June 9, 2021 Meeting

The June 9, 2021 Waterloo Technical Society (WTS) meeting was called to order by President Stephen Crouse at 7:40 pm. This was the third meeting of the 107th year of the Waterloo Technical Society. President Crouse welcomed attendees and introduced the WTS Officers for 2021

A total of 23 members and guests attended.

Treasurer's Report. Ken Friend presented the Treasurer's report. A beginning balance of $757.47 with $340.00 income from paid membership and expenses of $20 for the May 2020 speaker 's meal and $16.04 to J. Stevenson for sound system cable from wireless receiver to powered speaker leaves a new balance of $1,061.43. Treasurer Friend's report stated a total of 6 honorary and 19 paid members yielding a membership roster of 25 members.

Introduction of Officers. Officers for the 2021 year (year 107) were noted:

President:	Stephen Crouse
Co-Vice Presidents:	Jerry Mohling and Dan Johnson
Treasurer:	Kenneth Friend and Paul Anderson
Dinner Reservations:	Derek Eagles and Steve Lang
Secretary:	James Stevenson
Publicity/Recognition:	Vacant
Auditing:	Bill Mitchell and Jim Garrett
Nominating Committee:	Ralph Marrero
Web Site:	Tim Schoenfelder

Old Business. President Crouse reminded the membership that Kendrick Forrest Products tour would occur next Tuesday, June 15. Car-pooling would occur at 9:30 in the parking lot of the former Sears store at the Crossroads Mall. The tour would begin in Edgewood at 11:30 am sharp. At this time, 27 WTS and Cedar Valley Woodworkers members have made reservations.

New Business. No new business was discussed.

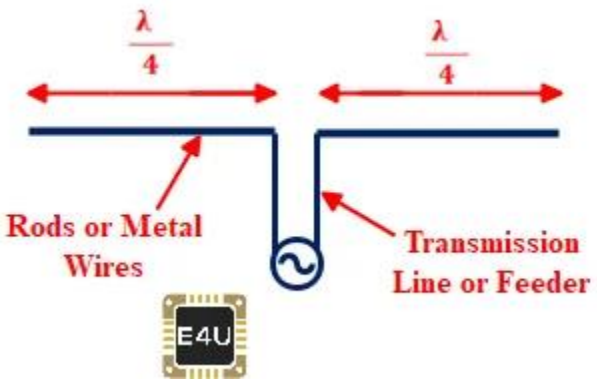
Guest Speaker. **Doug Vernier** is president of V-Soft Communications, Cedar Falls and he is a senior consulting broadcast engineer. He served for seven years as the principal engineer for the Corporation for Public Broadcasting's digital radio conversion program. He has also served two terms on the Board of Directors of National Public Radio. Doug has authored numerous technical papers, including chapters on radio-TV propagation in the 10th and 11th edition of the National Association of Broadcasters Engineering Handbook. In 2011, he received the Association of Public Radio Engineering Achievement award. Doug is recognized by the Society of Broadcast engineers as a 'lifetime' Professional Broadcast Engineer. He retired from the University of Northern Iowa where he established KUNI and expanded KHKE and other state-wide transmitters. He has degrees from the University of Michigan where he studied engineering. In his spare time, he follows his hobby as an Amateur Radio (Ham) enthusiast…call sign K0DV.

Ham Radio physics, history and operation. Doug began his presentation with a brief introduction to Ham Radio. Prior to 1924, the U.S. Department of Commerce provided oversight of the developing amateur radio usage. In

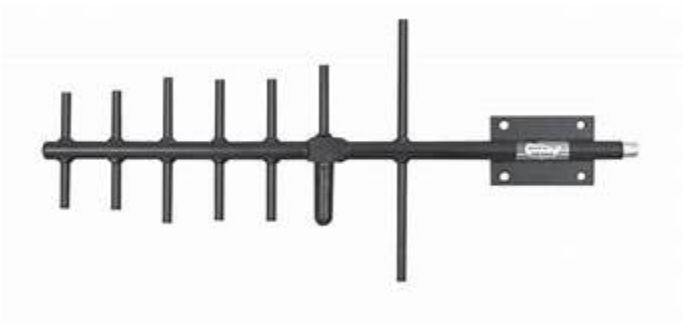
1924 the Federal Communications Commission was formed and given responsibility for regulating and licensing Ham Radio operations. Radio waves are electro-magnetic waves that do not attenuate over long distances.

Ham operators think in terms of wavelength but also transmit and receive on the frequency spectrum as commercial radio and television stations do. Higher frequencies are used by television stations and lower are used by FM and AM radio stations. The FCC issues licenses to use specific frequencies for all radio wave devices from wireless microphones to NASA space exploration. This reduces cross-talking and ensures communication lines are not used inappropriately. Ham operators cannot encrypt broadcasts in order to oversee compliance with licensing agreements.

Antennae are built to wave lengths which permit resonance of the emitted and received signals. Several antennae designs were shown by Doug.



The radio-frequency (RF) voltage source is applied to the center between the two sections of the dipole antenna. This voltage and a current flowing through the two conductive elements produce a radio signal or an electromagnetic wave to be radiated outwards from the antenna.

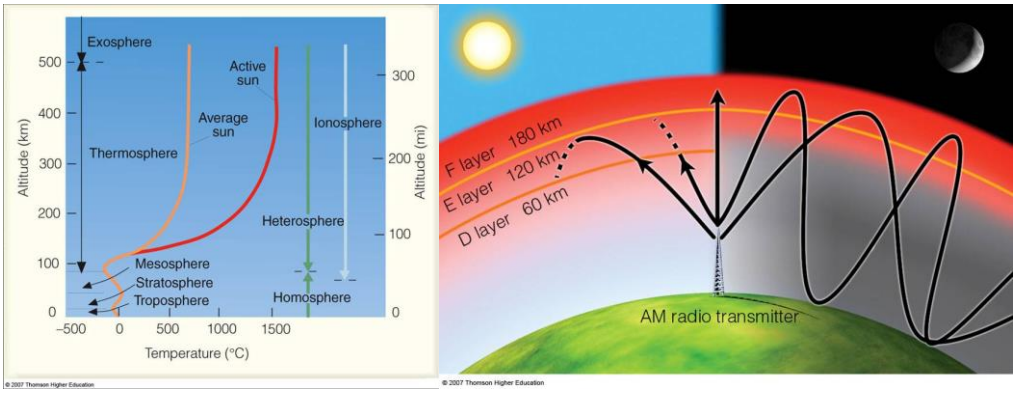


Yagi antennae are directional and available through major retailers like Walmart. It is a directional antenna consisting of two or more parallel resonant antenna elements in an end-fire array



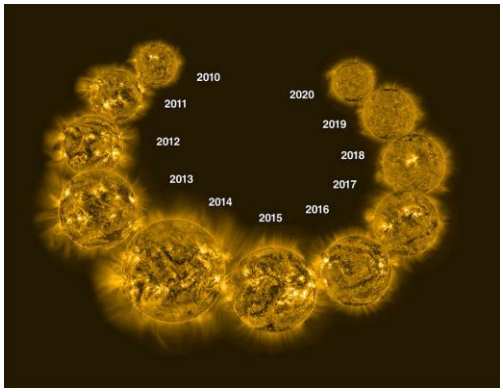
Log periodic antennae are also directional. A Log-periodic antenna is that whose impedance is a logarithamically periodic function of frequency.

Signal propagation. Ham radio waves are reflected in the ionosphere which allows the signal to travel far around the globe.

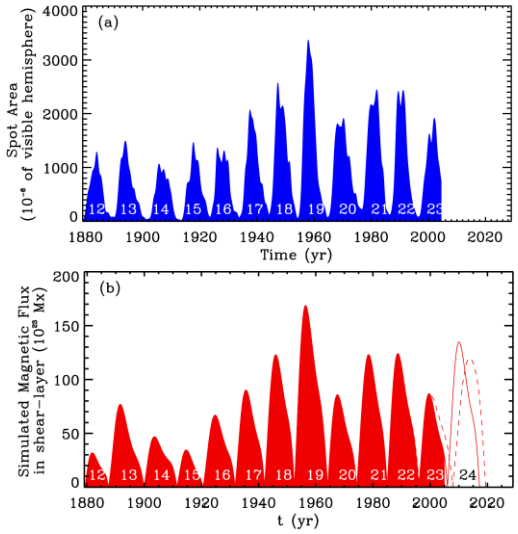


Ions are charged particles. The sun's rays ionize the atmosphere surrounding the earth. Solar cycles determine the amount of ionization. The ion bands are labeled D, E. and F as altitude increases. The highest band, F, is good for the higher frequency, shorter wavelength, transmissions.

Every 11 years or so, the Sun's magnetic field completely flips. This means that the Sun's north and south poles switch places. Then it takes about another 11 years for the Sun’s north and south poles to flip back again.



The solar cycle affects activity on the surface of the Sun, such as sunspots which are caused by the Sun's magnetic fields. As the magnetic fields change, so does the amount of activity on the Sun's surface.



Giant eruptions on the Sun, such as solar flares and coronal mass ejections, also increase during the solar cycle. These eruptions send powerful bursts of energy and material into space. This activity can have effects on Earth. For example, eruptions can cause lights in the sky, called aurora, or impact radio communications.

Ham operators issue QSL cards to confirm the distance of their broadcasts. A QSL card is a written confirmation of a two-way radio-communication between two amateur (ham) radio stations. A typical QSL card is a special size but made from the same material as a typical postcard, and most are sent through the mail in envelopes so as not to get mangled by the post office machinery.



QSL cards derived its name from the Q code “QSL”. A Q code message can stand for a statement or a question (when the code is followed by a question mark.) In this case, when one ham says to another… ‘QSL?’ (note the question mark) it means “Do you confirm receipt of my transmission?” The other ham will normally reply ‘QSL’ (without a question mark) which means “I confirm receipt of your transmission.”

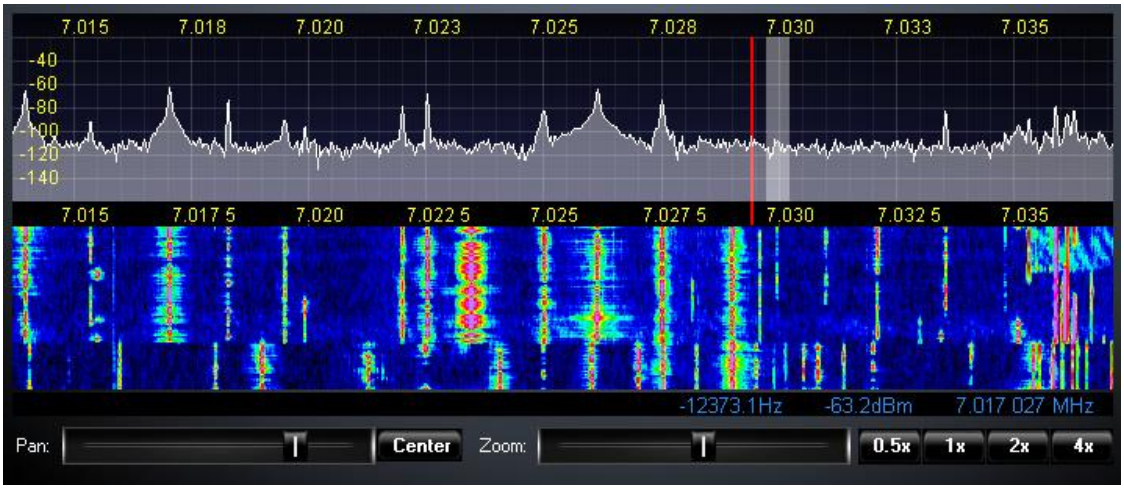
Doug passed several of his QSL cards among the attendees for them to view.

Public Service. An interest in amateur radio has allowed thousands of people to follow rewarding careers in the high technology sector. Amateur radio contributes to the national skill base and thereby to the economic wellbeing of the country.

Radio Amateurs also have a long tradition of helping their communities recover in times of emergency or disaster. They do this by providing strong, decentralised systems that provide the basic network needed to bring up the services now seen as essential by the public. They can also provide interoperability links between users of different radio systems who may not normally work together like Voluntary Agencies.

Charlie Angel related his help with a tornado that devasted Charles City, Iowa on May 15, 1968. He established a communication link, long before cells phones, so families could check the condition of loved ones. Also, hospital supplies were requested from Dubuque and arrived by plane and police cars within 2.5 hours, saving many lives and keeping health care operation. He also helped connect ham-to-phone communications for a sailor's return planning from Greenland to Washington state after a three-year deployment. The sailor heard his 3-year-old daughter's voice for the first time. The memory of this experience is still touching Charlie's heart today.

Modern technology. Today there are apps for tablets, phones and windows computers. This enables remote operation of Doug's radio in Iowa from his winter home in Florida. The scanners can be tuned to a range of frequencies with waterfall graphs showing strength of the signal. This enables operators to find others and tune in to talk.



Education. Doug also reviewed how he started his interest in Ham Radio when his grandfather gave him a crystal radio kit at age 8. His dad then bought him his first Ham Radio at age 14. He then self-educated and passed his Trainee license test. He holds an Advanced license which has been discontinued for new applicants.

Class	Examination Difficulty	Privileges
Technician	Easy. The course material covers radio basics and safety material. Very simple calculations.	Line of sight communications using relatively inexpensive radios. Good for local communications. Entry-level equipment is approximately $200 to $300, although you can spend more. See here for a discussion of how much it costs to become a Technician operator.
General	Somewhat harder. More detailed radio material, including some straightforward calculations.	Worldwide and local communications. Requires more significant equipment. Entry level equipment starts around $1000. Again, you can spend more! See here for a discussion of how much it costs to become a General operator.
Amateur Extra	Quite difficult—not at an engineering level, but close.	Same as General, except on additional frequencies. Also permitted to administer examinations.

Ham operators now operate video broadcasts as well as audio only. An interesting fact is that the U.S.S. Iowa museum operates a station.

Meeting adjourned at 9:10 pm.

Next Meeting. The next meeting will be July 14, 2021. Nathan Eick will address the topic of Aerial Services.

Respectfully submitted,

James R. Stevenson, Secretary