B-PLUS

Albany **A**mateur **R**adio **A**ssociation – AARA

April 2023

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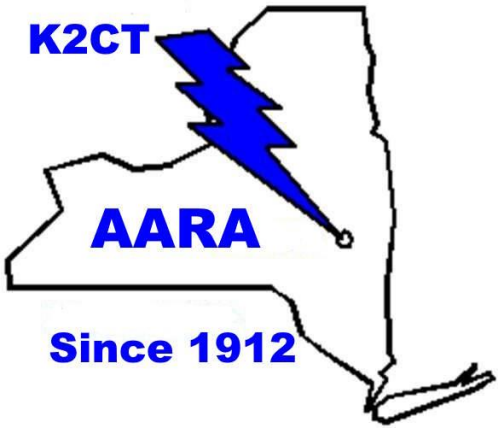


AARA March Meeting
April 5th 7:30 PM
Slingerlands Fire Dept.

Program: To Be Announced

PLEASE Pay Your Dues
Dues are $20
Checks can be sent to:

Saul Abrams, K2XA
307 Maple Rd.
Slingerlands, NY 12159

Coming Attractions….

The May AARA meeting will be a live SKYWARN SPOTTER TRAINING SESSION starting at 7 PM. Registration details will be available soon (watch our Facebook page, website, and K2CT-AARA groups.io)

The following article is copied with permission from the Spring 2023 issue of the **Spring 2023 www.indexa.org Issue 138 of the INDEXA**

The CW Receiving Machine

Ralph Fedor, M.D. - KØIR

Decades ago I purchased a new accessory for my ham shack called the CW Sending Machine. It was a marvelous piece of equipment. You pushed a button on it to send a CQ; another to send your name, QTH, and other information you wanted in your QSO; another for contest exchanges; and so on. Numerous upgrades and improvements occurred in the following years and continue in today's contest and logging programs. There is also a CW Receiving Machine. It has unimaginable capabilities and has not required any upgrades or modifications for at least 5,000 years.

This marvelous device is surrounded by a cushion of membranes, a thin layer of fluid and a hard protective case. Its only visible components are our external ears, which are designed to capture sound in our environment and channel it into our external auditory canal and on to our tympanic membrane (eardrum). The brain contains more than ten trillion junctions and functions 24 hours a day to keep you alive, breathing, warm, in pH balance and provide you with both short and long term memory. Its outputs control our external and internal muscles, allow us to speak, keep us in balance, regulate our heart rate and blood pressure, coordinate problem solving, and manifest themselves in our social behavior and emotions. The brain's inputs allow us to visualize the world around us, experience touch, taste foods, smell, determine body position, and most important to us in this discussion; hear auditory stimuli and understand language by assembling the com-ponents of syllables and words.

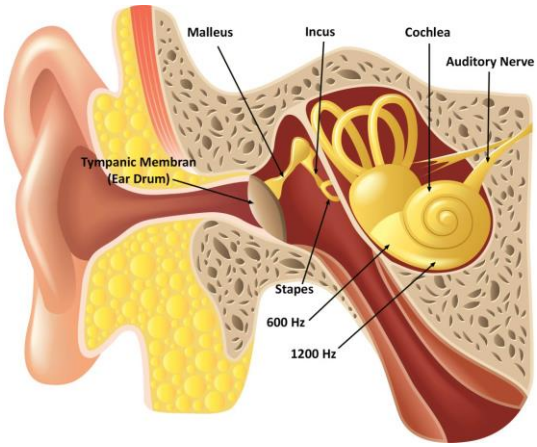
There are 44 discrete sounds in the English language. We call each of these discrete components a phoneme. Consider a phoneme to be one "bit" of information. The word "dog" has three phonemes: *dah - au - ga.* The number of possible combinations of the 44 phonemes is 2.658 X 1054. The longest word that I could find in the English language is ***Pneumonoultramicroscopicsilicovolcanoconiosis,*** a lung disease caused by the inhalation of quartz or silica particles. The word contains 27 syllables, and by my count, 39 phonemes. So, if this is our longest word, then our brain needs to

be able to deal with at least 2.04 X 1046 possible phoneme combinations. This is the awe-inspiring power of our brain that permits our understanding of language.

By comparison CW consists of just two “bits”, a dit and a dah, which we combine to form letters, syllables and words. Just as we send phonemes to our brain for processing, we likewise send CW to it. But the level of complexity in assembling CW input into meaningful information is many, many orders of magnitude less than assembling and understanding language.

Now, let’s introduce some sound: A 600 Hz tone that is 600 msec. in length, a pause of 600 msec, four 600 Hz tones each 200 msec in length and spaced by 200 msec., another pause of 600 msec., and finally a single 600 Hz tone of 200 msec. duration. This is six bits of information and the letters; T, H, and E.
When each of these sounds occurred, your tympanic membrane vibrated at, you guessed it, 600Hz. On the inside of our tympanic membrane there is an attachment to a small bone called the malleus. It picks up the vibrations and through articulations, passes them on to two other bones, the incus and stapes. As a point of interest, and for your next trivia game, the stapes is the smallest bone in the human body. Everything up to this point has been conductive. Our 600 Hz tones are about to leave the middle ear chamber, enter the inner ear, and switch to fluid hydraulics and neurosensory mechanisms to convey their information.

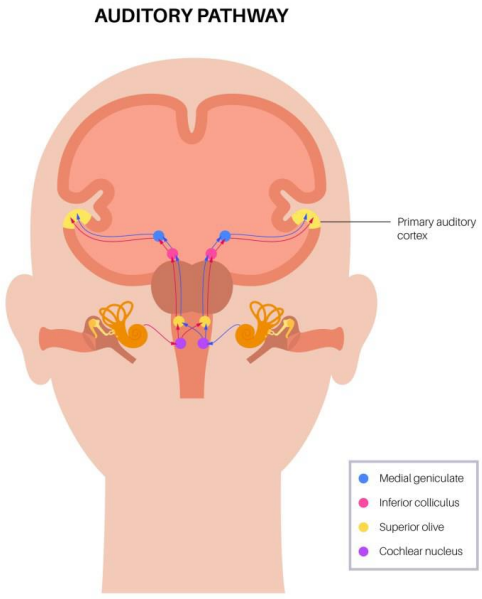
The dominant structures of the inner ear are the choclea and vestibular systems. The vestibular system (semicircular canals) have to do with balance and sensing acceleration. Our 600 Hz tones have little to do with this system, so we’ll ignore this anatomy and physiology for now. The chochlea, where the action is, is a closed, fluid filled, snail-shaped chamber lined with tiny, hair like cells called the organ of Corti. This cochlea is topographically mapped with low frequency sound stimulating receptors near the base of the choclea and high frequency sound stimulating receptors near its apex.



The stapes is fixed to a membrane over an oval opening in the choclea and acts like a hydraulic piston sending 600 Hz shock waves through the cochlear fluid. This causes a mem-brane separating two chambers of the cochlear to ripple like a rope being snapped. The movement stimulates the hair cells of the Organ of Corti that are sensitive a frequency of 600 Hz and they in turn stimulate the auditory nerve.

Fibers of the auditory nerve sense the vibrations of the organ of Corti and send electrical impulses along neurons by sodium, potassium, calcium, and chloride ions moving across electrical and concentration gradients at nerve cell mem-branes. Chemical neurotransmitters relay the impulses between neurons as our 600Hz bits make their

way to our brain-stem. Along the way the neurons encounter several nuclei which process and relay information, and importantly, send nerve fibers to the opposite side of the brainstem. Therefore, information from both ears reaches both sides of our brain. This route and process is not unique to our 600 Hz tones. All sound: CW, music, background noise, and language behave in exactly the same manner.



The cochlea is filled with a fluid that moves in response to the vibrations from the oval window. As the fluid moves, 25,000 nerve endings are set into motion. These nerve endings transform the vibrations into electrical impulses that then travel along the eighth cranial nerve (auditory nerve) to the brain.

Sound waves strike the eardrum, causing it to vibrate (like a drum) and changing the acoustic energy into mechanical energy. The malleus (bone), which is attached to the eardrum, starts the ossicles into motion. The stapes moves like a piston in the oval window of the cochlea creating a hydraulic, mechanical energy

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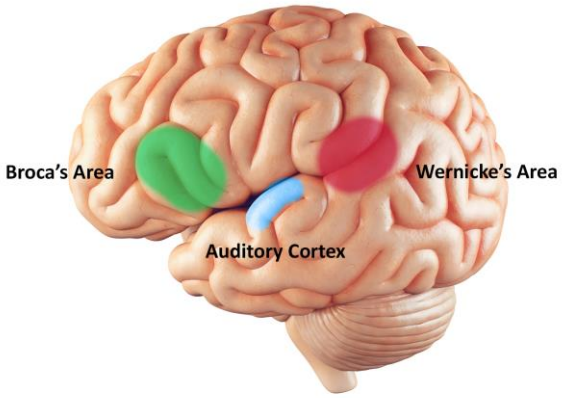

The nuclei in the brainstem act like internet or network nodes, sorting and directing information flowing to them from the auditory nerve. They also send some nerve fibers from each auditory nerve to the opposite side. This is a backup system and assists in sound localization. After the last nucleus, our 600 Hz tones are on their way to the CPU of our CW Receiving Machine, our brain.

The auditory cortex of the temporal lobes of our brain collects all the input from the auditory nerve and topographically sorts it. All the phenomes and the dits and dahs are

then relayed to Wernicke's area, just posterior to the auditory cortex. This is an assembly area where the input is decoded and enters our consciousness. We "hear" sound and now make sense of what we hear. Just as we instantaneously hear and understand words, we "should" instantaneously hear and understand CW characters. Just as we fuse phonemes to create syllables and words, our brain is capable of creating syllables and words from CW characters.

Once recognized and brought into consciousness, this CW information is relayed to other areas of the brain as necessary. For example, if we wish to speak the letter we received, information is sent to Broca's area, the speech center, and we speak the letter. If we wish to type the letter, our motor cortex is stimulated to engage our fingers. Or, a CW phase may be sent to our short term memory, or if we judge the information to be really important, it may go into our long term memory center.
This is how our brains are wired. The entire capacity of our brain can handle 11 million bits of information per second. Our conscious mind, that part of the brain with which we hear language, can deal with 40 to 60 bits per second. We learn language by assimilating information from our environment and by being taught — nature and nurture. However, we only learn CW by being taught. How we are taught is therefore critically important. Practice is important to learning both language and learning CW and it is optimal if we start with a blank slate with no old, erroneous methods cluttering up our auditory cortex or Wernicke's area.

A toddler's language develops by fusing phenomes and syllables. When these become fused into words, this is the turn-ing point in the comprehension of language. The "phenomes" of CW are dits and dahs. They need to be fed into the brain as meaningful, discrete bundles representing letters. The bundles should not be dismantled and then consciously reassembled, rather they must erupt into our consciousness without a voluntary effort on our part. When we hear the word (sound), "balloon," we instantly recognize this discrete bundle of sound and know what it represents. To duplicate the way we learn language, we need to tell the student, "This **sound** represents the letter ___." Focus on the sound rather than its composition.

As in language, when we begin to fuse the sounds of letters into words, we have reached the turning point and have an impedance match with the wiring of our brain. If this is true we should be able to decode CW at a rate similar to that with which we can decode language, 40 to 60 bits per second. Let's put this to the test.
At the 2019 ITU CW competition, two individuals copied code at 195 words per minute. If we use the word "Paris" as a standard five-letter word, made up of 14 bits, 195 words per minute equates to 2,730 bits per minute or 45.5 bits per second. It correlates!

Can everyone learn CW? No.

There is a condition known as auditory dyslexia.. Individuals with this problem may hear sounds but are unable to interpret them. They may decode sounds out of sequence or need constant repetition of instructions. The condition is most often discovered in childhood.

There are also multiple forms of aphasia. Most are the result of a stroke or trauma, and may leave the affected individual unable to understand, speak, read or comprehend. Since hearing is a bilateral process and we have those cross-over areas, hearing is seldom compromised.

However, if you are able to read this article, understand normal speech, speak normally, and follow instructions; then your CW Receiving Machine is likely in good condition, and with the proper teaching methods and practice, you can master CW.

Net Controls and Participation Wanted:

- When the weather is real bad and you have nothing to do – TRY SKYWARN.

  The Spring SKYWARN Spotter training schedule will be published shortly. A single training session (there will be a choice of dates and times) will give you the key weather information necessary to safely observe and report severe weather which helps the weather service provide the most timely weather forecasts/watches/warnings to keep everyone as safe as possible.

  Existing SKYWARN spotters need to complete the training at least once every two years.

  SKYWARN nets collect the pertinent information (such as: snow depth, rain exceeding X amount, wind damage, flooding, freezing rain, and other severe conditions). Participants and SKYWARN Net Controls (Anyone who has completed the Spotter training) are needed.

  Questions? Contact Bruce, WA3AFS (NWS Regional SKYWARN Coordinator) at wa3afs@arrl.net

- The NYSPTEN (New York State Phone Traffic and Emergency Net) meets every day of the year at 6 PM local time on 3.925 Mhz. Your participation would be appreciated and alternate net controls are needed. No previous experience is necessary (suggested scripts and procedures can be found at the qsl.net\nyspten website.) NYSPTEN provides a very generous benefits package for regular and alternate net controls.

  Questions? Contact Bruce, WA3AFS (wa3afs@arrl.net).

  The ACACES (Albany County Amateur Communication Emergency Services) group (which is associated with AARA) was regular nets at 7:30 PM on the 2nd – last Tuesdays of each month on the 164.640 repeater (tone 100). The first Tuesday of the month is their meeting (live or virtual). The last Tuesday of the

month the net is on the 145.190 (tone 103.5) AARA repeater. Questions? Open to all.

Important Links

ARRL Home: www.arrl.org

Find an ARRL Affiliated Club: www.arrl.org/clubs

Find your ARRL Section: www.arrl.org/sections

Find a license class in your area: www.arrl.org/class

Find a license exam in your area: www.arrl.org/exam

Find a hamfest or convention: www.arrl.org/hamfests

Email ARRL Clubs: clubs@arrl.org

The Eastern Iowa DX Bulletin

This bulletin is a compilation of **currently active** DX operations (or those that will become active within the current week)

http://www.eidxa.org/EIDXBulletin.html

Saratoga County Amateur Radio Association

SWAP FEST

Attention! Date changed, now April 1!

Saturday, **April 1**, 2023
Doors Open at 7 am

50 West High Street (Solar Bldg)
2 blocks west of Rt. 50
Ballston Spa, NY 12020

VE Test Session at Noon

Talk-in – 147.00 or 147.24 (PL = 91.5)