had ever seen.

When they looked careful at the sample, they noticed an irregularity in the middle of it. It seemed to have cooled funny. Probing around, they found that the funny bit in the middle was a little less pure than the ends, forming a "junction" between the two. This was a huge breakthrough. They realized they needed a sort of sandwich with a specially impure "filling" on pure "bread".

The experiments of 1947 were all about refining this idea, and when they were finished they succeeded in producing a "solid state" (semiconductor, not vacuum tube, which is "hollow") amplifier. The device was crude, made of a little of the lucky germanium, gold foil, and a triangle of plastic, but it worked! A small signal could be made into a bigger copy using it.

When they showed it to Shockley, he was surprised. What wasn't a surprise to people who knew him was that he took credit for the discovery and the famous photo of the three of them has Shockley at the bench, a place he never sat, he was a theoretical physicist, not at all at home in the lab. He was brilliant, and contributed a lot due to his deep understanding of the quantum theory that came, eventually, from Einstein's Annus Mirabilis, but he didn't invent this device. This was a huge accomplishment, and they needed to name the device. They wanted it to sound modern, and cool, but weren't having much success. Many suggestions were made, but John Robinson Pierce (1910–2002) one of the Bell Labs physicists suggested "transistor" for "transfer resistor", and it stuck. The transistor was born.

Shockley, Bardeen, and Brattain shared the Nobel Prize for Physics for its invention, though Shockley's name didn't end p on the patent because he hadn't contributed directly. Even more upsetting was that his own attempt to patent his Lilienfeld-like device, the one he'd made on paper, was blocked by the Lilienfeld patent. He never was much of a financial success, and managed to alienate the people he worked with who went on to form an important next step in your radio: Texas Instruments (TI).

Then, we had to make them cheap...

Producing transistors wasn't easy. The methods to make practical transistors took a long time to work out, and even when they could make them reasonably well "yield" (the number of good ones out of a *Continued page 24*

A not so brief History - continued from page 23

batch) was fairly low. The only way to make transistors a commercial success was to produce a lot of them so they would be cheap. People from Bell Labs went to Texas to work that out. They had two problems: making transistors, and selling them. Eventually, they worked out the first, but the second was a bit sticky. After the telephone company and the military bought all they could use, there were quite a few left. They needed a customer. Fortunately, one found them.

Finally, we had to put them together...

Masaru Ibuka (1908-1997) was a Japanese scientist who wanted to become a successful businessman. He and Akio Morita (1921-1999) decided to go into the electronics business together, so they formed Tokyo Tsushin Kogyo Kabushiki Kaisha (Tokyo Telecommunications Engineering Corporation) and built tape recorders, a very high tech thing at the time, the first in Japan.

However, in post-war Japan, the real opportunities were trade with the U.S. and they wanted a product for that market. In the early 1950s, Ibuka traveled in the United States to a technical meeting about Bell Labs' new invention: the transistor. He was among the first to license the transistor, and created the first transistor radio (the great-grandfather of your radio!) the TR-63, and he bought all the transistors that TI could make. He and Morita changed the name of the company to "Sony" because they thought "sonny-boy" was a popular phrase in the U.S., and "sonus" means sound in Latin. The transistor radio was a huge success in the U.S. and every teenager wanted one. It was the iPod of the 1950s.

So, while your radio used an integrated circuit (a very large number of transistors in one device), and silicon rather than germanium, which is a better choice for transistors, it's history stretches back to the beginning of radio and electronics. I hope you enjoy the radio, and maybe you will find you have an interest in the technology behind it. Things have changed a lot since Armstrong, and even since Ibuka, but your little Sony radio is the legacy of those men and thousands of others who contributed to all the parts and ideas that make it possible.

Some Ham Trivia

Peggy Sue Gerron, ex-K5PSG, of Lubbock, Texas, who inspired singer Buddy Holly's 1957 rockabilly hit "Peggy Sue," died on October 1. She was 78. First licensed in 2004 as KE5AKW, she later obtained the vanity call K5PSG. Her license expired in 2014, and K5PSG has since been reissued. Gerron went to high school with Holly and later married The Crickets drummer, Jerry Allison. As rock 'n' roll history has it, Holly originally titled the song "Cindy Lou," but Allison convinced the singer to change the tune's name to "Peggy Sue." In a 2004 interview, Gerron said that story is close to the truth, but not entirely accurate. After Holly's death in 1959, Gerron toured with The Crickets when the band got back together. Over the years, Gerron made public and media appearances all over the country. She said her participation in the 2004 W5B special event in Lubbock commemorating Holly helped inspire her Amateur Radio aspirations. "You can do TV specials, and you can be interviewed by the very best DJs," she said, "but there is nothing like the feeling of putting your finger down, and transmitting your call sign, and having somebody answer back."

Take time to laugh for it's the music of the soul Author: --From an old English prayer

Sad News From Minnesota

The Pillsbury Doughboy died yesterday of a yeast infection and trauma complications from repeated pokes in the belly. He was 75.

Doughboy was buried in a lightly greased coffin. Dozens of celebrities turned out to pay their respects, including Mrs. Butterworth, Hungry Jack, the California Raisins, Betty Crocker, the Hostess Twinkies, and Captain Crunch. The grave site was piled high with many flours. Aunt Jemima delivered the eulogy and lovingly described Doughboy as a man who never knew how much he was kneaded.

Born and bread in Minnesota, Doughboy rose quickly in show business, but his later life was filled with turnovers. He was not considered a very smart cookie, wasting much of his dough on half-baked schemes. Despite being a little flaky at times, he still was a crusty old man and was considered a positive roll model for millions.

Doughboy is survived by his wife Play Dough, three children: John Dough, Jane Dough and Dosey Dough, plus they had one in the oven. He is also survived by his elderly father, Pop Tart. The funeral was held at 3:50 for about 20 minutes.

No trees were killed to bring you this Newsletter,
but millions of electrons were terribly inconvenienced.

33

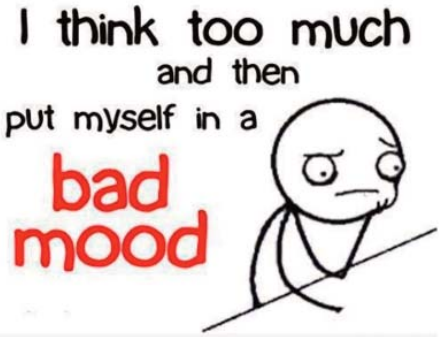
The History and Proper Use of 33 "33", the signature used between YL's is often mis-used and its origin tends to get lost. YLRL was organized in 1939 and it was at this time that, through YLRL women amateur Radio Operators seemed to find their niche. "YL" was adopted as a general term denoting any licensed Amateur feminine operator, regardless of age or marital status.

"33" was originated this same year by Clara, W2RUF - ex W8KYR- and adopted by YLRL for exclusive YL use. It means "Love sealed with friendship between one YL and another YL". With this background and meaning, it is very understandable that "33" is not only exclusive with YL's but is NEVER used in the plural. We sign "33", never 33"s.

Reprinted from YL Harmonics, Issue #2, 1980. Thanks to Lea, AB5TY-sk, for the reference.

(Note also that 73 and 88 should NEVER be used in the plural form. You would not say Best Regards's nor Hugs and Kisses's would you?)

If at first you don't succeed,skydiving is not for you.



There are only THREE kinds of people in this world... those who are good at math and those who aren't.

October Meeting

November 2018

Preparedness Leads to Readiness - Matt W8DEC

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
				1	2 WRARC Net 9:00PM 145.270 Swap n' Shop Ask the Elmers	3
4 Standard Time 	5 ARES Net 8:30 PM 146.745 PL 110.9	6	7 Bittersweet Chocolate with Almonds Day	8	9 WRARC Net 9:00PM 145.270 Swap n' Shop Ask the Elmers	10 USMC Day 
11 Veterans Day 	12	13 Ham Breakfast Eat'n Park Boardman 8:30 A.M. Board Meeting Eat'n Park Austintown 7:00 P.M.	14	15 America Recycles Day	16 WRARC Net 9:00PM 145.270 Swap n' Shop Ask the Elmers	17
18 	19 ARES Net 8:30 PM 146.745 PL 110.9	20 WRARC Meeting 7:00 P.M 	21  WaveBender Input Due	22 Thanksgiving 	23 WRARC Net 9:00PM 145.270 Swap n' Shop Ask the Elmers	24 
25	26 	27 Eat'n Park Boardman 8:30 A.M. Ham Community Breakfast	28 Red Planet Day	29	30 WRARC Net 9:00PM 145.270 Swap n' Shop Ask the Elmers	