# BARS Billerica Amateur Radio Society

**NEWS FOR AND BY BARS MEMBERS**

JANUARY 2021

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## BARS physical meetings are on hiatus until further notice.

The decision to resume in-person club meetings and breakfasts at Stellio's will be made entirely by the Board based on the outlook of this medical emergency. The safety and well-being of our membership is important to us.

Meanwhile, virtual club and breakfast meetings using Zoom have proved an enjoyable substitute. Please ignore the sections, below which give directions and schedule for in-person meetings.

VE License Exams are now virtual – see the VE section near the end of the newsletter for details.

--BARS Management.

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## From the President's Desk
from the President of BARS, Doug Bruce, KC1MJK

Happy New Year Everyone,

2020 was quite a year, and I am sure that all of the Club members would like to put 2020 in the rear view mirror as soon as possible. This past year opened my eyes to the fact that ham radio is the perfect hobby for the Covid-19 pandemic.

First of all, ham radio offers the perfect solution to achieve social distancing while remaining in contact with many people in your local area as well as around the world , and you don't even have to wear a mask when you get on the air!

Secondly, ham radio is the perfect escape from the grim realities of the world today. There is nothing like grabbing a cup of coffee/tea and heading to the shack and rag chewing with your ham radio friends.

The B.A.R.S net on Wednesday nights is a great example of how hams in the local area can stay in touch with other B.A.R.S. members, as well as learning a thing or two about our great hobby.

Thirdly, during the pandemic, ham radio brings everyone together in the spirit of "Helping The Other Fellow", which is the motto of Camp Abnaki in North Hero, Vermont, an overnight camp that I attended in Vermont when I was a boy with our family. Helping new and old hams alike gives a special feeling of satisfaction when you help another ham get involved and get on the air or back on the air with an improvement to their station.

Lastly, ham radio has had to make major adjustments to the culture of the hobby to enable it to continue as it has in the past. Examples of these adjustments include online testing, "virtual" club meetings and gatherings, and virtual mentoring. The ham culture prides itself on being creative and innovative, and these adjustments illustrate how good ham radio operators are at adapting to change, be it small or large.

I look forward to 2021 with great hope and anticipation. I look forward to having a Field day in 2021, which I have never participated in, as I have only been a ham radio operator for only a year or so.

I look forward to getting back together at Stelio's on Saturday mornings, having in person Club Meetings again, being able to safely visit other hams at their houses for projects and good fellowship ,as well as in person testing so that hams can advance through the license ranks of the FCC. I feel that we are a vaccination away from being able to enjoy these activities again. I feel that there is a great light at the end of the dark COVID-19 tunnel.

We also have several great guest speakers lined up in the coming months, so keep an eye out on the B.A.R.S. website for these announcements.

73,
Doug, KC1MJK

## Next BARS Zoom meeting:
## January 6 at 7:00 PM
## "Introduction to the Nano VNA Analyzer"
## Presenter: Bruce MacKinnon, KC1FSZ

Our guest speaker to start off the new year will be Bruce MacKinnon, KC1FSZ, who will give a presentation on the Nano VNA Network Analyzer. This tool can find problems with your feed line, determine your antenna's characteristics and so much more. Be sure not to miss this one!



We will announce the link to join the Zoom meeting before the meeting, but it will be posted to the BARS email list and should not be shared outside our Club. Are you on the email list? If not, please send an email to bars-subscribe@w1hh.org and then simply reply to the robot response from the server and you will be subscribed.

Observing our Zoom meeting requires only a web browser and headphones/speakers. You do not need a webcam or microphone unless you want to speak or be seen.

Before our meeting date, please go to https://zoom.us/test and see if it will function for you. If you have problems, we can try to assist – feel free to ask questions on the BARS email list.

I am looking forward to "seeing" many of you on Wednesday 1/6 here at 1900.

Doug, KC1MJK
President, Billerica Amateur Radio Society

## A Message From the Editor
from Marla Wallace, WA1GSF

Hauʻoli Makahiki Hou! Which is Hawaiian for Happy New Year. I'm hoping all of us have a happier 2021. Now that vaccines are beginning to roll out, we should be able to do meetings, breakfasts and VE sessions "live" again in a few months.

Learning a new language as an adult can be hard. Especially if nobody locally speaks it. Fortunately, in the case of learning the Morse Code Language, there are "native speakers" in BARS. The Board has had ongoing discussion about code instruction and it's likely that BARS will eventually offer code classes. This could be done via Zoom, at least for receiving practice. Stay tuned for further info. Meanwhile, see again the announcement of the Slow Speed CW (con)Test, below, in the STRAYS column.

In other Newsletter News, BARS is going to participate in an "article exchange" program, administered by the Eastern Massachusetts ARRL division's Club Coordinator, Bruce Blain, K1BG. What this means is that articles published here can be included in the newsletter of other clubs – with proper credit to the author, of course. As of this printing, I'm still getting up to speed on how this will work. I hope to say more about this in the next issue. We have had some really excellent articles and they deserve a wider audience, so this is an exciting development. And we will also have the opportunity to include articles from other clubs in our pages. Ham radio is about communication and this is yet another channel we can use.

## Club News: On-line VE Exams

We started doing only online exams in December. Our next online exam session will be on January 14. If you are interested in participating in these sessions as a candidate or as a VE, please contact Bruce at W1LUS@hotmail.com to register for this online exam session. --de Bruce, W1LUS

## Club News: No Yankee Swap This Year

The January meeting has been our usual Yankee Swap however it is obvious that because of COVID restrictions we can't do that this year.

In its place I'm asking folks to consider donating the $15 you would have spent on a gift to either make a money donation or a food donation to your local food pantry. If you don't have a local pantry the Merrimack Valley Food Bank https://mvfb.org is a great place to donate to. I've volunteered a few afternoons while I was working at Oracle and was amazed how many kids rely on the one small bag of food for the entire day.

There is always the donation bucket at Market Basket as you exit the store to leave items in. May your holiday be a joyous (but safe) one.
--de Jim Evans N1HTS

## Feature Article: The Role of Shortwave Global Cipher Morse Messaging, 1916 - Present

# By Henry G. Christle, Sr., WA1VAB

Please enjoy this brief journey though the earliest days radio as a messaging medium.  Two recent books on the subject are my source, which I highly recommend as informative and entertaining.

The Woman Who Smashed Codes by Jason Fagone, reveals details about husband-and-wife team; Elizabeth and William Friedman preeminent code breakers who have been shrouded in total secrecy, until now, nearly 50 years after their deaths.  Herbert Hoover and the FBI took full credit for their achievements because the Friedman's identities, success, and efforts "did not exist" and had to be totally concealed from our enemies.

Using a digital copy of the 448-page book The Woman Who Smashed Codes, and Kindle software on a PC, a few events have been quoted in these few pages for your perspective of these fast-paced early and formative days of shortwave radio.    The Friedmann story begins c1914, Marconi's story began 15 years prior and dove tails into Friedman's story, so let us consider Marconi briefly.

Credit to author Erik Larson, for his great book Thunderstruck, which is devoted to the life of Marconi.

In 1909 Marconi received the Nobel Prize in Physics for developing shortwave radio.   Marconi was "self-educated" and in his mid-teens became totally immersed to learning how natural phenomenon could power his vision of wireless telegraphy, from observing the effects of lightning strikes on objects remote to lightning strikes, concluding there were some "invisible waves" caused by the energy in lightning strikes.

Marconi experimented for 20 years when he created the first rotary spark gap transmitter and receiver.

Marconi's shortwave radio message crossed the Atlantic Dec 17, 1902 demonstrating proof of instantaneous global messaging.  Marconi's demonstrated proof in 1902, he was able to obtain investors to develop transatlantic wireless transmitters for ships at sea.  There was a telegraph cable under undersea at this time, however it could not help ships.

The Marconi Wellfleet transmitter antenna wires were supported on 20 200-foot ship masts, the rotary spark gap transmitter operated at 20,000 volts, transformer stepped up from 2,200 VAC from 45 horsepower kerosene generator.  When operated the spark gap transmitter could be heard from 5 miles distant, operators at the site wore head gear to block the sound of dots

and dashes which sounded like shot gun blasts in radio room.  From this site, on 18 January 1903 transatlantic the 100 KW message reached England Marconi station and reply was received.  Some transatlantic Marconi stations had 50 miles of wire in the antennas.  Rotary spark gap is VLF, it follows the Earth's curvature, and bounces off ionosphere and requires lot so power.   Spark gap was replaced by continuous wave (CW) starting little before 1920.

However, during the 20 years spark gap served ships, a famous event occurred prior to the Titanic tragedy (1912) which grabbed the publics enthusiasm and propelled much needed investment in Marconi's wireless radio.

Dr. Hawley Crippen, born in Chicago, practiced medicine in London, and was known as a truly kind person.  His wife never returned from a trip home to America, and his secretary moved with him.  The neighbors were suspicious, called Scotland Yard.  They paid Dr. Crippen a view visits, considered him innocent, but when queries with US came back empty, they found a decomposing body in his basement.

Dr. Crippen and his secretary booked passage on the Montrose, under captain Kendall, headed for Quebec.  Crippen was in disguise, and his secretary was disguised as his son.  Kendall did not buy the son's disguise, and got suspicious, and used the wireless to query the Montrose owners who queried Scotland Yard who decided with a faster ship, they could overtake the Montrose, which had a 40-hour head start and be waiting at Quebec port for the Montrose.  During the passage they became within in radio range of the Montrose, and had conversations with Kendall, and gave him the plan.  Radios in those days at sea only had a 200-mile range, however the large land-based stations radios could span the ocean, SWL'ers, and news reporters seeking hot stories took advantage of by learning Morse code, and listening to wireless.  The result was when the ships docked in Quebec, the port was packed with hundreds of pushy spectators and reporters, Dr. Crippen was like OJ Simpson in terms of public interest, only Wireless was the media not TV.  Dr. Crippen was the first wireless radio sleuthing event and helped Marconi's investment portfolio immensely and more importantly the total lack of privacy with wireless communications was exposed resulting in awakening for encryption rules and functions.

In 1916, during WW1, Morse code wireless, shortwave messaging evolved into the most important media for instant two-way communications and freely used by all countries and listened to by millions, anyone who learned Morse code, could copy the messages, unless messages were encrypted.  Tens of thousands Morse code operators, and thousands of codebreakers were in urgent employ of both Allies and Axis countries.   Troop positions, weapons deployed, ships in harbor, US manufacturing plant attendance, work hours, supply routes.

For centuries Kings, Queens, and their minions used and understood secret codes (ciphers) in written messages.

Elizabeth Smith, a 23-year-old Quaker schoolteacher, and her future husband William Friedman, a plant biologist, married in 1916, are today 50 years after their deaths, recognized as world's most famous codebreakers, who trained teams, managed, and cracked wireless codes into the '70's. The US was totally unprepared in recognizing the need for codebreaking, and the people required, it was indeed our good fortune having civilians up to the many tasks.

Shortwave radio Codebreaking was a new science, required by service agencies, business, and spies, Elizabeth was hired by Mr. Fabyan, a wealthy textile magnet, to work at Riverbank, his personally owned and funded research laboratory in Geneva, IL. Elizabeth demonstrated a gift and interest in codebreaking, her assignment was to resolve arguments that the large graphic first letters of paragraphs contained coded messages from Francis Bacon (1561-1626) was the author of Shakespeare's works. The Friedman's resolved *"There are no hidden messages in Shakespeare."* *--Fagone, Jason. The Woman Who Smashed Codes (p. 61). Dey Street Books. Kindle Edition.*

The intercepted and decoded telegram burned its way from hand to hand, from junior diplomat to senior diplomat, first in London and then in Washington, producing involuntary noises of surprise and bulging eyes. It was obvious that the president himself needed to see it. At 11 A.M. on February 27, 1917, the U.S. secretary of state, Robert Lansing, carried a copy of the intercepted telegram to the White House and showed it to Woodrow Wilson. The president read it and grew uncharacteristically angry: "Good Lord!" he said. "Good Lord!" The telegram had been sent from Germany to Mexico on January 16, traveling by three separate telegraph routes and encoded as a series of number blocks: 130 13042 13401 8501 115 3528 416 17214. The British had intercepted the message, and a small team of civilian codebreakers toiled for a month in a secret office inside Whitehall to scrub historian away the grime of code and make the plaintext visible. What they saw, to their shock, was nothing less than a conspiracy plot against the United States.

Written by Germany's foreign minister, Arthur Zimmermann, the telegram proposed an alliance between Germany and Mexico: "We intend to begin unrestricted submarine warfare on the first of February. We shall endeavor in spite of this to keep the United States neutral. In the event of this not succeeding, we make Mexico a proposal of alliance on the following basis: make war together, make peace together, generous financial support, and an understanding on our part that Mexico is to reconquer the lost territory in Texas, New Mexico, and Arizona. The settlement in detail is left to you."

*The Zimmermann Telegram, as it came to be known, was indisputable proof of a German plot against America, "clear as a knife in the back and near as next door," as the historian Barbara Tuchman has put it. Residents of Texas were particularly displeased to learn that the Kaiser was trying to give*

*them to Mexico, but outrage against Germany was general across the States. The telegram sped up history. It pushed America into war with Germany, whether America was ready for war or not. It was not. And this is how the telegram changed the destinies of Elizebeth Smith and William Friedman: as American codebreakers, they happened to possess an extraordinarily rare and suddenly indispensable set of skills.*

*--Fagone, Jason. The Woman Who Smashed Codes (pp. 63-64). Dey Street Books. Kindle Edition.*

A History video document on the German/Mexican communications fell into our hands by good luck and can be viewed on YouTube, the entire video is 21 minutes, the specific reference starts at 15:00 minutes. Control key + click the link below:

https://www.youtube.com/watch?v=xY3Sz-ZaXXM

President Wilson presented the message to Congress, who immediately declared war on Germany. America immediately entered WW1, and the Friedman's found US Army was seeking their help in developing civilian teams to decipher shortwave coded messages.

The dramatic surprise to President Wilson, is followed my many as critical during WW2, and the cold war and beyond, we cannot underestimate the importance continued cryptography surveillance.

History repeats itself, at least radio shortwave communications, skip ahead to 1939, when the key supplier to Signal Corps and USN, Ted R. McElroy, who holds the world title for CW speed tests, (75 wpm). McElroy 's company manufactured Morse keys, bugs, automated punched paper code sender capable of 200 words/minute (17 characters/second), machines for US Army Signal Corps., and US Navy, in Boston, MA, when in the '40's, under threat of German Submarine attack on this factory making critical defense products, relocated this manufacturing plant to a remote, hidden, guarded location in Littleton MA. All global instantaneous communications were Morse code, and most of that by shortwave radio. The plants had limited access near Ft Pond and were guarded by MP's. As the proud owner of an excellent engineered 1938 McElroy bug, I see why the military bought $5 million dollars' worth for WW2. This history and some photos are in the Book McElroy World's Champion Radio Telegrapher by Tom French.

*Pattern recognition is the first step in decoding text, which is how 5- or 6-character blocks became the popular format, transmitted message formats were 25 blocks of 5 characters each, that is 5 rows and 5 columns. To this day ARRL Radiograms continues to use this format, although field maybe longer than 5 characters, hams must use plain language only, and do not use 5 number-character ciphered coded groups.*

*And yet anyone who has ever solved a cryptogram on a newspaper puzzle page has conquered the 403 septillion possibilities, because, of course, there are shortcuts, ways of taming the task by grabbing on to certain patterns in the text. This is the essence of codebreaking, finding patterns, and because it's such a basic human function, codebreakers have always emerged from unexpected places. They pop up from strange corners. Codebreakers tend to be oddballs, outsiders. The most important trait is not pure math skill but a deeper ability to pay attention. Monks, librarians, linguists, pianists and flutists, diplomats, scribes, postal clerks, astrologers, alchemists, players of games, lotharios, revolutionaries in coffee shops, kings and queens: these are the ones who built the field across the centuries and pushed the boundaries forward, stubborn individuals with a lot of time to sit and think and not give up.*

*--Fagone, Jason. The Woman Who Smashed Codes (pp. 70-72). Dey Street Books. Kindle Edition.*

"Spy radios", were designed to be reliable, and user friendly. Spy radios were crystal controlled, early models had 6L6 RF outpower, less than 25 watts, and 100-foot antenna wire, typically wrapped on a 8 x 8 inch form, all of which fit in a suitcase, stored out of site. These radios were engineered to function with 100-foot wire antenna, on crystal-controlled frequencies, with supplied loading coils for the crystals. Thousands of spies called home daily. The operators would verify they were alone, throw the antenna form over a tree, it would unwind under its weight. Spy radios had a range of 250 to 1000 miles as function of the band, and propagation. My Novice set up in '54 was 17 watts RF from a 6L6, with the 100-foot wire over tree, and I worked EU and Hawaii on 80 meters at night on CW.

In the early '50s, the RS-6 CIA spy radio was top of line, use peanut heated filament tubes, but still used crystals, and the 100 feet of wire for an antenna. Steve Ellington N4LQ delivers a great presentation on YouTube (YT), control click the link below to view.

https://www.youtube.com/channel/UC8yv24rjknvixn1KIAcwzoQ

Spy "Numbers Stations" are still on the air, estimates there are 100,000 foreign spies in America today, who could receive crypto instructions from Numbers Stations.

https://news.clearancejobs.com/2019/04/10/spies-on-the-radio-numbers-stations-are-still-on-the-air/

Link to Numbers broadcasts: control click to view: https://www.youtube.com/watch?v=ZQpDoR8ZGTc&feature=youtu.be

Twelve million letters per week went to service men during WW1, as many as 50 million cryptographic messages were processed during WW1.

The competitive global need for immediate secret communications sponsored the technological advances we have today, light weight, intelligent shortwave radios, Morse code has not changed, it is as reliable and powerful as ever, with the most sensitive audio detector, and interrupter ever, a human ear and brain at the other end.

Ham radio operators continue to honor the traditions, discipline in shortwave messaging ARES/NTS traffic nets operate daily as much the same as 100 years ago. Operators enjoy these exercises, and preparedness for potential future service to communities. My main pleasure in ham radio, is working with traffic handlers, and keeping our skills sharp in relaying every message accurately.

Thanks to Marconi's 100 kw station with an antenna a mile long, we are finding our way.

Thanks for reading and Happy New Year

Henry – WA1VAB

## Feature Article: Longwave DX is Tough Enough With an Underground Antenna
### By Andy Wallace, KA1GTT

Having the accurate UTC time for the radio shack has always been important. Nowadays with many ham stations being connected to a computer this task is done automatically for you, as long as you are connected to the Internet.

I have yet to finish setting up my computer for FT8 and other modes so I am "old school" in the shack still, with a paper logbook and a clock on the wall. My clock is one I have owned for 20+ years - a Skyscan 86715 "Atomic" clock.

At my former upstairs apartment, this 2xAA LCD clock with a large display would sync to WWVB just fine. Now that my shack is in the basement I found that it would not sync even when placed on an outside window. WWVB transmits time signals on 60 kHz - well below the AM broadcast band in what is called the long wave spectrum. You may be familiar with WWV and other time stations which transmit on 2.5/5/10/15 MHz but WWVB's format does not include voice announcements.

https://www.nist.gov/time-distribution/radio-station-wwvb

The above link will give you a lot of information about the WWVB station in Fort Collins, CO and describes the time code format. The image below is what is transmitted (newer info is in the link). To get meaningful time from this transmission, the signal must be decoded by digital circuits.

Why not simply replace my antique clock with a more modern and probably more sensitive one? Ah, there's the rub. I want GMT/UTC in the shack, and most new clocks only do U.S. timezones!

(One exception is the Lacrosse WS-8115-U-S-INT clock for $26. https://www.amazon.com/Crosse-Technology-WS-8115U-S-INT-Digital-Temperature/dp/B003I4EL0K/ref=sr_1_13?dchild=1&keywords=lacrosse+WS-8115&qid=1608913748&sr=8-13 - the manual at Amazon does show it can be set to an offset of 0 for GMT.)

So in looking around the net I found many ideas for increasing the signal strength to the clock with an external antenna. I didn't want to do anything really ugly - like mount a receiving loop outside the cellar - so I opened up the wall clock and found the 60 kHz antenna. It was a ferrite bar with a solenoid (single layer) coil of enamel wire on it. This was in parallel with a capacitor on the clock board which made things resonate at 60 kHz.



Anyone who has used a portable transistor radio for the AM band knows that the ferrite bar antenna inside is more sensitive than a whip antenna at these low frequencies (1 MHz) and you may have also noticed that the bar antenna allows you to peak and null radio stations by turning the radio. Ferrite basics can be found here:

https://www.electronics-notes.com/articles/antennas-propagation/ferrite-rod-bar-antenna/basics-tutorial.php

The WWVB clock contained a small ferrite bar, only about as long as one of the AA batteries used to power it. I have a small supply of longer ferrite rods I got from ebay years back for experimenting. The physical properties are unknown but I thought since they were larger (3/8" x 5.5" long) they might capture more signal.

I am lucky enough to own an LC meter for measuring the values of coils and capacitors. Following the wires from the clock's loop to the capacitor on the PCB I had half of the needed equation. The capacitor's markings were 2A682J. The important numbers there are 682. These are an abbreviation for the capacitor value.
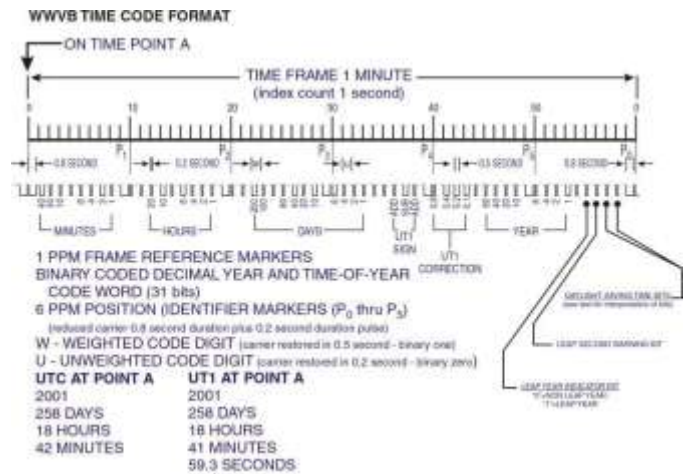


Two digits for the value, and one digit for the multiplier. In this case it stands for 68 and two trailing zeros - 6800 pF or in the newer parlance, 6.8 nF.

I unsoldered the wires of the bar and measured the inductance with my LC meter. It came in at 1.16 mH, perhaps reading a little high from being on a metal desk.



Googling for an L/C calculator I found a nice one at Daycounter which showed that for 60 kHz resonance, and a capacitor of 6800 pF, the coil needed to be 1.03 mH. The stock antenna resonated more like 57 kHz.

## LC Resonance Calculator

When an inductor or capacitor are placed in series or parallel they will have a resonant frequency which is determined by the design equation below. LC resonant circuits are useful as notch filters or band pass filters. The are also found in oscillator circuits.
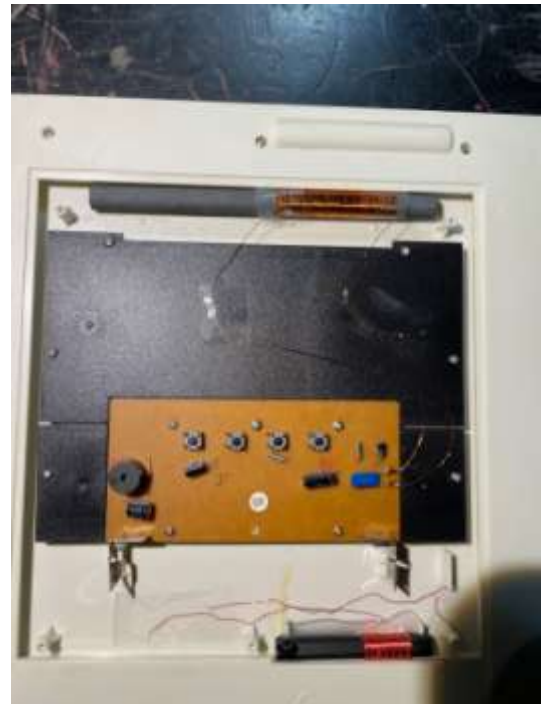
Enter in any two parameters for a resonant circuit, and this calculator will calculate the third missing parameter.

| Frequency: | 0.0600 | (MHz) |
| Capacitance: | 6.80e+3 | (pF) |
| Inductance: | 1.03e+6 | (nH) |

Calculate



Leaving the back off of the clock, I placed it in an upstairs window overnight and was very happy to see that it synced up just fine with WWVB. I tidied up the wiring, put the back on, and placed it where it had been in the shack window. Within 1/2 hr and during DAYLIGHT, it synced up without issues! Success. It has been running fine there for weeks. This is pretty definitive proof that the larger ferrite bar captures a stronger signal for the clock chip to decode.



I used some enamel wire and wound a new coil on my unknown Chinese ferrite bar. To make things easier - and seeing there were 100+ turns on the stock bar - I wound 100 turns on the bar and left the leads very long. I stripped the enamel off the ends with sandpaper and then tinned them, and measured the inductance on my LC meter. 100 turns came out at 0.9 mH. To get to 1.03 mH, I would need (100T/.9mH) x 1.03 mH = 115 turns approximately.

I took the long leads and wound them back on the bar and measured the inductance from time to time, stopping at 1.03. I believe I used close to 110 turns.

A nice surprise was that the plastic case for the clock had plenty of room for the new bar. I mounted the antenna at the top of the case and ran the wires down to the capacitor.

This modification was a learning experience for me and I am happy to keep something I enjoyed functioning for 2021 and beyond.

## Feature Article: Upgrading my Station Computer

## By Scott Ginsburg, K1OA

The fan on my Dell desktop station computer started sounding ratty about a year ago. When I looked into what it would take to replace it, the process sounded daunting and I decided to live with it for a while. Recently I realized that the computer, a refurbished Dell Optiplex 755 running Windows 7 that I bought off eBay 6 years ago, was going on 12 years old. I bought it from a Microsoft Authorized Refurbisher for $160 and it's been a great machine, but at 12 years old I decided I was pushing my luck and the time was ripe for replacing it.

My station computer not only interfaces to my HF radio, but it runs all my contesting and logging activities as well. This includes being able to run FT8/FT4, PSK31, RTTY and generating CW during CW contests. It is also used to program my mobile radios and various handhelds via USB. My computing requirements are very modest as none of the software I run is particularly compute intensive. The Optiplex 755 had a Core 2 Duo 3.0 GHz CPU with 4 GB of RAM which was adequate for my software requirements, although over the years Firefox got slower and slower.

After reading an article in the Nov/Dec issue of the ARRL National Contest Journal on choosing a contest computer I saw a reference to sources for refurbished computers and I decided to take action and began perusing the mentioned vendor's websites. My goal was to find another desktop machine that would be powerful enough to carry me through at least the next 5 or 6 years. Desired specs would be:

| CPU | Intel Core i5 |
|---|---|
| RAM | 16 GB |
| HDD | 1 TB |
| USB Ports | At least 6 |
| Serial Port | 1 |
| Monitor Port | VGA |
| PCI Slot | 1 |
| Operating System | Win10 License Key |

For the CPU, the difference in price between the i5 and i7 didn't seem worth it to me, again because I don't have steep compute requirements. The jump from 4 GB to 16 GB seemed appropriate as programs these days are taking ever more memory. For the hard drive I decided that if I was buying a refurbished machine I didn't want a Solid State Drive (SSD) as there are lifetime write limits and I couldn't vouch for how much wear and tear an SSD had been through. Buying a magnetic drive seemed like a safe bet, and I could get much higher capacities at a lower cost. My USB requirement was to support a USB keyboard, USB wireless mouse dongle, SignaLink USB sound card, various radio programming interfaces and my UPS data interface. My Yaesu FTdx5000 CAT radio interface is serial so having at least one serial port to drive the radio was desired. I have a 2-port RS-232 serial PCI card that was used for running MMTTY software and connecting to the FSK RTTY port on my radio but I was dubious if this would run on Win10. The other serial port could potentially be used for a serial CW keying interface, so at least one PCI expansion slot would be needed. Video requirements were not that stringent as I could connect my existing VGA monitor to an HDMI port through a converter and HDMI is still very available, especially in a 5 year old computer.

After 6 years of flawless performance from my Dell Optiplex 755 I decided to stick with the Optiplex line. These machines are well made business grade computers and there are still good refurbished options. After spending time researching model numbers in my age range, lining up all my specs, and looking at reseller ratings I settled on a particular Microsoft Authorized Refurbisher on the Amazon marketplace that had an excellent rating. My purchase would also be backed by the Amazon return policy should I run into any issues. My target was the Dell 5040, and two weeks after I found the exact machine that met all my specs the price dropped from $380 to $320 so I pulled the trigger!

The computer arrived a few days later and it was now time for the fun project of software installation and data migration. The first thing I did on my existing machine was to take screen shots of the installed software using the Windows Snipping tool and navigating to the installed programs section of the Windows 7 Control Panel. This took two screen shots, which I printed out for keeping track of my progress. I wasn't able to get Windows file sharing working between the old and new computers and rather than continue wrestling with that I took a 128 GB USB thumb drive and started copying files. Fortunately I had saved many of the program downloads in my Downloads directory, some of which would install just fine on Win10. I grabbed the entirety of my Documents directory, as well as various program data files

scattered on the C: drive. With the thumb drive all loaded up, I plugged it into my new computer and started the install process.

Most of the data files for the various programs I use could be copied into the working directories of the newly installed software. For example the default provided .ini or .cfg configuration files can be overwritten using your existing files and the software state should look exactly as it did on the old machine. You may need to reinstall a license key file as well, so remember that the next time you buy software that comes with a license key file - keep it in a safe place! This was the case for DX4WIN, my main logging program.

I'm an active user of the ARRL Log Book of the World (LOTW) system. Migrating from one computer to another requires you to export a file from the old TQSL program, copy that file to the new computer, and import it into the new TQSL installation. This is done through the File->Backup and File->Restore window commands. Firefox required a similar procedure involving creating a backup file and then importing that into Firefox on the new machine (Bookmarks->Show All Bookmarks->Import and Backup).

My two FT8/FT4 programs, WSJT-X and JTAlert were easy to get back up and running. For WSJT-X I needed to copy my old wsjt-x.ini, wsjtx_log.adi and ALL.adi files to Users\Scott\AppData\Local\WSJT-X on my new machine. For JTAlert it was as easy as copying the entire Users\Scott\AppData\Local\HamApps directory from the old machine to the new machine.

As I installed the new software I checked off each item on my installed programs printout. Going from Win7 to Win10 there were a few older programs that didn't want to install on Win10, such as my W6ELProp propagation prediction program. I decided to leave that as a project for another day.

My final task was to install the 2-port serial PCI card, a StarTech PCI2S550. After plugging it into one of the two PCI expansion slots on the new machine, I installed the drivers that had been downloaded from the vendor website and much to my surprise this old card actually worked!

I hope this inspires those of you out there that have either not yet connected a computer to your radio or are using an older machine that is ready to be upgraded. It's well worth the effort!

## Feature Article: Why Upper Side Band vs Lower Side Band?
### By Bruce Anderson, W1LUS

Did you ever wonder why we use Lower Side Band, LSB, on 160, 80 and 40 Meters and Upper Side Band, USB, on 20 meters and higher? While most modern transceivers can generate either sideband on all bands the use of LSB on 160, 80 and 40 meters and USB on 20 meters and above is the common practice. The reason for this practice lies in the evolution of how SSB signals for amateur radio were generated.

In the early days of SSB, we are talking the 1950's here, there was limited commercial SSB equipment. The 50's was the dawn of the age of transistors and amateur radio equipment was still almost all vacuum tubes. Those were also the days when hams building their own rigs was much more common than it is today. The two basic methods used to generate SSB signal are filter and phasing. One of the early SSB transmitters that became very popular for hams to build used the filter method to generate a 9 MHz USB signal then mix it with a 5 to 5.5 MHz VFO to generate a 14 to 14.5 MHz signal for 20 meters or a 4 to 3.5 MHz signal for 80 meters. Two bands from one generator, what a bargain!

Therein lies the answer to my original question. When the 9 MHz USB signal and a 5 MHz VFO are mixed to produce a 14 MHz output, as the VFO increases in frequency the 14 MHz signal increases in frequency. Thus an increasing frequency in the USB signal remains an increasing frequency and it remains to be a USB signal.

But when taking the difference frequency at the output of the same mixer as the 5 MHz VFO frequency increases, the 4 MHz frequency decreases. That also means that increasing frequecies in the original USB signal become decreasing frequencies in the 80 meter band. i.e. the USB signal gets inverted and becomes a LSB. Thus USB became the default sideband on 20 meters and above and LSB on the lower bands.

[Except the mandated use of USB on 60m breaks the paradigm – ed.]

## Feature Article: A Simple Solution to an Annoying Problem
### By Jim Osborn, KB1SEQ

As the title suggests, this brief article will report on a rather simple solution I made to fix an annoying set of problems. I have recently been playing with FT8 communication on my Yaesu FT100 radio. Things went well for the first couple months. After learning how to configure things I was able to make a couple QSOs and was making good progress. My immediate challenges were figuring out the details about how the radio and WSJT-X software worked. But then I had couple problems that brought progress to an abrupt halt.

Shortly after Thanksgiving I noticed that I was no longer getting the radio to switch into transmit mode. I have a SignaLink USB device in between the radio and my computer. So, the red Tx light would glow, but there was no Tx coming from the radio. Of course, I did not notice the radio at first, but I noticed that no one was responding to any of my CQ calls, nor my responses to their calls. When I finally realized that the radio was no longer transmitting, my initial thought was that I had destroyed the output amplifier with too much power. Yes, when I received no

responses, I started raising the output power level to try and get someone to answer. I had to enlist help, but they determined that the SignaLink unit was the problem. Apparently the Tx potentiometer had broken loose from the circuit board. The result was that the unit could detect the VOX signal, but was not passing the actual transmit data on to the radio. I had to call Tigertronics support and order a replacement Tx pot for the SignaLink. After desoldering the original circuit board holes, I was able to solder in the replacement part and I was back in business.

So my most recent issue has been a bit more difficult to diagnose. Things started when I began hearing the Tx relay in the SignaLink begin to chatter. What I'm trying to describe is that the relay was initially closing, but then it would repeatedly open and close again during random FT8 transmission blocks. The red Tx light would go out and the radio would also drop back into receive mode. Most of the time, I would drop the QSO, but occasionally one would continue to completion even with the relay chatter. I tried resetting both Tx and Rx potentiometer setting, but nothing seems to result in a permanent fix to the problem. I thought I was on the right track, because multiple Internet searches suggested that the relay chatter was related to audio feedback. The suggestions ranged from muting the computer mic and adjusting other audio settings.

I also started having trouble with the WSJT-X software. I was repeatedly checking the audio setting, and I never had a clear indication that any of my changes were working. It actually seemed like the computer was making changes on its own. But then one day everything stopped. There was no WSJT-X waterfall display, no decoded signals, nothing! I rebooted the computer and things started working again. I contacted a friend who suggested that I needed chokes on all of my interconnecting cables between the computer and all of the ham devices. Completely frustrated, I simply let things sit for a couple days while I ordered new cables and some RFI chokes.

When I returned I installed the cable and a couple chokes; and I was able to use the setup for a couple QSOs. But I was still hearing some occasional relay chatter. I reached over to touch the SignaLink unit and the chatter stopped? I suddenly realized I had a signal ground problem.

So here is the rather simple solution that I used. I wanted to install a ground bus connected to a station ground and make short connections from each piece of ham equipment to the bus. From what I have read, this would have been a more traditional signal ground system. I purchase some #10 copper wire and planned on using it as the bus and making a single connection to a power outlet ground. But this wire was too stiff and not suitable for me to use in my setup.

I determined that the 12V Power Supply I was using had an earth ground terminal, and it was connected to the ground terminal on the power cord. So I used some #16 wire to make ground wires for each piece of ham equipment. I soldered a terminal on each wire so I could make a screw connection to each device. I then crimped each ground wire to a longer piece of the #16 cable that I then connected to the ground terminal on the PS.

So in a few words, here is my simple solution to a set of very frustrating problems I've had with my FT8 radio setup. First, I have a new USB Cable from the SignaLink USB Device to my computer that has integrated RFI chokes at both ends. And all of my ham radio devices (SignaLink, Radio and SWR meters) are connected to a ground wire that runs to the Earth Ground terminal on the main Power Supply. I've been running for over a week now with no more "relay chatter" issues and my computer setup has been solid. I have made numerous new QSOs and I'm happy with the operation. I'm back to work in search of a WAS Award.

## Strays
### Found on the Web

For this issue, I found a really nice lecture on the history of semiconductor electronics from copper oxide rectifiers to FinFETs. Watch it at https://youtu.be/qhJaq3kl6Dc

--de Marla Wallace, WA1GSF

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## Making ZOOM available to Elmers

In this time of social distancing we have been using Zoom for our monthly club meetings. I have been thinking that Elmers could also be using Zoom to coach new hams instead of actually going to visit with them. Elmers could perhaps help with programming a new radio with the new ham sharing their computer screen and the Elmer helping to walk them thru the process. An Elmer could have Zoom on their cell phone and show a new ham how their shack was setup. Use your imagination and see how you might use this tool. If you would like to use Zoom for this, contact Bruce, W1LUS@hotmail.com, with a date and a time and a meeting will be setup for you. You may also contact Bruce if you would like training on using Zoom to Elmer someone.

--de Bruce Anderson, W1LUS

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## A Poem

Marla,
 A ham friend of mine wrote this poem. He say's you may use it as long as he gets full credit...which is only fair. He is not a BARS member, but is fine with it  for the newsletter.
his call is KD1FW. Name is James Cavanaugh.
73, John, KC1FTJ

### What Does a Ham Radio Operator Do?
By James Cavanaugh, KD1FW
(reprinted by permission)

What does a ham radio operator do?
Besides talk from here to Kathmandu?
By conversing politely with others around the Earth
Through the power of radio, we show our worth
A licensed representative of their country's goodwill
Through conversations, this they help fulfill.

Volunteering for public service
        hams you'll always see
At races, walks and bike tours annually
Like sentinels guarding from beginning to end
Attending to the welfare of all who attend.

At home in the shack or outside in the park
Setting up equipment in daylight or dark
To practice for harder times when
        they will need to be in the stable
In helping to communicate when
        no one else may be able

When emergencies arrive,
        making most people nervous,
The amateur operator steps up
        For community service.
Using whatever power source they can find
To give those around them more peace of mind
From their practiced hands, messages will arrive,
Informing the public whatwe need to survive
Over the airwaves from disasters they arrive
To notify families that their loved ones are alive

Continuously vigilant, never looking for glory,
This is the amateur radio operator's story

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# Upgrading Your License?  Here's a Resource

If you are thinking of upgrading your license using one of the Online exam sites. I recommend that you take some free practice exams on HamStudy.org. I recommend it because the software used to generate practice exams on HamStudy.org is the same software that is used to create exams for online tests. By doing that when you take an online upgrade exam the test question

format will be familiar. With HamStudy.org practice tests you should use the keyboard to select the answer, A,B,C, or D and not your mouse as that is way online exams are run.

--de Bruce Anderson, W1LUS

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# Weekly Sunday Night CW Slow Speed Contest

There is a weekly slow-speed CW contest run by the local K1USN guys.  This is a good way to polish up your CW skills. See http://www.k1usn.com/sst.html for details.   This is also included in the Get-On-The-Air column, below.



-- de Tom Walsh, K1TW

## Secretary's Reports
from Scott Ginsburg, K1OA, Secretary

### BARS General Meeting, Dec 2, 2020

President Doug Bruce, KC1MJK called the Zoom virtual meeting to order at 7:07 PM.

ARRL New England Vice Director Phil Temples, K9HI gave a presentation on the ARRL and an update on what is currently happening at the League.

There were 27 attendees. KC1MJK closed the meeting at 8:50 PM.

**BARS Board of Directors Meeting, Dec 17, 2020**

Board Members present: KC1MJK, W2IRY, W1LUS, WA1VAB, K1OA, KA1GTT

The Board discussed the upcoming speaker schedule.

A vote was held and approved to provide a $25 donation to donorschoose.org  as requested by our upcoming February speaker. Although the club does not typically pay speaker fees it was deemed an acceptable alternative to buying the speaker dinner the night of the meeting which is not happening in the current environment.

## BARS Membership
Bruce, W1LUS, our BARS Treasurer reports that as of  1/1/2021, we had 102 members.   To date 39% of 2020 members have renewed for 2021

## 2021 BARS Member Dues
The BARS Board has changed the policy on member dues.  A $15 annual BARS membership now runs from January 1st and expires on December 31st.   Any renewal or new membership made after September 1 will be valid until December 31st of the next year.  Memberships allow us to
- Pay our bills;
- maintain our great web page;
- fund field day;
- and bring the membership a great variety of informative meetings and speakers.

## Treasurers Report for December 2020
from Bruce Anderson, W1LUS, Treasurer

For December our expenses were Zoom $15.93 and PayPal fee of $4.44.  We had 6 new/renewals in October for $90.  We now have $331.57 in the Bank and $817.47 in our PayPal account for a total of $1149.04

Dues for 2021 will remain at $15 for 2021 and are due starting January 1, 2021.

Dues can be paid several ways:
- Via bank to bank transfer with Zelle, Venmo, PayPal, etc. by sending $15 to bars.dues@outlook.com.
- With credit card by using the Join/Renewal membership form on the W1HH.org website.
- With cash or check by mailing $15 to Billerica ARS, PO BOX 832, Nutting Lake, MA 01856

Bruce Anderson,  W1LUS
Treasurer

## BARS Needs You!!!
We are looking for a few good hams to act as net control on the regularly scheduled Wednesday night nets!  All it takes is one night a month; if you are interested contact Chris, KC1IUK.  Also, the club needs volunteers for light tasks of ~ 1 hour a month.  Are you able to pitch in?  Contact Bruce, KC1MJK.

## Wednesday Night Net
Join us on the Billerica Repeater for the weekly BARS net each Wednesday at 8:00 PM (**except on the first Wednesday of the month which is club meeting night**).

Repeater info:
147.12 MHz
+600 kHz (normal) offset
Encode CTCSS 103.5 Hz

## Club Meetings
First Wednesday of the month at 7:00PM at Chelmsford Bible Church, 128 Gorham St., Chelmsford MA
Park in back and enter by rear door
Chelmsford Bible Church Hall, 128 Gorham St, Rear Door, Chelmsford MA 01824-3220 (map)

## VE Sessions
We started doing only online exams in December. Our next online exam session will be on January 14. If you are interested in participating in these sessions as a candidate or as a VE, please contact Bruce at W1LUS@hotmail.com to register for this online exam session.

Eventually, we hope to resume holding VE sessions as before, every month on the 2nd Thursday at 7:00 PM at Chelmsford Bible Church, 128 Gorham St., Chelmsford MA.  Park in back and enter by rear door.  Chelmsford Bible Church Hall, 128 Gorham St, Rear Door, Chelmsford MA 01824-3220 (map)

**December 2020 VE Session Report**

On December 10 we had our first online VE Exam session. Originally we had two people signed up.

At about 6 PM the day of the exam one of the candidates canceled. The other candidate was located in Georgia. He passed his Technician and General exam tests and is now KO4KCB. Our next session will be on January 14, 2021. If you are interest in taking an online exam contact me at w1lus@hotmail.com

Thanks to Scott, K1OA, Andreas KC1NTL, Niece KA1ULN, and Gary, W1GFF for their help in running the session.

Bruce Anderson, W1LUS

## Club Breakfast every Saturday

On Saturday mornings around 8:15AM, we also meet weekly for a casual, social breakfast at Stelio's restaurant. Stelio's Family Restaurant, Billerica, MA (map)

## Future Meetings

**The 2/3 meeting will be held via Zoom.**

## Subscribe to the BARS Mailing List

To subscribe to the BARS email list, send a blank email to bars-subscribe@w1hh.org and watch for an automated reply. Note that bars-subscribe is all one word.

Reply to that message from the list server and you are then subscribed.

To post to the list, address your email to bars@w1hh.org

## BARS January Suggestions - Get-on-the-air Events

BARS is a "get-on-the-air" (GOTA) club. We encourage members to participate in the varied events on HF and VHF. Here are some popular suggestions for this month:

| Date | Event |
|---|---|
| Jan 1 | ARRL Straight Key Night (0000-2359Z) ** |
| | http://www.arrl.org/straight-key-night |
| Jan 2-3 | ARRL RTTY Roundup |
| | http://www.arrl.org/rtty-roundup |
| Jan 2 | ARRL Kids Day (1800-2359Z) |
| | http://www.arrl.org/kids-day |
| Jan 4, 11, 18, 25 | K1USN Slow Speed Test (0000-0100Z) |
| | http://www.k1usn.com/sst.html |
| Jan 9-10 | Straight Key Century Club (SKCC) Weekend Sprintathon |
| | https://www.skccgroup.com/operating_activities/weekend_sprintathon/ |
| Jan 16-18 | ARRL January VHF Contest ** |
| | http://www.arrl.org/january-vhf |
| Jan 30-31 | Winter Field Day |
| | https://www.winterfieldday.com/ |

**\*\* Top Recommendations for this month**

Details on each contest above and more events can be found every week on the WA7BNM contest calendar at :
 https://www.contestcalendar.com/weeklycont.php?mode=custom&week=current

## BARS Leadership Team

President: Doug Bruce,  KC1MJK
Vice President: Kayla Creamer, W2IRY
Treasurer: Bruce Anderson, W1LUS
Secretary: Scott Ginsburg, K1OA
Net Coordinator: Chris Lobdell, KC1IUK
Newsletter Editor: Marla Wallace, WA1GSF
New Member Outreach: John Fisher, KC1FTJ
BoD: Mike Raisbeck, K1TWF
BoD: Henry Christle, WA1VAB
Ex Officio: Andy Wallace, KA1GTT