

VCARC / Radio Club Newsletter

VCARC Members Assist with the Iron Line Sled Dog and Fat Bike Races

by Paul N7EKY

VCARC contacts:

President **Paul Clay** – N7EKY pclay@nnex.net

Vice President **Andy Falkenstern** – N9NBC n9nbc@arrl.net

Secretary **Tony Campion** – KC9SZW an.campion@gmail.com

Treasurer **Dave McMaster** retired.2@charter.net

VCARC members traveled to Iron River, Michigan, on January 29-30 to assist the Iron Range Amateur Radio Club with the Ironline Sled Dog and Fat Bike Races. Club members provided communications for road crossings and checkpoints back to net control operators at the Chamber of Commerce building, reporting crossing times for race participants.

The value of this effort was confirmed Friday evening when a sled dog team crossed one checkpoint but was missing from the next. Club members at the checkpoint notified net control about the missing team, who then contacted the Search and Rescue organization. Later that evening they located the sled dog team and musher a considerable distance outside of the race course. It was found later that the musher had lost control of his dogs who then ran until exhausted.

Some VCARC members spent Friday night in the Iron Range Club House and from the photos, it appears that they didn't at all suffer from lack of comfort.

Members commented that the two days of race support were tiring but excellent training and that many looked forward to similar events in the future. Club members Bob Parson (N9HSQ), Dave McMaster (KC9ZJO), Andrew Falkenstern (N9NBC), Dave Stott (KD9DRG), Lorin Johnson (KD9CXC), Robert Heuer (KD9DDE), Donald Korbas (KD9EPY), Roger Schutt (KD9EPX), and Paul Clay (N7EKY) performed admirably and were awarded Certificates of Appreciation at the February 10 meeting. Adam Kicker representing the Ironline Fat Bike Race attended the VCARC meeting and presented commemorative drinking glasses to the members who assisted. Thanks Adam!

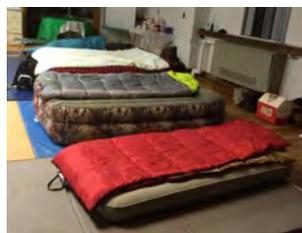


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Riders compete in the Ironline Fat Bike Race.



All the comforts of a bunkhouse. . . .



Iron Range Amateur Radio Club supported the Ironline Sled Dog Race; VCARC members assisted.

Vilas County Amateur Radio Club, Inc. Repeater #1

aka Ministry Monday Night Net — by Paul N7EKY

On February 1, Ray (KB9CBL) conducted the VCARC net as usual on 145.150 MHz but with a big exception. With the repeater temporarily off the air the net was conducted NET on simplex. Ray noted "We are amateur radio operators and we find ways to make things work. Just like any other situation where the repeater is down, area hams should be able to communicate"

Ray tested the Northwoods ARES portable antenna system and setup at the Manu-

facturing Incubator in Eagle River. His reasoning was that a large majority of the folks that check in are located in the Eagle River and Three Lakes area within a ten mile range and should be rock solid. Ray stated that from a base station, there is no reason not to get twenty miles on simplex.

The results were better than expected for some and a disappointment for others. For example Paul (N7EKY) reported that Ray's signal was very strong up to Waters-

meet but Roger (KD9EPX) had difficulties communicating with some fairly close in stations. There was a significant amount of "Relay" called in and some stations had apparently forgotten to remove the -600 offset so were not transmitting on the 145.150 MHz frequency but instead 144.550 MHz.

Please note that Tom (KC9UDA) is in need of additional Net controllers for the Net. If interested please contact Tom (KC9UDA) kc9uda@yahoo.com.

Ministry Repeater - KD9DXK/R

by Paul N7EKY



Dave (KB9WCK) discovered a severe mismatch, or high SWR, on the antenna.

Many members had commented on the poor receiver sensitivity and apparent reduction in area coverage over the past weeks. Tim (KC9FNX) had discussed this with Dave Kobylinski (KB9WCK), who is in possession of test equipment capable of troubleshooting Motorola repeaters. Most important of all, Dave knows his stuff and how to use the equipment. Tony (KC9SZW) and Fred (KD9CCE) were able to schedule some time when Dave could examine the repeater with test equipment. Dave discovered that there is a severe mismatch, or high SWR, on the antenna, which he believes is well over 1.7 to 1. With a 100 watt transmitter, Dave said that over 40 watts was being reflected back into the duplexer. He did not know if there was any damage to the repeater or duplexer but recommended that the repeater be turned off immediately, which was done.

The existing PD-220-2 antenna is the property of Ministry Health Care so tuning to our frequency of 145.150 MHz is not an option. After consulting with Dave (KB9WCK) a replacement has been ordered, a Diamond X700HNA. Cost to the club with shipping and factory tuning to our repeater frequency of 145.150 MHz is \$409.00. Dave indicated that the antenna should have a figure under 1.3:1, the factory tuning will ensure this. The Iron Range Club uses two Diamond antennas, the next model down from what we ordered. The X700HNA sports a gain figure of over 9dB and a nominal VSWR of 1.5:1, which is identical to the PD-220-2. We will keep the club informed of progress on the repeater antenna project. Tony (KC9SZW) is in charge of the repeater and Fred (KD9CCE) our liaison at Ministry.

Slow Scan Television (SSTV)

by Paul N7EKY

SSTV is a picture transmission method also referred to as narrowband television. Where the old analog television signal required a bandwidth of about 6 MHz the SSTV signal grabs only about 6 KHz of bandwidth. SSTV is a much slower method of transmitting a picture, which may take more than a minute to transmit, depending on the mode and picture quality. Some have likened SSTV to the old Facsimile transmissions, where one can watch the picture take shape after each pass.

Mainly used by radio amateurs on VHF and HF frequencies, SSTV appears to be gaining in popularity and anyone can freely monitor amateurs exchanging pictures on several popular frequencies. SSTV is very commonly heard on 14.230 MHz where someone with a simple receiver connected to their computer running one of several free SSTV programs can easily decipher these pictures. Even without a physical connection, one can receive SSTV by placing their computer's microphone to the receiver's speaker.

So what do you really need to do SSTV? Well, as stated above, not much more than a transceiver and input and output to the computer's sound card. Most people would soon look for a more artful integration between the computer and transceiver so that

both send and receive SSTV can be accomplished along with transceiver keying or computer program control of the transceiver.

There are many ways of interfacing the rig to the computer but we will discuss the use of the Tigertronics Signalink USB "sound card". This product can be configured to support most amateur transceivers and provides a form of isolation between the transceiver and the computer. Some form of rig control is also accomplished through the Signalink, although this may be simply transceiver keying control.

When ordering the Signalink it is wise to do a little homework to make sure the correct product model number is purchased and that both cables are correct. One cable runs from the Signalink to the personal computer's USB port and the other cable from the Signalink to the transceiver's data port.

There are several free or paid for applications available that will allow reception and transmission of SSTV. My favorite is MMSSTV. It is free and there are many club members who are familiar with the program. It can be downloaded from [http://](http://www.hamuniverse.com/sstv.htm)

www.hamuniverse.com/sstv.htm. The program is not difficult to install with the critical piece being the selection of the correct input and output audio selection under Option, Setup MMSSTV, Misc, and Sound Card. If you use the Signalink, the Sound Card Options will both be identified as Microphone (USB Audio CODEC) and Speakers (USB Audio CODEC).

In addition to 14.230 MHz, SSTV may be found on 3.845, 3.857, 7.171, 14.233, 21.340, 28.680 MHz, and on the Monday night Iron Range Slow Scan Net at 8:00 PM Local time on 145.170 MHz. Please remember that SSTV is full duty cycle. You may want to turn the power down somewhere near 50 percent, depending on the rig.

There are certainly other ways of interfacing your transceiver to your personal computer. This may simply be a matter of features, price, and personal preference. The Signalink was highlighted simply because it is widely used by local Amateurs. Finally, if this article has whet your appetite but you're just not sure how to proceed, the VCARC has hams ready and anxious to help. Contact Paul (N7EKY) or Tom (KC9UDA) for more information.

Tech Talk

by Paul N7EKY

Paul (N7EKY) and Andy (N9NBC) presented "Setting up your Ham Shack" just before the monthly meeting on February 10. They approached the problem from the standpoint that a properly designed ham shack is a system with many parts including room, HVAC, sound protection, electrical, radios, grounding, emergency power, and antennas. According to Paul and Andy, if taken together, a ham shack can be designed to provide the proper environment and support items to last far into the future.

The next Tech Talk session is scheduled for 11 am February 20 at the classroom with Roger (KD9EPX) presenting "Building for the Ham Shack". The APRS SIG will meet at 10:30 am in the Classroom on Saturday, February 27, after the Ham Breakfast. For more information about Tech Talk or the APRS SIG contact Paul (N7EKY) at pclay@nnex.net.

Technician Class News

by Paul N7EKY

On January 16-17 VCARC conducted a Technician license examination preparatory class in Eagle River. Volunteer Examiners (VE) Vince (KA8FFM), Andy (N9NBC), Roger (KD9EPX), and Paul (N7EKY) teamed up to present the class to four individuals from Forest, Vilas and Oneida Counties. According to Paul, there had been six people who were to join the class but one was a no-show and another fell ill.

The class was based on the Ham Radio License Manual from the ARRL and covered Basic Electricity, Propagation, Radio and Antenna Theory, Rules and Regulations, and Safety, everything needed to pass the examination which qualifies for the Federal Communications Commission (FCC) Technician Class license.

At the end of the second day, the VEs administered examinations for six Technicians, two Generals and one Extra Class license. The great news is that all nine taking examinations passed and will receive either their first license or upgrade. Dr. Paul Weeks (WA9YD) passed his upgrade to Extra and both Bob Parsons (N9HSQ) and Don Korbas (KD9EPY) passed their upgrade to General. Don Couey and Robert Olszewski of St Germain, Dr. Richard Reinhart of Minocqua, Charles Poupart of Lac Du Flambeau, Charles Ceglarek of Mercer, and David Simcoe of Bessemer, Michigan, passed the Technician Class exam.

The classroom and facilities were provided by the Vilas County Economic Development Corporation. Students and teachers all thought the

facilities were outstanding and a perfect fit for the event.

The next class is tentatively set for March or April in Iron River. Some VCARC members will travel to assist the Iron Range club to teach the class. This is part of a budding cooperation and teamwork between clubs in the Northwoods. VCARC, the Iron Range ARC and the Rhinelander Repeater Association frequently work together. For example, Mike (KC9ZJF) is the President of the RRA and volunteered to assist with the VE Session. More of this type of cooperation can only help hams in the Northwoods!

Do you want to teach or know someone who wants to take a class? Contact Paul (N7EKY) at pclay@nnex.net.

Automatic Packet Reporting System - APRS - Part II

by Paul N7EKY

So, lets say you have decided to at least look into APRS on 2 meters and you wonder what it will take to get there. Several radio models are equipped for APRS out of the box. These radios can be expensive if purchased new. For example, the flagship touchscreen dual bander from Yaesu, the FTM-400XD runs \$639.95 before a \$100 rebate. Wow, right? But the radio is a 2M / 70cm rig with built in GPS and does Yaesu's C4FM digital (yes there are some folks capable of that mode in the club). The Kenwood flagship 2 / 70cm rig is the TM-D710GA with a hefty price tag of \$579.95 with an instant \$40 coupon. In addition to having a built-in GPS another advantage a purpose-built radio has is that APRS packets and text messages will appear on the radio's screen. Yes, there may be lower priced radios but you get the point, especially if you have a perfectly good rig that you are very happy with, except that it doesn't natively do APRS.

So how can we do APRS with our old HT or mobile radio? There are several products on the market specifically designed to do just that. One is the TinyTrak product line from Byonics. These are available with or without GPS and as a kit or fully assembled priced from \$30 up depending on features. In its simplest form, the TinyTrak may be a Terminal Node Controller (TNC) that is capable of APRS but would need a separate GPS for location. For a more robust setup, one might also invest in an external GPS unit similar to what Fred (KD9CCE) and Mike (KC9ZJF) are using with their radios. Again, you might ask yourself how much you are willing to spend and also, whether you simply want to send your APRS data out but are unconcerned with receiving packets or text messages. It can make a difference in the required hardware and, of course, cost. One of the least expensive of implementations is to use an existing radio connected to your smartphone. The iPhone will run

any of several applications that act as a software-based TNC while providing a client capable of allowing you to view APRS activity and send and receive text messages. This type of implementation was demonstrated at the January APRS Special Interest Group using a Baofeng HT connected to an iPhone using a commercially available interface cable. So, what to do? I'd recommend you attend the APRS SIG and discuss what others are doing or what they have tried. If you are out of town, address your questions to the APRS SIG leader, Fred (KD9CCE) at bouwmanf@gmail.com. You'd be surprised at the configurations available that have been tried in the club. The club APRS SIG could save you some money and save you many hours of configuration.

So far we have concentrated on 2 meters, specifically 144.390 MHz, which is where most APRS activity is found, but APRS is also in use on HF, and there are robust products that we can use there also. I use an ICOM IC-7000 in my shack. It is an HF/VHF/UHF rig that can very easily go mobile with a detachable head. Connected to my laptop, it is capable of APRS on VHF and HF using free software. The radio is connected to the PC through a TigerTronics Signalink USB external sound card. Software installed on the PC is UZ7HO's Soundmodem, a software based TNC which can be configured for VHF or HF, and the APRS-IS (meaning primarily Internet based APRS connection) application called APRSISCE/32. These two applications work very well together and, for me at home, can provide APRS on demand. An example of how this is setup can be found here:

<https://www.youtube.com/watch?v=EBO0isGj8W0>. This setup could easily be included in my go-kit.

Next time we will go through some of the APRS configuration options.

VCARC Members attend SATERN Training

by Paul N7EKY

SATERN, Salvation Army Team Emergency Radio Network, is comprised of radio amateurs who volunteer their expertise to support the Salvation Army in their relief efforts.

On Saturday, January 23, Ms. Terri Leece, Disaster Services Director for the Wisconsin and Michigan U.P. Division of the Salvation Army, taught "Introduction to the Salvation Army Emergency Disaster Services" and "Safe From Harm" to VCARC Members Tony (KC9SZW), Roger (KD9EPX), Dave (KC9ZJO), Bill (KG9RH), RayBob (KD9DDE), Paul (N7EKY), Don (KD9EPY), John (KD9DQZ) and Andy (N9NBC). The class was held at the Vilas County Economic Development Manufacturing building classroom in Eagle River.

Terri covered a brief history of the Salvation Army and the services they provide with an emphasis on Disaster

Services. During the introduction Terri focused on major disasters such as the 9/11 attack in New York, where she participated in the incredible efforts of the Salvation Army first hand. During the aftermath of the disaster the Salvation Army provided over 1 million meals to victims, first responders and disaster workers.

Next the Incident Command System, adopted from the Federal Government and in use by the Salvation Army, was explained and demonstrated how it would apply to small, localized, or major disasters. According to Terri, her organization will participate in two major exercises by the Air National Guard and Army National Guard in Wisconsin this summer and she is looking forward to utilizing the communications abilities of SATERN members during both exercises.

All nine of the VCARC members who attended the train-

ing have volunteered for duty as SATERN members. Many members may remember Bill Shillington (WA9ZCL), who is also a member of our club. Bill participated in the presentation to VCARC and the Iron Range Club a few months ago. He has been a volunteer with SATERN for many years and has deployed internationally in support of Salvation Army Disaster Relief.

Terri then conducted the presentation of "Safe From Harm", the Salvation Army's unique child safety program designed to help Salvation Army personnel and volunteers reduce the risk of abuse or injury to infants, children, youth, and vulnerable adults. The program highlights the risks and appropriate actions that Salvation Army personnel should take in certain circumstances. This is very important to the Salvation Army and they have made this class mandatory for anyone wishing to volunteer for the Salvation Army.



Tom White (KC9UDA) – Left and Don Korbas (KD9EPY) holding the banner donated by Don.

PSK31 Corner

by Bob KC9RF

After my presentation in October some of you have been trying out PSK31. During 2016 I will be writing a few articles about this mode of operation. During the winter I spend most of my time in Texas and operate my Yaesu FT-857D, tablet computer and Little Tarheel II screwdriver antenna from a Travel Trailer. See my QRZ page. It's amazing what 25 watts can accomplish. For example, in November, I had 71 contacts which includes European Russia, Ukraine, Austria, South Shetland Islands and six more. Stateside I logged 23 states. Contacts were made on 10, 15, 20 and 40 meters. The most common upper side band frequencies used are 14,070, 21,070 and 7070 MHz. Receiving PSK31 is very straight forward as shown in the figure below (figure courtesy of N1NKM).

Once your hardware is connected, there are many software programs available. I have used the three programs listed below. I like Fldigi the best as you can watch 10 conversations simultaneously. By clicking on the call sign in the receive window, the call sign is automatically put in the log display.

PSK31 free software download links:

Fldigi – info page <http://www.w1hkj.com/>

Fldigi program <http://sourceforge.net/projects/fldigi/files/fldigi/>

DIGIPAN <http://www.digipan.net/>

Ham radio deluxe <http://www.iw5edi.com/software/ham-radio-deluxe-5-download-links>

I hope to see you on the air as I will be operating from Port Isabel, Texas from Feb 21 to March 21, then operating from the Corpus Christi area in April. Have fun — I hope to see you on the air. If you have questions my email is sail_ski@yahoo.com

PSK31 RX ONLY

This is the simplest configuration possible: Receive only. No interface is required. Use this setup to verify that your computer is capable of running the desired software, and that it is getting a useable signal from the radio. It will also give you opportunity to watch how the QSO's are done.



Members received Certificates of Appreciation for assisting with the Ironline Sled Dog and Fat Bike Races.

Front row: Don Korbas (KD9EPY); Second Row: Paul Clay (N7EKY), Roger Schutt (KD9EPX), Robert (RayBob) Heuer (KD9DDE), Dave McMaster (KC9ZJO); Last Row: Andy Falkenstern (N9NBC), Adam Kicker (Ironline Races), and Bob Parsons (N9HSQ)

Club Membership

The Vilas County Amateur Radio Club, Inc. now can count 75 members!

Short Takes

— Next APRS Special Interest Group Meeting —

The next meeting of the APRS Special Interest Group will take place on Saturday, February 27 at 10:30 at the classroom. Following this meeting Tom (Kc9UDA) will demonstrate how to work with MMSSTV, the SSTV application. He will show those interested how to create or manipulate MMSSTV templates.

— Storm Spotter Webinar Training —

The Northwoods ARES Group will be offering National Weather Service Storm Spotter Webinar Training on Thursday, April 7 from 6:30 to 8:30 pm; note that this training is specifically scheduled for ARES. It will be held at the Oneida County Law Enforcement Center/Sheriff's Office, 2000 E. Winnebago Street, Rhinelander, in the Community Room. Please contact Ray at KB9CBL@yahoo.com or call 715-892-0175 if you would like to be placed on the list or request more information.

— VCARC Newsletter Articles Needed —

Members are encouraged to submit articles and photos involving club members, reviews of equipment you have purchased or built, and amateur radio in general. Your submissions are welcome! Please send them to pclay@nnex.net.

— Charter Membership Certificates —

If you haven't received your Charter Certificate, you can pick it up at any meeting. Just see Paul (N7EKY)

— Don Korbas Achieves Extra Class —

During a special VE Session held before our meeting February 10, Don Korbas (KD9EPY) passed his examination for Extra. Congratulations Don! VEs were Mike (KC9ZJF), Andy (N9NBC), and Paul (N7EKY).

— For Sale by Members —

This is a new section in our newsletter to list equipment members wish to sell or swap. Submit listings for your personally owned amateur radio equipment to Pclay@nnex.net. This is not intended for someone who makes it a business to buy and sell equipment.

For Sale: Yaesu FT-101-E with CW filter & Cooling Fan, very clean radio. Original owner, it's my Eagle River Rig. Asking \$350 or best offer. Call 1-847-274-8433 Bill W9ZCL

— Next Ham Breakfast Scheduled for February 27 —

Our next Ham Breakfast is set for 9 am on February 27 at the Friendship House in Eagle River. Please let Paul (N7EKY) know if you will attend. XYLs and YLs are invited also.

— National Parks On The Air - NPOTA —

Paul (N7EKY) and Andy (N9NBC) will travel to Calumet, Michigan in February to see what facilities are available to accommodate members of the VCARC this spring when they conduct a presence for NPOTA on HF. If you are interested in joining then please contact Andy (N9NBC).

Short Wave Listening for Beginners

by Roger KD9EPX

While most of us are busy enough with life in general and our ham activities, there is a whole world of listening just outside our little spectrum windows. I've been doing this since around 1962 with old Crosley tube console radios and have used many commercial and military surplus receivers over the years. Times and equipment have changed, as have many international broadcasters, but there is still a massive amount of HF activity to monitor.

First, you'll need a "general coverage" receiver, or a ham transceiver with that already built in, like the Alinco DX-SR8. For just the broadcasters, many small compact radios are available, as the bands can be crowded, it's best to have a digital readout for frequency. For the so-called "utilities" you will want selectable sideband capability, as most of these are SSB voice or one of several data modes. Frequency range needs to be 1.8 – 30 MHz, no gaps.

For the classical HF broadcasters, here's a list of the top 20. Notice that 'Radio Moscow' is no longer listed. Each of these have a website where updated schedules are available.

- CHINA RADIO INTERNATIONAL (CRI): 279 frequencies
- VOICE OF THE ISLAMIC REPUBLIC OF IRAN (VOIRI): 140 frequencies
- BBG – VOICE OF AMERICA (VOA): 126 frequencies
- BBG – RADIO FREE ASIA (RFA): 112 frequencies
- BBC WORLD SERVICE: 110 frequencies
- SOUND OF HOPE RADIO INTERNATIONAL: 84 frequencies
- ALL INDIA RADIO (AIR): 67 frequencies
- RADIO ROMANIA INTERNATIONAL (RRI): 56 frequencies
- AWR ASIA/PACIFIC: 52 frequencies
- RADIO JAPAN (NHK WORLD): 49 frequencies
- VOICE OF TURKEY (VOT): 43 frequencies
- RADIO TAIWAN INTERNATIONAL (RTI): 41 frequencies
- BBG – RADIO FREE EUROPE/RADIO LIBERTY (RFE/RL): 33 frequencies
- KBS WORLD RADIO: 32 frequencies
- SAUDI INTERNATIONAL RADIO: 32 frequencies
- AWR AFRICA/EUROPE: 30 frequencies
- VATICAN RADIO: 29 frequencies
- RADIO CAIRO 29: frequencies
- VOICE OF KOREA (VOK): 27 frequencies
- FEBC PHILIPPINES: 26 frequencies

Sixty-three broadcasters, or so, use just a single frequency.

The multiple frequencies are to cover both day/night and seasonal propagation needs as well as the intended target areas. Many use massive antenna arrays, often with 250kw transmitters.

A good site for getting lots of information in one place is shortwave.am, where you can select by broadcaster name, language, frequency or time. The SWLing.com, MonitoringTimes.com, and the dxzone.com are also sites with lots of information and more links for schedules, frequencies, and what else you can hear, like the military, governments, embassies, spy stations, and many aircraft frequencies. These are generally called "utilities". HF utilities fill large portions of HF bandwidth. Those using voice are normally USB, no matter which band is being used. Like hams and broadcasters, multiple frequencies are allocated to cover various propagation conditions.

Monitoring Times has both a Quick Guide to the Shortwave Spectrum, as well as an extremely detailed index by frequency showing exactly who claims what as "theirs." I suggest taking a look at the detailed index, then deciding if anything there is something you might want to listen to, then think about how many memories you might want. Then,

Continued next page

Short Wave Listening for Beginners — continued

look for a radio to match. If you are thinking lots of memory, best to pick something with software and a cable available.

For instance, I have a Grundig Satellite 750, with 1k memories you can organize in several ways, but the frequency and mode are the only parameters, and must be done from front panel. Compared to the Alinco DX-SR8, which has three banks of 200 memories each, very nice software/cable from RTSystems, and all parameters are programmable including alpha- numerics for display.

Every radio has its high and low sides, so read some reviews and talk to some folks with experience. There is a radio out there just for you.

The major broadcasting bands in kHz are 4750-5060, 5850-6200, 7100-7350, 9400-9900, 11600-12050, 13570-13800, 15100-15800, and 17480-17900. These are all AM or DRM.

The most aero en-route traffic is USB, 4650-4750, 5450-5730, 6525-6765, 8815-9040, 10005-10100, 11175-11400, 13200-13360.

The spy or “numbers” stations show up anywhere, reading 4-5 character groups in various languages. There is also plenty of crypto voice, from smugglers and various military groups.

An easy way to start on military traffic is the HFGC “Global Command” net run by USAF. Nighttime primary is 8992, daytime is 11175. Always USB voice, some crypto digital, at least three different types. Phone patches frequently on 11220. Just leave a radio on 11175, you will hear 3-8 transmissions per hour. “MAINSAIL” is the generic call sign for any GC base, like Andrews, Offut, Puerto Rico, Ascension, McClellan, etc. Lots of airborne command posts with tactical call signs, aircraft calling in from everywhere, and EAM (Emergency Action Message) traffic. Have overheard lots of plain traffic of very interesting events over the years. Their other common frequencies are 4724, 6739, 13200, and 15016. These are normally simulcast, on all six frequencies at same time at 5kw, for all the EAM transmissions.

Time and frequency standard stations in US are WWV (Fort Collins) and WWVH (Hawaii) on 2.5, 5, 10, 15 and 20 MHz. CHU from Canada is on 3.330 and 7.335 MHz.

As a general note, many of the frequency lists you may find are not totally up to date, no matter where you find them. Many of the smaller broadcasters are on very tight budgets, the spies just do their thing, and the military folks use what they say but encrypt or code even the plain voice, so while you may hear it, just what's up is a bit well hidden.

May you enjoy the listening, tune slowly and listen well. Secrets may be revealed . . .