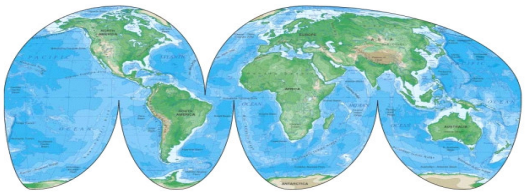
MOUNT VERNON AMATEUR RADIO CLUB

C  Q

December 2006 Newsletter

MEETINGS SECOND MONDAY OF THE MONTH AT THE RED CROSS ANNEX BUILDING,
300 N MULBERRY ST, MT. VERNON, OHIO
REPEATER FREQUENCIES: 146.790 (-) K8EEN /R 444.750 (+) KC8YED /R 53.790 (-) WA8YRS/R
SUNDAY NIGHT ARES NET AT 8:00 P.M ON THE K8EEN REPEATER OPEN TO ALL

FROM THE EDITOR

This is a very important time for our Club. The election of Officers for 2007. In the past, this has been done with a hand vote by whomever was present at the November meeting. This year, it was decided to include a ballot in the Newsletter and let those that wish to vote send the ballot back by mail, or return the ballots by hand during the December annual Christmas dinner/Club meeting. See instructions on the ballot. This months Newsletter will be reduced to four double sided pages to accommodate this ballot. Non members receiving the December Newsletter will not have a ballot enclosed. Members will need to use their own envelope and stamp to send their ballots in. This helps keep the clubs treasury strong. Or bring your ballot to the December Christmas dinner and turn it in then. Note that ballots should be mailed to Dick Huggins, WD8QHY.

During the November meeting, some discussion on a radio give-a-way was had. This would be an attempt to increase membership by offering a chance to win a radio if you renewed your membership or joined the club for the first time. In the end, it was decided that multiple prizes may be a better idea. The Club has designated $100 to be used to buy ham orientated prizes to be given away via a drawing at the February meeting. Mike McCardel, KC8YLD, has been put in charge of collecting the prizes. To be eligible for the prizes, you must have paid your 2007 dues by the February meeting. **You need not be present to win.** I hope all club members feel that our club gives back as much as it gets. Field Day, Working with the Red Cross, Repeater Maintenance, and Ham Radio Classes are some of the things our Club sponsors on a yearly basis.

Heading off this weeks Newsletter is the fact that the new FCC rules announced last month goes into effect December 15, 2006. This is worth repeating: The ARRL has created a band chart for the new rules in PDF file format. It is located at

http://www2.arrl.org/announce/regulatory/wt04-140/Hambands3_color.pdf

Use this band chart to figure out what frequencies you will be allowed to operate.

Just a reminder. This December issue will be the last issue non club members will receive. At the October meeting, it was decided to send out our November and December Newsletter to past club members in the hopes of motivating them to rejoin our club. This is being done with emails and Post office mail, for those that did not have email addresses. If you wish to continue receiving our Newsletter, please consider joining us. Best way to do that is to attend our December Christmas Dinner at Ryan's Steak House, Sunday, December 10, 2006, at 6:00pm. Alternatively, you can fill out the application in this Newsletter and send it to the Clubs Post Office Box. I believe for current members paid up through 2006, the last Newsletter you will receive without renewing for 2007 will be the January issue.

Mt. Vernon ARC
Christmas Dinner

December 10, 2006
6:00 P.M.

Ryan's Steak House
Coshocton Road,
Mt. Vernon, Ohio

I really enjoy the challenge of editing this Newsletter. Please help keep me in business by renewing membership for 2007. It will be interesting to see what prizes are raffled off at the February meeting.

AMATEUR RADIO "OMNIBUS" RULES CHANGES TO GO INTO EFFECT DECEMBER 15

(From the ARRL Letter November 16, 2006)

A little over a month after the Federal Communications Commission released the Report and Order (R&O) in the so-called "Omnibus" Amateur Radio proceeding, WT Docket 04-140 (FCC 06-149) to the public, a revised version appeared November 15 in the Federal Register

http://a257.g.akamaitech.net/7/257/2422/01jan20061800/edocket.access.gpo.go v/2006/pdf/E6-19189.pdf.

The changes in the R&O will take effect Friday, December 15, at 12:01 AM EST, 30 days after its publication.

As expected, the Report & Order clarified two items that had raised some concerns when it was first released last month: That the 80/75 meter band split applies to all three IARU Regions, and that FCC licensees in Region 2, which includes North America, can continue to use RTTY/data emissions in the 7.075-7.100 MHz band.

Still to be resolved are three controversial aspects of the Proceeding:

* Expansion of the 75 meter phone band all the way down to 3600 kHz (thus reducing the privileges of General, Advanced and Amateur Extra class licensees, who had RTTY/data privileges in the 80 meter band, and CW privileges of General and Advanced class licensees)

* The elimination of J2D emissions, data sent by modulating an SSB transmitter, of more than 500 Hz bandwidth. This will make PACTOR III at full capability illegal. Other digital modes effectively rendered illegal below 30 MHz include Olivia and MT63 (when operated at bandwidths greater than 500 Hz), 1200-baud packet, Q15X25 and Clover 2000.

* The elimination of access to the automatic control RTTY/data subband at 3620-3635 kHz.

The ARRL Board is discussing the possibility of a petition to reconsider several items in the R&O.

ARRL Regulatory Information Specialist Dan Henderson, N1ND, commented: "The release of the R&O in the Federal Register has started the countdown clock. We are all looking forward to being able to use the refarmed frequencies starting on December 15. We are still anxiously awaiting the release of the Report and Order for 05-235, the Morse Code Proceeding. We are hopeful that the Commission will be able to move on that petition and address the outstanding issues in the Omnibus R&O soon."

For more information, see the band chart

<http://www2.arrl.org/announce/regulatory/wt04-140/Hambands3_color.pdf>

and the Frequently Asked Questions on WT Docket No. 04-140

<http://www2.arrl.org/announce/regulatory/wt04-140/faq.html>.

Both have been updated to reflect the R&O as it was published in the Federal Register.

HAM HISTORY

By Barry Butz, N8PPF

Credit for this article goes to: International Electrotechnical Commission (IEC)

http://www.iec.ch/100years/techline/

If the coulomb is my favorite unit, possibly the hertz is my least favorite. What was wrong with simple old cycles per second anyway? But I don't mean to take anything away from Heinrich Rudolf Hertz (1857-1894). He was the experimenter who first observed energy being transferred from one coil to another, a groundbreaking contribution to the field of radio.

Heinrich Rudolf Hertz came from a family in Hamburg. In boyhood he showed great skill in constructing physics apparatus in a domestic workshop and was equally adept in learning Arabic and Sanskrit. At first Hertz aimed to be an engineer and served a year with a railway regiment in Berlin, but after a year at the University of Munich he chose to pursue academic physics instead. So he returned to Berlin in 1878 to enroll as a university student under Hermann von Helmholtz, world famous for his research in energy physics, physiology and electrodynamics. So rapid was Hertz's progress in investigating electromagnetic phenomena in Helmholtz's laboratory that in February 1880 he got his PhD – on electromagnetic induction in rotating spheres – aged just 22.

After serving as Helmholtz's assistant for a further three years, Berlin's 'golden boy' studied Maxwell's theory of electromagnetism, recasting it in Helmholtz's terms, avoiding reference to any electromagnetic ether.

Appointed to a professorship at the Karlsruhe Technische Hochschule in 1885, Hertz turned his attention to the study of open electrical circuits. Hertz demonstrated electromagnetic induction to his students using a condenser discharging through an open loop. Very soon he noticed an unanticipated phenomenon: 'side-sparks' in another nearby loop. Over the next three years Hertz researched the character of the radiation involved using his high frequency oscillator and an open loop detector. By 1888 he showed that the electromagnetic emissions associated with these sparks behaved just like waves. Physicists in Britain hailed these results as confirmation that electromagnetic waves could be transmitted and received – implied by Maxwell's theory but previously thought undetectable. Such astounding results made Hertz a superstar in physics and brought general acceptance of Maxwell's theory of electromagnetism.

In the hands of Marconi, Tesla and others the phenomenon of Herzian waves was transformed within a decade into wireless telegraphy and by the twentieth century into a global radio broadcasting industry. Tragically, Hertz himself did not live to see this application of his discoveries, dying young from blood poisoning in 1894. In commemoration of his contribution, the "hertz" was adopted as the unit of frequency (number of cycles per second) in the international metric system.

VHF/UHF WORLD

By Don Russell, WA8YRS

In the past, most of my articles have been written about HF frequencies and antennas for those frequencies. Since Contesting is one of my favorite ventures in ham radio, I know a lot more about the HF side of things than I do about the VHF/UHF world. This series will appear from time to time in our Newsletter in an attempt to balance things out. There is more to VHF and UHF than FM and repeaters, and we will be investigating some of those. Mostly we will talk about communication modes, propagation modes, antennas, and perhaps some unique aspects of life in this world. Unfortunately, this means I will have to do more homework to get the facts straight, but that just means I will learn a lot along the way too. If any club members have an idea for an article dealing with VHF/UHF/MICROWAVES, please email me with your suggestion at wa8yrs@arrl.net.

FM REPEATERS:

Okay, I picked an easy subject for the start of this series. There is a reason for that. Most hams know what repeaters do. They extend the range of hand held and mobile units by acting as a relay station between two or more stations. However, the average ham knows little about what makes a repeater do what it does. Why, if you talk too long, does a repeater "time out" and shut you down? How can a repeater transmit and receive at the same time on one antenna? So lets try to explain some of those things.

TIMERS:

To operate effectively, a repeater must keep track of several things. The very first thing would be when to turn on the transmitter upon receiving a signal at the receiver input. One would think that this would be simple. Once it receives a signal, the transmitter turns on. This would be okay, however, doing so in this manner would cause the repeater to do a lot of unintentional transmitting. Therefore, the first timer on the repeater is usually an input carrier timer. A repeater will not key up unless it sees a carrier on its input frequency of ¼, or ½ of a second. There are lots of noises out there that a sensitive receiver will pick up. Mostly electrical buzzes like ignition noise, lightening flashes, even an occasional signal reflected off of a meteor tail. These all last a very short period, and the input timer helps the repeater to decide if the signal received is a legitimate key-up.

If a signal appears at the receiver input for ½ a second, then the repeater recognizes this as a signal that wants to be repeated and several things take place. First, a carrier "time out" timer begins its count down. Next, the repeater Identification is made in either voice or Morse Code, which triggers an ID timer to start. Lets take this one at a time.

The time out timer starts a count down, usually set at three minutes. As long as the signal is present, this time will continue to count down. If a station transmitting exceeds this three minute limit, and the timer counts down to zero, then typically, the repeater will announce that the particular station is in time-out, and will shut the transmitter down until the station stops transmitting. Why is this done? The FCC tells us to do this. This timer is a fail-safe timer just in case a signal is being accidentally transmitted by a station that has a malfunctioning radio. Perhaps the mobile operator is sitting on the microphone and keying his push to talk without knowing it. Perhaps a base station plugged the wrong microphone into his radio and is on the air, but not aware of it. We have heard things like this occasionally on our own repeater. Not intentional, but we do not want the repeater to continue transmitting under these circumstances, so the timer will turn off the repeater transmitter. Don't worry, we are not trying to keep you from saying your peace. The timer will not reset until the offending signal (or over talkative ham) is dropped. Then the repeater transmitter will come back up and say that the time out is over and the conversation continues. If

this signal is indeed a malfunctioning radio and does not drop, then it would be time to break out the direction finding equipment we use during Transmitter Fox Hunts. Local operators are very good at not talking too long. I rarely hear this time out occur.

On to the ID timer. Repeaters must obey FCC rules just like all ham stations. Therefore the repeater needs to ID every 10 minutes, just like the operators do. So, when the repeater is first keyed up, it identifies, and then a timer starts counting down from 10 minutes. When the timer reaches zero, the repeater will identify again, the time resets to 10 minutes and counts down again. This goes on until the repeater senses that it is no longer being used (no signals on the input). The repeater will identify one last time, then go into a sleep mode and not identify again until the next time it is keyed up. In reality this takes two timers, but we usually just call it the ID timer. Smart hams like to identify at the same time as the repeater does, thus the repeater ID acts as a reminder that all stations need to identify. Because of this, our repeater is set to ID every 8 minutes, giving all stations in a round table type conversation a chance to ID in a timely manner.

There is one more timer used on a repeater that is worth mentioning. This would be called the courtesy beeper timer. After a signal is dropped (one station finished a transmission) a timer starts counting down and when it reaches zero, the courtesy beep beeps, and the three minute time out timer is reset, so that the other station has his full allotment of "talk time". If the other station starts transmitting before the beeper sounds, no timers are reset and that station will likely be in "time out" very soon. The wise ham lets the courtesy beeper do its thing before starting to transmit. This allows other stations to break in if they want to and also allows timers to reset.

One last timer is activated as soon as the courtesy beep has sounded. This timer is usually set at 2 to 5 seconds and after reaching zero, shuts the repeater transmitter down if a signal has not started transmitting on the repeater input frequency.

Luckily, all this is done with a repeater controller and modern controllers are easy to program and function reliably. A repeater tech these days need know no more than how to program the controller.

In the next segment of this series, we will cover audio mixing, repeater control, duplexers, and antennas. Okay, this may take more than one more month!

REPEATERS AND STUFF

By Don Russell, WA8YRS

Relatively little news regarding our repeaters this month. The 2-meter repeater continues its good performance.

I have been working a bit on the 6-meter transmitter site. We are now running 100 watts output compared to the 30 to 50 watts in the past. Last time I was in Mansfield the repeater signal was marginal at best. The increased power should remedy that. Barry, N8PPF, and I still need to do some work at the receiver site. We may try a different receiver, as neither of us are happy with the receiving performance of this repeater. One step at a time.

The 440 Mhz. repeater is still down. Eventually, this repeater will be back on the air. This is a hobby, so there has been no real problem with this repeater being down. With more and more dual band rigs being bought though, we need to keep our frequency pair for that band.

By now, most club members have heard of the FCC's rule changes. If not, read the article earlier in this Newsletter, and last months Newsletter.

Newsletter Credits
Editor: Don Russell, WA8YRS

Clip Art and Cartoons thanks to http://wm8c1.50megs.com/radio_clip_art.htm, http://www.qsl.net/k4adl/, http://pages.prodigy.net/kg0zz/clipart/ham_art3.htm, http://www.arrl.org/,

The ARRL letter is a weekly e-mail publication by the ARRL. You may read the entire ARRL letter by visiting the ARRL Web page at http://www.arrl.org/. **Other News** from: http://ky4ky.com/fyi.htm.

The ARES E-Letter is an e-mail digest of news and information of interest to active members of the ARRL Amateur Radio Emergency Service (ARES). Past issues of The ARES E-Letter are available at http://www.arrl.org/ares-el/. Issues are posted to this page after publication.

Project OSCAR is a monthly column written for Newsletter Editors. Columns will appear as space permits. You may download all the columns yourself at: http://www.projectoscar.net/beacon.php

Members are encouraged to send articles pertaining to ham radio, with an emphasis on local activities, equipment reviews, and

At first, I did not like moving the Novice and Technician plus CW privileges to the General Class CW band. This is what happened on 80, 40, and 15 meters. Then I got to thinking about how little activity there was on the old Novice bands and how unfair that was to someone trying to learn Morse Code. How can you learn and improve your CW on a band that has so little activity? Years ago, the Novice bands were very active and even as a General Class license holder, I spent much of my time talking to Novices. No more. So, I have had a change of opinion. I think this move will encourage Novices and Tech plus licensees to give CW a good try. Some will find it fun and stick with it. Others will try Morse Code out and decide that it is not for them. But at least they have a chance to talk to other hams on CW. That was not happening on the old Novice bands. This may even be the spark that lights the fire, and there will be more CW operators than ever before.

The one thing I truly do not like about the frequency changes is how much space is being allowed for 75 meter SSB. All the way down to 3.600 MHz!! This is going to crowd CW, RTTY, and Data all into a 100 KHz band space. Really not a big problem for CW. Even during a contest CW operators rarely go above 3.570 Mhz, But RTTY signals need a bit of room, and they will no doubt creep down in frequency if need be. I think dropping the SSB band down to 3.650 Mhz would have been more reasonable. Time will tell how this will affect things.

Everything else looks okay to me.

Due to the elections and the shortened Newsletter, and the new column that I have begun, I am keeping this column short. Please be sure to vote. Please come to the Christmas dinner and enjoy a night with your ham friends.

ComPIOnents

By Mike McCardel, KC8YLD
ARRL Public Information Officer, Knox County

Season's Greetings to all! Regardless of how you celebrate this time of year may it be filled with peace, joy and radio toys.

As this year winds down ARRL will be putting its final surge to its HELLO campaign, commemorating the 100th anniversary of the first wireless voice transmission. Locally we will be celebrating with our annual dinner and meeting at Ryan's Steakhouse Sunday December 10 beginning at 6pm. Pay as you go through the line and tell them you are with the Mount Vernon Amateur Radio Club. This is the night for election of officers. See ballot elsewhere in this newsletter. If for any reason you are not able to make the meeting, please forward your ballot to Dick Huggins, WD8QHY prior to the meeting.

MVARC is sponsoring examinations for acquiring and upgrading Amateur Radio licenses, December 9, beginning 9:30am at the American Red Cross Training Center, 300N Mulberry, Mount Vernon. Exams for all four elements, including morse code, will be made available. Walk-ins are welcomes. Cost for the exams is $14 regardless how many elements you take. To retake a failed element an additional $14 fee is charged. Examinees must show a drivers license or state ID card to take the exam. I lieu of a photo ID, two forms of ID will be required. Examinees must also know their social security number to file their application. All tests in this examination are based on current rules and exam pools. Changes to the rules that will go into effect December 15 won't appear on exams.

Speaking of changes to rules, especially the band plans, with the increased phone bandwidth one can pretty much guess what the FCC may do in regard to dropping the CW requirement.

Need ideas for radio related Christmas gifts (even for yourself) within a budget. Try something fun like these QRP radio kits.

The tuna tin 2, the Island Cutter kit, DC40 Deluxe kits or the Zomboids transmitter kits or the Yo-Yo antenna. See more details in the December CQ.

www.QRPme.com
www.qrpkits.com
www.hamradiofun.com

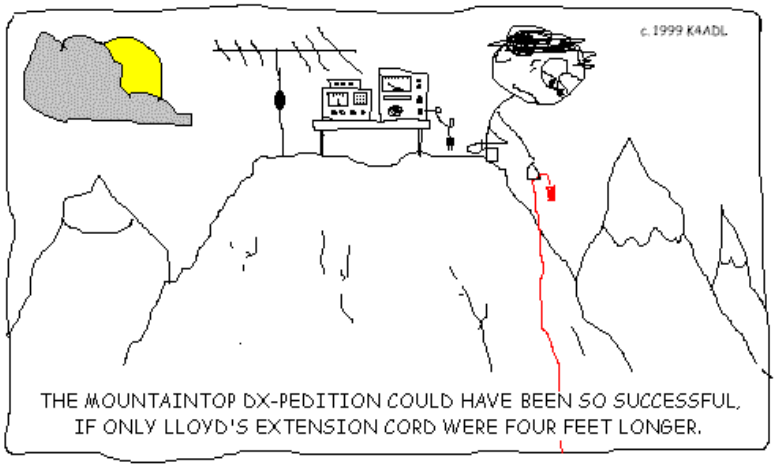
Until next Month, Get On The Air! and

73, all!

FROM THE ARRL LETTER
December 1, 2007
SHUTTLE DISCOVERY CREW INCLUDES THREE RADIO AMATEURS

NASA has set Thursday, December 7, as the launch date for the next space shuttle mission to the International Space Station (ISS). Shuttle Discovery will carry three radio amateurs, one of whom -- US astronaut Sunita Williams, KD5PLB -- will join ISS Expedition 14 in progress. She'll replace European Space Agency astronaut Thomas Reiter, DF4TR, whose duty tour has spanned Expeditions 13 and 14 -- the first time that's happened in the history of the ISS. Williams is said to be eager to do Amateur Radio on the International Space Station (ARISS) <http://www.rac.ca/ariss> school group contacts from NA1SS.

Also aboard Discovery will be European Space Agency astronaut and mission specialist Christer Fuglesang, KE5CGR/SA0AFS, Sweden's first astronaut, who will be making his first journey into space. Plans are in place for Fuglesang to carry out an ARISS school contact with students at Thunmanskolan in Knivsta, Sweden. The contact would be the first ARISS school QSO with Scandinavia.



On November 20, Fuglesang attended an Amateur Radio training session at Johnson Space Center to prepare him for using the ARISS Phase 2 station for his school contact.

Primary payloads on the 12-day mission are the P5 integrated truss segment, SPACEHAB single logistics module and an integrated cargo carrier. Mission specialist Nicholas Patrick, KD5PKY, also is on the seven-member STS-116 mission crew. This will mark the 20th shuttle flight to the ISS. -- NASA;ARISS

Membership Form

Club dues run from Jan. 1 until Dec. 31 and are collected during the last quarter of the year. You can mail in the dues to the address below or bring them to a meeting. Dues are prorated for new members at the time of application. Visit our Web Page at www.mvarc.net

Dues Schedule: $12 regular

$10 for second member in the same family, for those over 65 yrs. of age, and for those living outside Knox County

Mt. Vernon Amateur Radio Club, P.O. Box 372, Mt. Vernon, OH 43050

Name_____Call-Sign_____

Street_____

City_____State_____Zip Code_____

Phone Number_____License Class_____

ARRL Member (Y/N)_____E-Mail_____

Extra Donation (Optional)_____

Members are entitled to a free MVARC E-Mail address. Would you like one? No_____Yes_____

If yes please enter password_____

Other Comments:

GENERAL STUDY GUIDE
PART 3
FROM EARL PAAZIG, N8KBR
http://studyguide.eqth.org/

Read through this material a couple of times, then visit one of the many on-line web pages that allow you to take a General Class practice test. Here are a few: http://www.aa9pw.com/radio/ , http://www.eham.net/exams/ , http://www.qrz.com/ham/ Take a practice test every month and see how your score improves

SUBELEMENT G3 -- RADIO WAVE PROPAGATION [3 Exam Questions -- 3 Groups]

Ionospheric disturbances

- An amateur station may need to try a higher frequency to continue communications during a sudden ionospheric disturbance.
- The effect that a sudden ionospheric disturbance has on the day-time ionospheric propagation of HF radio waves is it disrupts signals on lower frequencies more than those on higher frequencies.
- Geomagnetic disturbance is a dramatic change in the earth's magnetic field over a short period of time.
- Those latitudes greater than 45 degrees latitude are the propagation paths more sensitive to geomagnetic disturbances.
- Degraded high-latitude HF propagation can be the effect of a major geomagnetic storm on radio-wave propagation.
- The K-index is a measure of geomagnetic stability.
- The A-index is a daily value measured on a scale from 0 to 400 to express the range of disturbance of the geomagnetic field.
- A visible aurora might result during periods of high geomagnetic activity.

Sunspots and solar radiation

- It takes 8 minutes for the increased ultraviolet and X-ray radiation from solar flares to affect radio-wave propagation on the earth.
- Solar flux is the radio energy emitted by the sun.
- The solar-flux index is a measure of solar activity that is taken at a specific frequency.
- Long-distance radio communication in the upper HF and lower VHF range is enhanced when sunspot numbers are high.
- The sunspot number is a daily index of sunspot activity.
- The sunspot cycle is the approximately 11-year variation in the sunspot number.
- Solar coronal hole activity affects radio communications because the activity emits charged particles that usually disrupt HF communications.
- It takes charged particles from coronal mass ejections (CMEs) 20 to 40 hours to affect radio-wave propagation on the earth.

Maximum usable frequency

- If the maximum usable frequency (MUF) on the path from Minnesota to France is 24 MHz, the 15 meter band should offer the best chance for a successful contact.
- If the maximum usable frequency (MUF) on the path from Ohio to Germany is 17 MHz, the 20 meter band should offer the best chance for a successful contact.
- If the HF radio-wave propagation (skip) is generally good on the 24-Mhz and 28-MHz bands for several days, 28 days later you might expect a similar condition to occur.
- One way to determine if the maximum usable frequency (MUF) is high enough to support 28-MHz propagation between your station and western Europe is to listen for signals on a 10-meter beacon frequency.
- Radio waves with frequencies below the maximum usable frequency (MUF) are bent back to the earth when they are sent into the ionosphere.
- When the lowest usable frequency (LUF) exceeds the maximum usable frequency (MUF) no HF radio frequency will support communications along an ionospheric signal path.
- The factors that affect the maximum usable frequency (MUF) are:
- Path distance and locations
- Time of day and season
- Solar radiation and ionospheric disturbances
- *(All of these choices are correct)*

Propagation "hops"

- You would tune to 14.1 MHz to hear beacons that would help you determine propagation conditions on the 20-meter band.
- During periods of low solar activity, Frequencies above 20 MHz are the least reliable for long-distance communication.
- At any point in the solar cycle the 20-meter band usually supports worldwide propagation during daylight hours.
- The maximum distance along the Earth's surface that is normally covered in one hop using the F2 region is 2500 miles.
- The maximum distance along the Earth's surface that is normally covered in one hop using the E region is 1200 miles.
- A skywave signal sound can be heard like a well-defined echo if it arrives at your receiver by both short path and long path propagation.
- A short distance hop on 10 meters might indicate the MUF exceeds 50 MHz on the 6 meter band.

Height of ionospheric regions

- The average height of maximum ionization of the E region is 70 miles.
- The F2 region can be expected to reach its maximum height at your location at noon during the summer.
- The F2 region is mainly responsible for the longest-distance radio-wave propagation because it is the highest ionospheric region.

Critical angle and frequency

- The "critical angle" as used in radio-wave propagation is the highest takeoff angle that will return a radio wave to the earth under specific ionospheric conditions.

HF scatter

- A wavering sound is a characteristic of HF scatter signals.
- HF scatter signals often sound distorted because the energy is scattered into the skip zone through several radio-wave paths.
- HF scatter signals are usually weak because a part of the signal energy is propagated into the skip zone.
- Scatter radio-wave propagation allows a signal to be detected at a distance too far for ground-wave propagation but too near for normal sky wave propagation.
- Scatter propagation on the HF bands most often occurs when communicating on frequencies above the maximum usable frequency (MUF).
- Ionospheric absorption will be at minimum near the maximum usable frequency (MUF).
- Daylight fading on the 40-meter band is associated most with which ionospheric D layer.
- The main reason the 160-, 80- and 40-meter amateur bands tend to be useful only for short-distance communications during daylight hours is because of D-region absorption.

Editors note: In order to make everything fit on the desired two pages per month, SUBELEMENT G4 is being skipped for now, and SUBELEMENT G5 is being presented. G4 will appear in next months edition of the Newsletter.

SUBELEMENT G5 -- ELECTRICAL PRINCIPLES [2 Exam Questions -- 2 Groups]

Impedance, including matching

- Impedance is the opposition to the flow of AC in a circuit.
- When the impedance of an electrical load is equal to the internal impedance of the power source the source delivers maximum power to the load.
- The unit used to measure impedance is the Ohm.
- Impedance matching is important so the source can deliver maximum power to the load.
- Core saturation of a conventional impedance matching transformer should be avoided because harmonics and distortion could result from saturation.

Resistance, including ohm Reactance

- Reactance is opposition to AC caused by inductors and capacitors.
- The unit used to measure reactance is the Ohm.

Inductance

- In an inductor, reactance causes opposition to the flow of AC.
- A coil reacts to AC such that as the frequency of the applied AC increases, the reactance increases.

Capacitance

- In a capacitor, reactance causes opposition to the flow of AC.
- A capacitor reacts to AC such that as the frequency of the applied AC increases, the reactance decreases.

Metric divisions of these values

Decibel

- A two-times increase in power results in a change of 3 dB higher.
- A percentage loss of 20.6% would result from a transmission line loss of 1 dB.

Ohm's Law

Current and voltage dividers

- In a parallel circuit with a voltage source and several branch resistors, the total current equals the sum of the branch current through each resistor.
- The capacitance and voltage rating of a series circuit consisting of two equal value capacitors with equal voltage ratings would be the total capacitance, which would be half that of each capacitor, and maximum voltage, which would be twice that of each capacitor.
- If three equal resistors in parallel produce 50-ohms of resistance and the same resistors in series produce 450-ohms, the value of each resistor is 150-ohms.

Electrical power calculations and series and parallel components

- If 400 VDC is supplied to an 800-ohm load, 200 watts of electrical power are used.
- The electrical power used by a 12-VDC light bulb that draws 0.2 amperes is 2.4 watts.
- Approximately 61 milliwatts are being dissipated when 7.0 mill amperes flow through 1.25 kilohms.

Transformers (either voltage or impedance)

- If the 2250-turn primary is connected to 120 VAC, the voltage across a 500-turn secondary winding in a transformer is 26.7 volts.
- The turns ratio of a transformer to match an audio amplifier having a 600-ohm output impedance to a speaker having a 4-ohm impedance is 12.2 to 1.
- Mutual inductance causes a voltage to appear across the secondary winding of a transformer when a voltage source is connected across its primary winding.

Sine wave root-mean-square (RMS) value

- A DC voltage equal to the RMS value of an applied sine-wave AC voltage would produce the same amount of heat over time in a resistive element.
- The peak-to-peak voltage of a sine wave that has an RMS voltage of 120 volts is 339.4 volts.
- A sine wave of 17 volts peak is equivalent to 12 volts RMS.

Mount Vernon Amateur Radio Club
Ballot for Club Officers -- 2007

President (Vote for one)

☐ Ruben Clark KB2SAI

☐ Mike McCardel KC8YLD

Vice President (Vote for one)

☐ Don Russell WA8YRS

☐ Steve Dick KC8YED

Treasurer (Vote for one)

☐ Bob Bruff N8PCE

☐ Barry Butz N8PPF

Secretary (Vote for one)

☐ Jeff Butz N8SMT

Director – 2 year term (Vote for one)

☐ Don Bunner KB8QPO

Ballots may be presented in person or by proxy **Sunday December 10, 2006** during the Club meeting to be held at Ryan's Steakhouse at **6pm**, or be delivered to:

Dick Huggins, WD8QHY
11986 S. Bay Rd.
Fredericktown, OH 43019-8714

before Dec 10.