Autumn Leaves

The Aero Aerial

The Newsletter of the Aero Amateur Radio Club
Middle River, MD
Volume 14, Issue 11
November 2018

Editor Georgeann Vleck KB3PGN

Website: http://w3pga.org
Facebook: https://www.facebook.com/pages/Aero-Amateur-Radio-Club/719248141439348

About the Aero Amateur Radio Club

Meetings

The Aero Amateur Radio Club meets at 7:30 pm on the first and third Wednesdays of the month at Essex SkyPark, 1401 Diffendall Road, Essex. Meetings begin at 7:30 p.m. local time. Meetings are canceled if Baltimore County Public Schools are closed or dismiss early.

Repeaters

W3PGA **2 M :** INPUT : 147.84 MHz, OUTPUT : 147.24 MHz, PL 123.0
W3PGA **70 Cm:** INPUT : 444.575 MHz, OUTPUT : 449.575 MHz, PL123.0
W3JEH **1.25 M:** INPUT : 222.24 MHz, OUTPUT : 223.84 MHz

Club Nets

Second Wednesday Net – 10 Meters (28.445 MHz) @ 8 p.m. Local Time
Fourth Wednesday Net – 2 Meters (147.24 MHz Repeater) @ 8 p.m. Local Time
Fifth Wednesday Net – 70 Centimeters (449.575 MHz Repeater) @ 8 p.m. Local Time

Radio License Exams

The Aero Amateur Radio Club sponsors Amateur Radio License Exams with the ARRL VEC. Examination sessions are throughout the year. Walk-ins are welcome; arrive no later than 30 minutes after start time. $15 charge.

2018 Examination Schedule

Time:	1:15 pm		
Dates:	Sunday, Nov. 11		
Where:	White Marsh Library		

White Marsh Library, 8133 Sandpiper Circle, White Marsh, MD
Contact: Patricia Stone AC3F, email: ac3f@juno.com, landline: 410-687-7209

LOCAL AREA NETS

Day	Time	Freq. (MHz)	Net Name
Daily	9 – 10 am	145.330	Oriole Net
Daily	6 pm	3.820	Maryland Emergency Phone Net
Daily	6:30 – 7 pm	145.330 no PL	Balto. Traffic Net (b/u 146.670 PL 107.2)
Daily	7 pm & 10 pm	3.643	MD/DC/DE Traffic Net
2nd Tue	7:30 pm	146.670	Baltimore County RACES Net
2nd Wed	8 pm	28.445	Aero ARC Net
4th Wed	8 pm	147.240	Aero ARC Net
5th Wed	8 pm	449.575	Aero ARC Net
Fridays	7:30 pm	145.330	Back in the Day Net
When activated by NOAA		147.030	SkyWarn (primary)

SPECIAL NOTICE

NO MEETING ON WEDNESDAY, November 21 – the day before Thanksgiving.

News

The Amateur Radio Parity Act of 2017

ARRL HQ provides information on legislative effort for all Amateur Radio operators and their ability to serve all communities with effective outdoor antenna. http://www.arrl.org/amateur-radio-parity-act

Source: MDC Section News, Vol. 13, No. 10, Wednesday, October 16, 2018

NET REPORTS

10/10/18: 28.445 MHz, 20:00 t0 20:29 local.

W3PGA NCS Joe Essex, W3JEH Ron Perry Hall, AA3GG Gus Parkville, KC3FBL Jim Parkville.

4 members on the net.

10/24/18: 147.240 MHz, 20:00 to 20:57 local.

W3PGA NCS Joe Essex, KB3JVP Ken Middle River, AA3GG Gus Perry Hall, KC3FBM Franklin Parkville, W3VRD Phil Essex, KB3VAE Rich Middle River, W3JEH Ron Perry Hall, KB3TBH George White Marsh, K3TEL Arnold Towson, KC3IPK Dave Waverly mobile, KC3FBL Jim Parkville, KC3HZU William Edgewood, N3CVA Ian Baltimore City

12 club members and 1 visitor on the net
People reported a stronger signal since the damaged cable was repaired.

VE CORNER

by Pat Stone, AC3F

The AERO VE Team held its 5th session for 2018 on Sept. 23, 2018. We served 5 applicants. Congratulations to new extra AC3DO Dane Smith, and new techs KC3MDH Larry Holt, KC3MDI Robert Bittner, KC3MDJ Robert Gates, and KC3MDK Mark Kreatle.

Many thanks to VE's: WB3FMT, KC3FBL, KC3FBM, AB3QK, KB3VAE, ACOLP and KD3TP for assisting me with our session. You all did a great job. It was a pleasure working with all of you.

Our last test session for 2018 will be held at 1:15PM on Sunday, November 11, at the White Marsh Library. Hope to see you then.

I don't know either, this is just a graphic I found.

UPCOMING HAMFESTS and EVENTS

Saturday, Dec. 8, 2018: Third Annual SantaFest
Location: American Legion Youth Camp, 9201 Surratts Road, Cheltenham, MD
Sponsor: Prince George's County Emergency Radio Association & American Legion
Website: http://pgares.org/santafest/
Talk-In: 145.230(-) PL 110.9 K3ERA Repeater
Contact: Charles Hallock, AA3WS, Phone: 301-535-1666 | Email: selbynet@hotmail.com

Sunday, January 20, 2019: The 6th RadioWinterFest!
Location: National Electronics Museum, 1745 W Nursery Rd, Linthicum Hts, MD 21090
Sponsor: ARC of the National Electronic Museum
Website: http://www.k3nem.org/
Talk-in: 146.7600- (107.2), WA3DZD Jessup, MD
Near the BWI Airport, just south of Baltimore
Sponsor: Mid-Atlantic Antique Radio Club
Website: https://www.nationalelectronicsmuseum.org/

Sunday, March 24, 2019: WINTERFEST
Location: Northern Virginia Community College, Annandale Campus, Richard J. Ernst Cultural Center, 8333 Little River Turnpike, Annandale, VA 22003
Sponsor: Vienna Wireless Society
Website: http://viennawireless.net/wp/events/winterfest
Talk-In: 146.910- (77.0), WD5DBC Tyson's Corner, VA
Contact: Harry Mamaux, K3NF, Phone: 703-395-6721 | Email: k3nf@cox.net

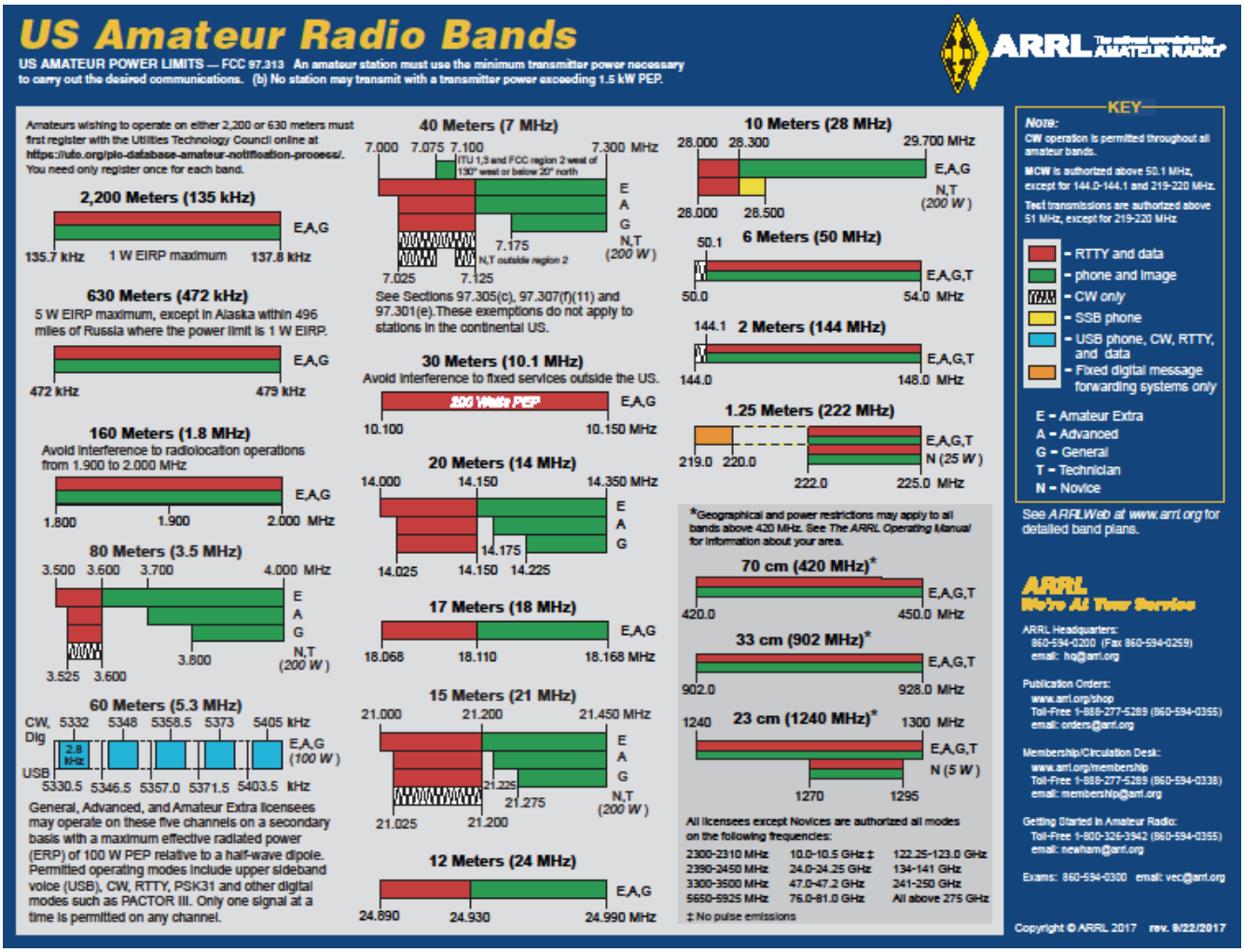
Saturday, April 27, 2019: Delaware State Convention (Delmarva Radio & Electronics EXPO)
Location: Cheer Community Center, 20520 Sand Hill Road, Georgetown, DE 19947
Sponsor: Sussex Amateur Radio Association
Website: http://radioelectronicsexpo.com
Talk-In: 147.090+ (PL 156.7), WS3ARA Millsboro, DE - Sussex ARA
Contact: Herbert Quick, KF3BT, Phone: 302-629-4949, Email: herb@hamiltongraphics.com

Saturday, April 27, 2018: York Hamfest
Location: Elicker's Grove Park, 511 Roth Church Road, Spring Grove, PA 17362
Sponsor: York Hamfest Foundation
Website: http://www.yorkhamfest.org
Talk-In: 147.330+ (PL 123.0), W3MUM PennMar, PA
Contact: Duane Sterner, KB3QLQ, Phone: 717-332-1385 | Email: duane.sterner@yahoo.com

You may view upcoming Hamfests at: http://www.arrl.org/hamfests-and-conventions-calendar

U.S. Amateur Band Plans: Not Just a Pretty Color!

Compiled by Joe Miko



The above chart can be downloaded of free in PDF format in Color or B&W from the ARRL web site.

The ARRL's Color Band Chat is not just a pretty color but is a guide line to the radio frequencies that we all use and, in some cases, share with other services. But where does is come from? Not from Newington CT or Gettysburg PA, but from something called the ITU.

ITU was **founded in Paris in 1865** as the **I**nternational **T**elegraph **U**nion. It took its present name in 1934, International Telecommunication Union, and in 1947 became a specialized agency of the United Nations.

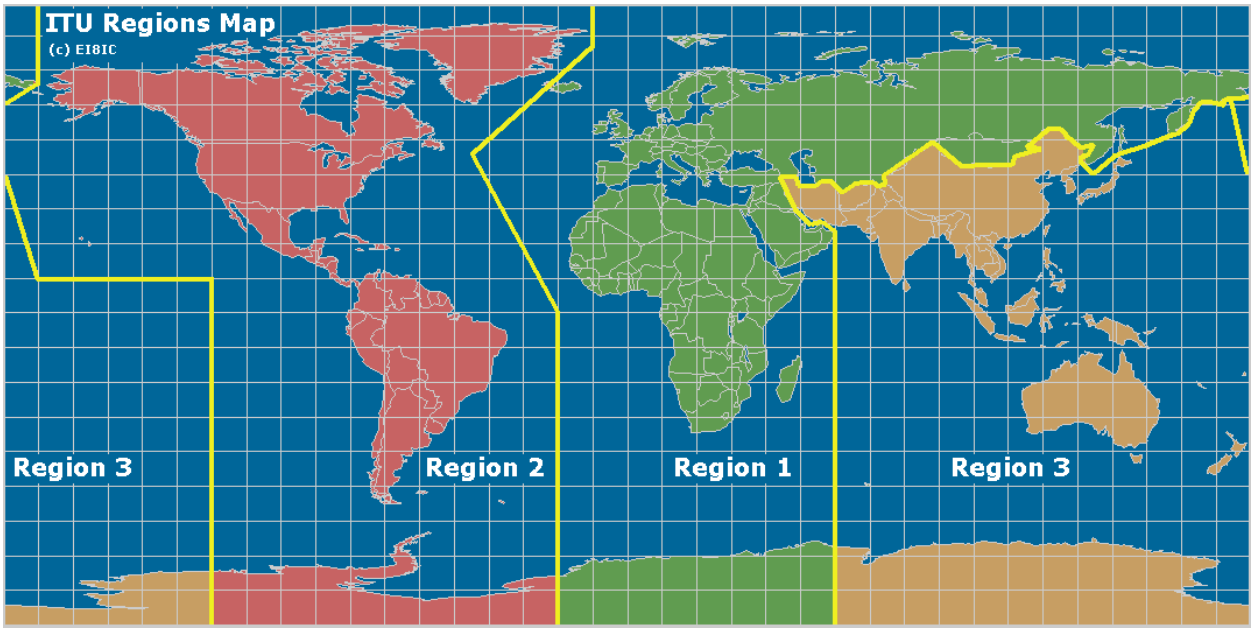
ITU is a United Nations specialized agency for information and communication technologies – ICTs.

Their task is to allocate global radio spectrum and satellite orbits, develop the technical standards that ensure networks and technologies seamlessly interconnect, and strive to improve access to ICTs to underserved communities worldwide.

ITU is committed to connecting all the world's people – wherever they live and whatever their means. Through our work, we protect and support everyone's fundamental right to communicate. Currently there are at least 193-member states.

There are **195** countries in the world today. This total comprises **193 countries** that are member states of the United Nations and 2 countries that are non-member observer states: Vatican City (Holy See) and the State of Palestine.

The ITU divides the world into three regions.



- **Region 1** comprises Europe, Africa, the former Soviet Union, Mongolia, and the Middle East west of the Persian Gulf, including Iraq.
    - The western boundary is defined by Line B.
- **Region 2** covers the **Americas** including **Greenland,** and some of the eastern **Pacific Islands.**
    - The eastern boundary is defined by Line B.
- **Region 3** contains most of non-FSU Asia east of and including Iran, and most of Oceania.

Lines:

- Line B is a line running from the North Pole along meridian 10° West of Greenwich to its intersection with parallel 72° North; thence by great circle arc to the intersection of meridian 50° West and parallel 40° North; thence by great circle arc to the intersection of

meridian 20° West and parallel 10° South; thence along meridian 20° West to the South Pole.[1] Ref Wikipedia

In addition to the ITU members allocating frequencies there are other groups throughout the United States and Canada that act as Frequency Coordinators. The ARRL is not a frequency coordinator, nor does the ARRL "certify" coordinators. Frequency coordinators are volunteers normally appointed by a coordinating body.

These members coordinate and keep records of repeater frequencies (input and output) listed and non-listed frequencies. Frequency Coordinators will recommend frequencies for proposed repeater in order to minimize interference with other repeaters and simplex operations. Any one wishing to considering the installation of a repeater should check with the local frequency coordinator prior to such installation. Ref ARRL Repeater Directory 2018 Edition pg. 38

The local coordinating groups in the MD, DC, DE and PA area are:

MD, DC & DE - The Mid Atlantic Repeater Council www.tmarc.org
PA Eastern - Area Repeater Coordination Council www.arcc-inc.org
PA Western - Western Pennsylvania Repeater Council www.wprcinfo.org

Words as in the ARRL's Considerate Operator's Frequency Guide

These are not regulations and occasionally a high level of activity, such as during a period of emergency response, DXpedition or contest, may result in stations operating outside the frequencies ranges.

Nothing in the rules recognizes a net's, group's on any individual's special privilege to any specific frequency. Section 97.101(b) of the Rules states that "Each station licensee and each control operator must cooperate in selecting transmitting channels and in making the most effective use of the amateur service frequencies. No frequency will be assigned for the exclusive use of any station." No one "owns" a frequency.

It's good practice – and plain old common sense – for any operator, regardless of mode, to check to see if the frequency is in use prior to engaging operation. If you are there first, other operators should make an effort to protect you from interference to the extent possible, given that 100% interference-free operation is an unrealistic expectation in today's congested bands.

The following Amateur Radio Band Plans was taken from the ARRL's web site.

Amateur Radio Band Plans

2200 Meters (135.7 – 137.8 KHz) and 630 – Meters (472 – 479 KHz) bands

General, Advanced and Amateur Extra class licensees are authorized to use these Amateur Bands

Amateurs wishing to operate on either 2,200 or 630 meters must first register with the Utilities Technology Council online at https://utc.org/plc-database-amateur-notification-process/. You need only register once for each band.

135.7 – 137.8 KHz: 1 W EIRP maximum
472 - 479 KHz: 5 W EIRP maximum, except in Alaska within 496 miles of Russia where the power limit is 1 W EIRP.

160 Meters (1.8-2.0 MHz)

1.800 - 2.000 CW
1.800 - 1.810 Digital Modes
1.810 CW QRP
1.843-2.000 SSB, SSTV and other wideband modes
1.910 SSB QRP
1.995 - 2.000 Experimental
1.999 - 2.000 Beacons

80 Meters (3.5-4.0 MHz)

3.590 RTTY/Data DX
3.570-3.600 RTTY/Data
3.790-3.800 DX window
3.845 SSTV
3.885 AM calling frequency

60 Meters (5 MHz channels)

*Only one signal at a time is permitted on any channel
*Maximum effective radiated output is 100 W PEP

5330.5 USB phone[1] and CW/RTTY/data[2]
5346.5 USB phone[1] and CW/RTTY/data[2]
5357.0 USB phone[1] and CW/RTTY/data[2]
5371.5 USB phone[1] and CW/RTTY/data[2]
5403.5 USB phone[1] and CW/RTTY/data[2]

1. USB is limited to 2.8 kHz

2. CW and digital emissions must be centered 1.5 kHz above the channel frequencies indicated in the above chart

40 Meters (7.0-7.3 MHz)

7.040 RTTY/Data DX
7.080-7.125 RTTY/Data
7.171 SSTV
7.290 AM calling frequency

30 Meters (10.1-10.15 MHz)

10.130-10.140 RTTY
10.140-10.150 Packet

\20 Meters (14.0-14.35 MHz)

14.070-14.095 RTTY
14.095-14.0995 Packet
14.100 NCDXF Beacons
14.1005-14.112 Packet
14.230 SSTV
14.286 AM calling frequency

17 Meters (18.068-18.168 MHz)

18.100-18.105 RTTY
18.105-18.110 Packet

15 Meters (21.0-21.45 MHz)

21.070-21.110 RTTY/Data
21.340 SSTV

12 Meters (24.89-24.99 MHz)

24.920-24.925 RTTY
24.925-24.930 Packet

10 Meters (28-29.7 MHz)

28.000-28.070 CW
28.070-28.150 RTTY
28.150-28.190 CW
28.200-28.300 Beacons
28.300-29.300 Phone
28.680 SSTV
29.000-29.200 AM
29.300-29.510 Satellite Downlinks
29.520-29.590 Repeater Inputs
29.600 FM Simplex
29.610-29.700 Repeater Outputs

6 Meters (50-54 MHz)

50.0-50.1	CW, beacons
50.060-50.080	beacon subband
50.1-50.3	SSB, CW
50.10-50.125	DX window
50.125	SSB calling
50.3-50.6	All modes
50.6-50.8	Nonvoice communications
50.62	Digital (packet) calling
50.8-51.0	Radio remote control (20-kHz channels)
51.0-51.1	Pacific DX window
51.12-51.48	Repeater inputs (19 channels)
51.12-51.18	Digital repeater inputs
51.5-51.6	Simplex (six channels)
51.62-51.98	Repeater outputs (19 channels)
51.62-51.68	Digital repeater outputs
52.0-52.48	Repeater inputs (except as noted; 23 channels)
52.02, 52.04	FM simplex
52.2	TEST PAIR (input)
52.5-52.98	Repeater output (except as noted; 23 channels)
52.525	Primary FM simplex
52.54	Secondary FM simplex
52.7	TEST PAIR (output)
53.0-53.48	Repeater inputs (except as noted; 19 channels)

53.0	Remote base FM simplex
53.02	Simplex
53.1, 53.2, 53.3, 53.4	Radio remote control
53.5-53.98	Repeater outputs (except as noted; 19 channels)
53.5, 53.6, 53.7, 53.8	Radio remote control
53.52, 53.9	Simplex

2 Meters (144-148 MHz)

144.00-144.05	EME (CW)
144.05-144.10	General CW and weak signals
144.10-144.20	EME and weak-signal SSB
144.200	National calling frequency
144.200-144.275	General SSB operation
144.275-144.300	Propagation beacons
144.30-144.50	New OSCAR subband
144.50-144.60	Linear translator inputs
144.60-144.90	FM repeater inputs
144.90-145.10	Weak signal and FM simplex (145.01,03,05,07,09 are widely used for packet)
145.10-145.20	Linear translator outputs
145.20-145.50	FM repeater outputs
145.50-145.80	Miscellaneous and experimental modes
145.80-146.00	OSCAR subband
146.01-146.37	Repeater inputs
146.40-146.58	Simplex
146.52	National Simplex Calling Frequency
146.61-146.97	Repeater outputs
147.00-147.39	Repeater outputs
147.42-147.57	Simplex
147.60-147.99	Repeater inputs

Notes: The frequency 146.40 MHz is used in some areas as a repeater input. This band plan has been proposed by the ARRL VHF-UHF Advisory Committee.

1.25 Meters (222-225 MHz)

222.0-222.150 Weak-signal modes

222.0-222.025 EME

222.05-222.06 Propagation beacons
222.1 SSB & CW calling frequency
222.10-222.15 Weak-signal CW & SSB
222.15-222.25 Local coordinator's option; weak signal, ACSB, repeater inputs, control
222.25-223.38 FM repeater inputs only
223.40-223.52 FM simplex
223.52-223.64 Digital, packet
223.64-223.70 Links, control
223.71-223.85 Local coordinator's option; FM simplex, packet, repeater outputs
223.85-224.98 Repeater outputs only

Note: The 222 MHz band plan was adopted by the ARRL Board of Directors in July 1991.

70 Centimeters (420-450 MHz)

420.00-426.00	ATV repeater or simplex with 421.25 MHz video carrier control links and experimental
426.00-432.00	ATV simplex with 427.250-MHz video carrier frequency
432.00-432.07	EME (Earth-Moon-Earth)
432.07-432.10	Weak-signal CW
432.10	70-cm calling frequency
432.10-432.30	Mixed-mode and weak-signal work
432.30-432.40	Propagation beacons
432.40-433.00	Mixed-mode and weak-signal work
433.00-435.00	Auxiliary/repeater links
435.00-438.00	Satellite only (internationally)
438.00-444.00	ATV repeater input with 439.250-MHz video carrier frequency and repeater links
442.00-445.00	Repeater inputs and outputs (local option)
445.00-447.00	Shared by auxiliary and control links, repeaters and simplex (local option)

446.00	National simplex frequency
447.00-450.00	Repeater inputs and outputs (local option)

Note: Specific VHF/UHF channels recommended above may not be available in all areas of the U.S. Geographical and power restrictions may apply to all bands above 420 MHz. See The *ARRL Operating Manual* for information about your area.

33 Centimeters (902-928 MHz)

Frequency Range	Mode	Functional Use	Comments
902.000-902.075	FM / other including DV Or CW/SSB	Repeater inputs 25 MHz split paired with those in 927.000-927.075 or Weak signal	12.5 kHz channel spacing Note 2)
902.075-902.100	CW/SSB	Weak signal	
902.100	CW/SSB	Weak signal calling	Regional option
902.100-902.125	CW/SSB	Weak signal	
902.125-903.000	FM/other including DV	Repeater inputs 25 MHz split paired with those in 927.1250-928.0000	12.5 kHz channel spacing
903.000-903.100	CW/SSB	Beacons and weak signal	
903.100	CW/SSB	Weak signal calling	Regional option
903.100-903.400	CW/SSB	Weak signal	
903.400-909.000	Mixed modes	Mixed operations including control links	
909.000-915.000	Analog/digital	Broadband multimedia including ATV, DATV and SS	Notes 3) 4)
915.000-921.000	Analog/digital	Broadband multimedia including ATV, DATV and SS	Notes 3) 4)
921.000-927.000	Analog/digital	Broadband multimedia including ATV, DATV and SS	Notes 3) 4)
927.000-927.075	FM / other including DV	Repeater outputs 25 MHz split paired with those in 902.0000-902.0750	12.5 kHz channel spacing
927.075-927.125	FM / other including DV	Simplex	
927.125-928.000	FM / other including DV	Repeater outputs 25 MHz split paired with those in 902.125-903.000	12.5 kHz channel spacing Notes 5) 6)

Notes:

1) Significant regional variations in both current band utilization and the intensity and frequency distribution of noise sources preclude one plan that is suitable for all parts of the country. These variations will require many regional frequency coordinators to maintain band plans that differ in some respects from any national plan. As with all band plans, locally coordinated plans always take precedence over any general recommendations such as a national band plan.

23 Centimeters (1240-1300 MHz)

Frequency Range	Suggested Emission Types	Functional Use
1240.00-1246.000	ATV	ATV Channel #1
1246.000-1248.000	FM, digital	Point-to-point links paired with 1258.000-1260.000
1248.000-1252.000	Digital	
1252.000-1258.000	ATV	ATV Channel #2
1258.000-1260.000	FM, digital	Point-to-point links paired with 1246.000-1248.000
1240.000-1260.000	FM ATV	Regional option
1260.000-1270.000	Various	Satellite uplinks, Experimental, Simplex ATV
1270.000-1276.000	FM, digital	Repeater inputs, 25 kHz channel spacing, paired with 1282.000-1288.000
1270.000-1274.000	FM, digital	Repeater inputs, 25 kHz channel spacing, paired with 1290.000-1294.000 (Regional option)
1276.000-1282.000	ATV	ATV Channel #3
1282.000-1288.000	FM, digital	Repeater outputs, 25 kHz channel spacing, paired with 1270.000-1276.000
1288.000-1294.000	Various	Broadband Experimental, Simplex ATV
1290.000-1294.000	FM, digital	Repeater outputs, 25 kHz channel spacing, paired with 1270.000-1274.000 (Regional option)
1294.000-1295.000	FM	FM simplex
	FM	National FM simplex calling frequency 1294.500
1295.000-1297.000		Narrow Band Segment
1295.000-1295.800	Various	Narrow Band Image,

		Experimental
1295.800-1296.080	CW, SSB, digital	EME
1296.080-1296.200	CW, SSB	Weak Signal
	CW, SSB	CW, SSB calling frequency 1296.100
1296.200-1296.400	CW, digital	Beacons
1296.400-1297.000	Various	General Narrow Band
1297.000-1300.000	Digital	

Note: The need to avoid harmful interference to FAA radars may limit amateur use of certain frequencies in the vicinity of the radars.

HAPPY THANKSGIVING!

From the Skies over Mt. Essex

SKY Events for November 2018

Nov 4th- Daylight Saving Time Ends, starts on March 10, 2019

Nov 6th - Mercury greatest elongation E (23°

Nov 7th – New Moon

Nov 11th – Saturn is 1.5° S of the Moon 06:00 EST

Nov 12th – N Taurid Meteor Shower peaks

Nov 14th – Spica is 1.2° above and right of Venus

Nov 15th - First Quarter Moon and *Mars is 1.0° N of Moon at 23:00 EST*

Nov 16th – Moon is 0.7° s of Beehive (M44)

Nov 17th – Leonid Meteor Shower peaks

Nov 23rd – Full Moon, Colonial Full Moon name is "Beaver Moon" and Cherokee as "Trading Moon".

Nov 30st –- Last Quarter Moon

Planet Lookout at mid-Month

Sunrise 06:49 EST and Sunset 16:51 EST

Mercury – Evening- Rises 08:39 Set 17:48 Magnitude 0.2 Size 8.0 Arc Seconds

Venus - Morning. Rise 04:34 Set 15:24 Magnitude -4.5 Size 52.6 Arc Seconds

Mars - Evening. Rise 13:18 Set 23:56 Magnitude -0.3 Size 10.5 Arc Seconds

Jupiter - Evening. Rise 07:32 Set 17:19 Magnitude -1.7 Size 31.1 Arc Seconds

Saturn - Evening. Rise 10:11 Set 19:36 Magnitude 0.6 Size 15.5 Arc Seconds

Uranus - Evening. Rise 15:39 Set 04:58 Magnitude +5.7 Size 3.6 Arc Seconds

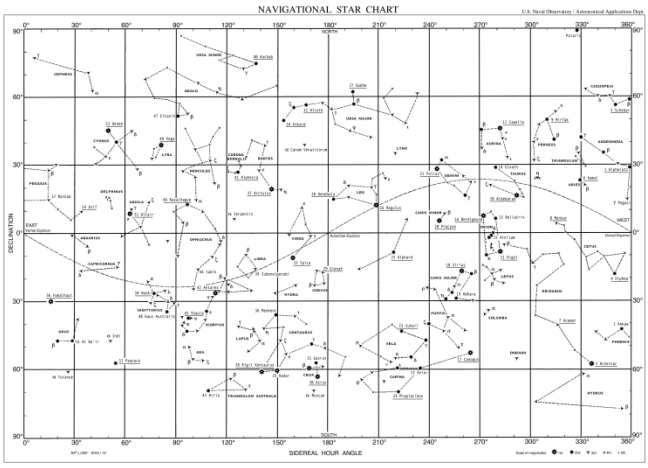
Neptune - Evening. Rise 13:49 Set 01:09 Magnitude +7.8 Size 2.3 Arc Seconds

Meteor Shower w/ Radiant Points for 2019

Shower Name	Max Date	Radiant Point SHA°	RA (Hr min)	Dec°	Rate ≈ /h	Moon Phase
1. Quadrantids	1/4	130	15 20	+49	110	< New Moon
2. April Lyrids	4/23	87	18 10	+34	18	< Last Quarter
3. η Aquariids	5/6	22	22 30	-01	50	> New Moon
4. S δ Aquariids	7/ 30	18	22 44	-16	25	> Last Quarter
5. Perseids	8/ 13	313	03 08	+58	110	< Full Moon
6. Draconids	10/9	101	17 45	+54	10	> First Quarter
7. Orionids	10/22	265	06 20	+16	20	> Last Quarter
8. N Taurids	11/13	300	04 00	+22	5	Full Moon
9. Leonids	11/18	207	10 12	+22	15	Full Moon
10. Geminids	12/14	247	07 28	+33	140	> Full Moon
11. Ursids	12/23	142	14 36	+75	10	> Last Quarter

Radiant Points (Sidereal Hour Angle(SHA) from the USNO Navigational Star Chart with the and Right Ascension / Declination, Rate approximate meteors per hour and Moon phase.

The USNO Navigational Star Chart is a collection of 57 stars used for ship and aircraft navigation. The Sidereal Hour angle is the number of degrees from the First Point of Aries or the Spring Equinox starting at 0 degrees and running East to West. This star chart can be found at the United States Naval Observatory web site.



For example, the star Regulus in Leo The Lion has a Right Ascension of 10 hrs and 9 minutes with a declination of + 11 degrees and 53 minutes. The Sidereal Hour Angle is 207 degrees and 7 minutes

(ref International Meteor Organization 2019 Meteor Shower Calendar IMO_IMO (2-18)