

MRAC Hamateur Chatter

The Milwaukee Radio Amateurs Club

April 2015 Volume 23, Issue 4

One of the World's Oldest Continuously Active Radio Amateur Clubs—since 1917

Presidents' Letter

Another busy month is upon us, but first, I want to thank everyone who attended the March meeting. We had a great turn out for Chris Wilson of Yaesu, and hope that everyone was able to get their questions answered about the System Fusion.

This month, we will have a new presentation from Joe N9UX. They launched another High Altitude Balloon (HAB) on April 18th as part of the Global Balloon Space Challenge, and will give us all the details from the event plus details about the recovery of the payload from the previous balloon launch. This will be an interesting program with some really great pictures from near space.

Also, a reminder that our upcoming elections will happen at our meeting on April 23. As many of you know, being a part of any organization means that one person cannot do everything. This includes myself, since I am involved in many of the area's radio clubs to varying degrees.

So, I am asking for help from you, our members. We need people to step up and fill 3 club director positions. We also need more members assuming leadership positions when planning club events.

As members, it is our responsibility to make sure that our rich history will continue for years to come, which means we all need to be actively involved with the group's leadership, planning, and activities. A successful club cannot run on the shoulders of one or two people. Please take this request seriously, and consider your contribution to our club.

Remember the excitement of being new to ham radio? I have been in communication with Timothy Overocker KD9DBG, who is the Advisor of LakeView Technology Academy Radio Club KD9DCS. He is working with the MRAC VEC to provide a special test session for his students, and is excited to see how many new hams will come out of his class. We are inviting his students to our Field Day this year, and I hope that you can all share time with them for some of their first operating experiences.

Finally, make sure to mark your calendars for our May 28 meeting for our annual auction.

'73 Dave, KA9WXN



MRAC Officers:

Terms Expiring in 2016

- President – Dave, KA9WXN
- V-President– Dan, N9ASA
- Secretary – MBH, KC9CMT
- Treasurer – MBH, KC9CMT
- Director – Mark, KB9RQZ

Terms Expiring in 2015

- Director – Al, KC9IJJ
- Director – Hal, KB9OZN

The Club Phone Number is: (414) 332-MRAC or

(414) 332- 6 7 2 2

Visit our website at:

www.w9rh.org

Mail correspondence to:

M. R. A. C.
PO Box 26233
Milwaukee, WI
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Board of directors meeting called to order at 7:06 pm by Dave Shank, KA9WXN club president.

Director's present: Michael KC9CMT, Dave KA9WXN, Dan, N9ASA, Hal, KB9OZN, Al, KC9IJJ, Mark, KB9RQZ

Absent: None

The Board of Director's minutes were accepted as published in the March Chatter by a motion forwarded by Michael, KC9CMT seconded by Dan, N9ASA. The Treasurers report was given by Michael, KC9CMT. A motion was made by Hal, KB9OZN to accept the Treasurers report as read; AL KC9IJJ seconded the motion. The Motion was carried by a unanimous vote. The February balance ended with \$20,602.05 in our Club accounts.

Meeting programs: For the March 2015 membership meeting, Yaesu will be giving a program on the Fusion Digital radio mode that they have developed. The April 2015 after election meeting presentation will be given by Joe, N9UX on the Balloon Recovery. The May meeting will be the annual MRAC auction. The MRAC/MAARS joint picnic will be on August 8th, 2015 at Greenfield park, picnic area number 2, a permit has already been issued for the picnic. The club meeting in June is before field day this year, so will be used to organize the field day effort. There will be no meetings during July & August of 2015. The club needs to start focusing on the 100th anniversary activities. Perhaps get all the hams in the Milwaukee area to come together for a event. The anniversary is in 2017.

Field Day: The farmers market will be at Konkel park in Greenfield again in 2015. Dave, KA9WXN has received a permit that secures our spot at Konkel Park in June of 2015. Dave will be asking the membership for station captains to help coordinate activities during field day. The Gateway Technical group will not be joining us this year at field day, they will be conducting their own field day activities.

Special Project Committees & Committee reports:

Repeater Report: The Yaesu Fusion repeater that Yaesu gave the club a great deal on, is on back order. Dave, WB9BWP is the repeater trustee and a control operator. The club would like at least one more repeater control operator. A club repeater control operator should be an extra class operator. We need to ask for volunteers at the membership meeting.

New Business: The clubs' anniversary is in 2017. We need to start planning event stations for the entire year. Dave, KA9WXN will attempt to generate interest among the membership in forming a committee to handle planning for future events. The club really needs PR and recruitment.

Swapfest Committee: Dan or Dave are going to contact American Science and Surplus about having a table at the MRAC 2016 swapfest. Dave KA9WXN will be discussing the 2016 swapfest date with MPTV in the next few weeks.

Special Projects: The MRAC will be setting up a table area at the upcoming AES Superfest the weekend of March 21st. Dave, KA9WXN will be giving a talk on repeater coordination. Dave, WB9BWP will be manning the club table. The club needs someone to take over the FM simplex contest for February of 2016. Ham radio is on the rise numbers wise, with more retirees and younger people entering the hobby, due to the influx of dirt cheap Chinese HT Radios for sale.

Clubs throughout the country need to use the spectrum that they have been given. The 220Mhz band is not used very often in the Milwaukee area. A Club calendar is a project that the Board of Directors' would like to pursue. We would like to organize meeting programs far enough in the future that a calendar of programs can be produced.

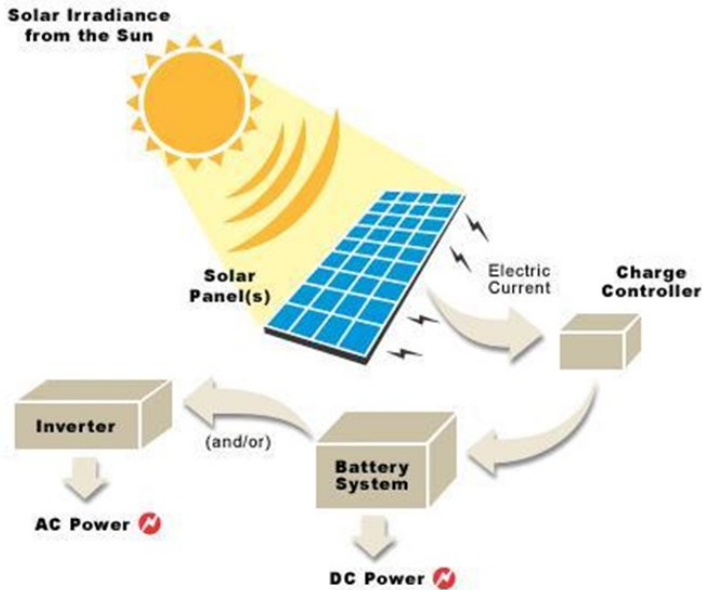
A motion was made to adjourn the meeting at 7:53 pm by Mark, KB9RQZ, seconded by AL KC9IJJ. Meeting adjourned at 7:56 pm. The room was returned to an organized condition as it was when the room was opened.



The Experimenters' Bench

DIY Solar Battery system

In this article you will learn how to untether from the grid, and avoid a smelly, noisy, fuel consuming generator except in extreme weather conditions. It can be pricey for a good system, but you'll have minimal ongoing expenses, unlike fuel and maintenance on a generator. The less power you consume, the less power you will need to generate, keeping the system costs down. It's important to start with conservation.



Living off-grid brings some unique challenges to your life-style. You need to be aware of your total power consumption, and the power consumption of your appliances. You also need to be aware of the amount of time you run each appliance, as a small consumer left on 24 hours a day can consume more than a power hungry devices used briefly.

In this article I'll show you how to untether from the grid, and avoid a smelly, noisy, fuel consuming generator except in extreme weather conditions. It can be pricey for a good system, but you'll have minimal ongoing expenses, unlike fuel and maintenance on a generator. The less power you consume, the less power you will need to generate, keeping the system costs down. It's important to start with conservation.

A photo-voltaic (PV) system consists of panels that convert sunlight into electricity, a charge controller to prevent the batteries from overcharging, a set of batteries to store the electricity for when the sun is not shining, and often, a inverter to turn the low voltage DC (battery voltage) into normal 120 volts AC house current.

Solar Panels (PV)

There are many ways to mount solar panels. Some of these methods may include fixed on your roof, fixed on the ground, fixed on pole mounts, or pole mounted tracking arrays. Mounting your panels on the roof makes sense from a security, stealth and convenience standpoint, and can lower roof temperatures in hot climates, but is inconvenient in snow country. Panel angle should be adjusted seasonally for best collection.

The size of a 200 watt panel is approximately 60" x 40" x 1.5", and weighs about 40 lbs, so keep that in mind when thinking about mounting methods and location.

Charge Controller

The solar panels are wired to a charge controller. This unit makes sure that the batteries get fed the proper amount of electricity, at a rate they can handle, and will help ensure longer life from the batteries. The traditional method is to have a 12v solar panel, a 12v charge controller, and a 12v battery. The newer and more efficient method is a series string of panels running at a higher voltage (100v or less, but at least 20v higher than battery voltage), a special MPPT controller, and the 12v battery pack. The MPPT controller matches the best performance curve of the panels to the batteries, allowing up to a 30% increase in power, without needing more panels.

Batteries

The typical battery in an off grid system is a flooded lead acid battery. This unit has vented caps, discharges hydrogen during charging, and needs to be vented, as well as hydrated fairly often. Another solution is the AGM battery. This unit does not need venting, and is sealed, eliminating watering. It also won't leak acid in the case of physical damage. It is more expensive, so there is a trade off. Deep cycle (do not get starting batteries) come in 6v and 12v. Consider two 6v in series to be a 12v, four in series for a 24v system, or eight in series for a 48v system. You can parallel multiple 12v batteries (or 6v pairs) to increase Amp Hour storage (two 100ah batteries in parallel = 200ah). Batteries in series add voltage, batteries in parallel add amp hours.

Inverter

An inverter changes low voltage dc (Direct Current) into 120v ac (Alternating Current) for regular household appliances. Inverters can range from the cheap \$60 750 watt Black and Decker from Walmart, to a \$2500 Xantrex or Outback with integrated battery charger and transfer switch for connecting to the grid or a generator. Cheap inverters have to be connected directly to an appliance, while the larger, more expensive units can be connected directly to your existing breaker panel.

Fuses, Breakers, and Disconnects

For safety, and convenience, we install fused disconnects between the solar panels and the charge controller, between the charge controller and the batteries, and between the batteries and the inverter. This allows us to safely isolate the components for maintenance (or panel deployment), or automatic disconnect in case of a short or equipment malfunction.

Battery Monitor

Running a system without a battery monitor is like using a bank account without a check register. You have no idea how much energy you have until it runs out and you are in trouble. The simplest, and least effective is a volt meter. It will tell you the voltage of the battery pack, but that reading is highly affected by charging and discharging, making the

reading basically useless. The best method is an amp hour meter on your battery pack, that indicates amp hours deposited, and amp hours withdrawn. These units commonly also include a amp and volt meter function. There are standalone units like the Bogart Trimetric, and integrated units like the Outback Flexnet DC. A standard multimeter (\$15 at Radio Shack) is useful for detecting power, polarity, and continuity, but not as a system monitor.

Wire Size

Wire size is a function of amps being carried, and the distance they need to move. If you have 40 amps (480 watts) of PV on your roof, and it's 8' to the charge controller and batteries, then you should use 8 AWG wire between the PV panels and the charge controller (and from the charge controller to the batteries). The wires between your battery(s) and inverter should be short and large. A 2000 watt inverter, 6' from the battery bank, needs 1 AWG battery cables. The smaller the AWG, the larger the cable. If your cables are too small, they will generate heat, and possibly a fire, as well as dropping the voltage to less than useful levels. Use the calculator at the bottom of http://www.powerstream.com/Wire_Size.htm, and use 3% voltage drop (or lower) as your target.

Generators

I know I said we wanted to avoid these things, but sometimes you can't. If you live in 100 degree weather, you are going to want an air conditioner, and that means a outlandishly large PV system, grid connection, or a generator. Many northern climates have a large number of sunless days. We like the Honda EU series generators. They are small, quiet, and scalable (can run one for small loads, and slave a second for heavy loads). Yamaha makes a similar series. Both can be modified to run on gasoline and/or propane. This is where you'll want the better inverter/charger/transfer units as mentioned in the inverter section, as there just one cable to connect to the generator, and switching/charging is automatic. A wired or wireless remote is available for remote start and shutdown, and the more expensive inverters can handle this procedure automatically based on battery needs.

Sizing the system - Math Alert!

I'll try keep this simple.

A 200 watt panel, optimally aligned (solar south, at an angle similar to latitude with seasonal adjustments), might gather 600 watt hours daily in NY (3 full sun hours * 200w), or 1200 watt hours in CA (6 full sun hours * 200w). 1200 watt hours is enough energy to run a 100 watt light bulb for 12 hours. See the pattern? Fortunately, we have better options than a 100 watt light bulb. In our home, we have installed 14 watt CFL's (Compact Fluorescent Lights). These put out a similar amount of light as a 80 watt incandescent light bulb. Here are some basic formulas:

Volts * Amps = Watts
Watts * Hours = Watt Hours
Watt Hours / Volts = Amp Hours
Amp * Hours = Amp Hours

More at <http://arduinotronics.blogspot.com/p/tutorials.html>

A 200 watt panel that produces 12v (nominal, it actually produces 15-20v) might produce 200 w / 12 a = 16.7 amps. In 3 full sun hours (NY), it might produce 600 watt hours (3h * 16.7a = 50 amp hours. 50 amp hours * 12v = 600 watt hours).

A battery rated at 100ah has about 50ah usable (50% discharge) otherwise it's life could be severely degraded. Typically batteries are rated at the C/20 rate, so a 100ah battery might deliver 5 amps for 20 hours. Taking into effect the 50% discharge, you are looking at 5 amps for 10 hours. If you pull the amp hours out faster, you have fewer usable ah. If you pull it out slower, you have more usable ah.

More sizing info and a chart showing sun hours for various areas is found at <http://www.green-trust.org/2003/pvsizing/default.htm>

A calculator for battery and solar sizing can be found at <http://www.green-trust.org/peukert/>

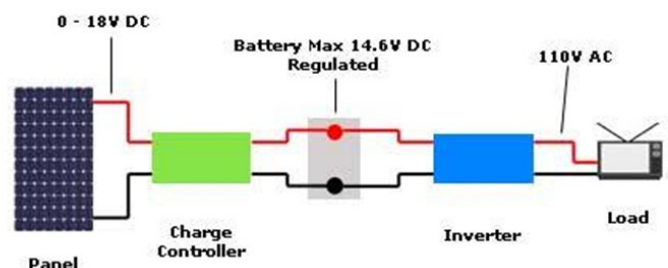
More on "Loads" and "Run Times"

A 700 watt (cooking watts) microwave might pull 1000 watts. If used for 15 minutes, it consumes 250 watt hours. A 30 watt laptop computer used for 4 hours would consume 120 watt hours. Consider our 14 watt CFL lights. If 6 are left on for 4 hours,
 $6 * 14w = 84w$
 $84w * 4h = 336 \text{ watt hours.}$
 $336 \text{ watt hours} / 12v = 28 \text{ ah.}$

A Kill-A-Watt meter is a useful meter for monitoring the amps, watts, and watt hour consumption of 120vac devices, and can be found for around \$20 at Radio Shack, Amazon.com and other places. There are similar devices for measuring 12vdc loads.

Putting it all together

So, you have mounted the panels on the roof or on a yard mount. You'll want to connect them in parallel (unless using the MPPT controller, (It's panel and controller specific, so check the data sheets for both), keeping array voltage below 100v is usually best) connecting positive to positive (red), negative to negative (black), and bring the wires inside to the charge controller (remember, series adds voltage, parallel adds amps). Don't forget your fused disconnect between the panels and the charge controller.



Next connect the charge controller to the batteries. Again, it's positive to positive (red), negative to negative (black), with a fused disconnect in between.

Next connect the batteries to the inverter. Again, it's positive to positive, negative to negative, with a fused disconnect in between.

If you are using a 24v or 48v battery pack, wire four or eight 6v batteries in series, respectively. You will need special controllers and inverters for the higher voltages, but your battery cables will be much smaller in large systems. This is the type of installation where a MPPT controller like the Outback FM 60/80 really shines.

What's it going to cost?

A basic low end system might consist of a 200 watt panel (\$550), a 20 amp charge controller (\$100), Two Walmart type 27 marine deep cycle 12v batteries (\$160), and a Walmart 750 watt inverter (\$60). With miscellaneous wire, fuses and connectors, you are looking at just under \$1000 for an autonomous, gridless, no power bill, power system. You would be able to power a couple of lights, a radio, and a small rv water pump, ideal for a rain water collection system.

A slightly larger setup might consist of 400 watts of PV (\$1100), a 40 amp charge controller (\$150), 200 ah of Deep Cycle (two Trojan T-105 6v's) battery storage (\$300), and a 2000 watt inverter/charger (\$1700). With miscellaneous wire, fuses and connectors, you are looking at just over \$3000. This would allow some use of a LCD/LED TV or Laptop computer, and a microwave.

Appropriate Energy Use

To reduce power consumption, propane appliances like the kitchen stove and refrigerator, water heater, clothes dryer, and furnace are common. However, this is just shifting you to the propane "grid" (although propane can be stored indefinitely). More appropriate energy use might include wood fired heat and cooking, wood/solar heated hot water, using indoor/outdoor clothes lines instead of a mechanical dryer, rainwater harvesting and a cistern instead of a deep well, and composting toilets instead of flush toilets.

We have lived off grid for over 6 years with systems similar to the above. We use worm bins to compost our food scraps, raised beds for gardening and produce much of our food. We heat entirely with wood, cut from our own woods, and use a propane tankless water heater. We would be happy to consult with you on your project, and help you become independent from the grid.

Welcome

Weather Hazard Awareness

4 Things You Need to Know About Tornado Season

by Andrea Thompson



A large tornado touches down near Dallas on April 3, 2012.

Credit: Brandon Sullivan - StormChasingVideo.com/TornadoTitans.

The start of spring brings blooming flowers, balmy temperatures and something else not so pleasant: the threat of tornadoes.

[Tornadoes](#) are some of the toughest weather Mother Nature can dish out, often appearing with little warning and possessing strong winds that can cause serious damage. Some 1,200 tornadoes touch down across the United States each year, most commonly in the spring months, a transition time when unsettled weather is more likely to occur.

Even if you don't live in Tornado Alley, you could experience a tornado, and preparation and understanding your risk is key. Here are four things you need to know about tornadoes and tornado season:

1. Tornadoes can happen anywhere, any time of year.

In the popular imagination, tornadoes are associated with the wheat fields and prairies of Kansas and the other Great Plains states — what is popularly called [Tornado Alley](#) — but tornadoes happen outside this area every year and, in fact, they can happen all over the world.

Twisters aren't as well documented in other parts of the world as they are in the United States and are typically only noted when they cause significant damage or happen to be caught on camera, according to the U.S. Storm Prediction Center (SPC), part of the National Oceanic and Atmospheric Administration (NOAA). But the data that is available suggests that outside of the United States, [other tornado-prone areas](#) include Canada's prairie provinces, north-eastern Mexico, northern Argentina, southern Brazil, Britain, Bangladesh and parts of southern Russia, according to the SPC.

The United States is essentially the world capital of tornadoes because of a fluke of geography. The worst tornadoes form from so-called supercell thunderstorms when warm, moist air is trapped underneath cool, dry air and when winds high up travel in a different direction than those at ground level. This setup is common over the central United States in spring when warm Gulf air meets cold Arctic air and the jet stream dips back down over the country after its winter sojourn up north.

What can happen in these storms is that rising warm air hits that change in wind direction and begins to rotate like a pinwheel. The heat continues to build underneath the pinwheel until it punches through this "cap" and turns the pinwheel on its side, creating a mass of rotating clouds called a mesocyclone that can spawn a tornado (though they don't always, and scientists aren't sure why).

Though this setup is most common over Tornado Alley, it can happen anywhere that conditions are right. And some tornadoes, known in storm-chaser parlance as "landspouts," don't form from supercell thunderstorms and have been observed all over the country. Waterspouts also typically don't form from supercells.

While the [peak time for tornadoes tends to be in the spring](#), there is no defined tornado season like there is for hurricanes. The peak in tornado formation in the United States tends to shift from south to north from the late spring to midsummer, according to the SPC.

A so-called [second tornado season](#) typically ramps up in November, again because of the transitional weather common in the fall. But tornadoes have happened in every month of the calendar.

Tornadoes can also happen at all times of the day. [Storms tend to sweep from west to east](#) across the country, which makes the time that tornadoes occur in particular areas vary. Areas nearer the Rockies are less likely to see the late afternoon and early evening tornadoes that are more common in the East. Research has found that nighttime tornadoes are twice as likely to kill people as daytime tornadoes, largely because people are asleep and may not hear weather radios or sirens. The threat of nighttime tornadoes increases in the winter as daylight hours shrink, and the mid-South leads the nation in experiencing nocturnal twisters.

Hurricanes and tropical storms can produce tornadoes when they form in the summer and fall months, typically in the thunderstorms in their outer bands. The circulations that produce them are often smaller and shorter-lived than in the storms on the Great Plains and so are harder to detect and to warn for, though the tornadoes they spawn can be just as dangerous.

2. The difference between tornado watches and warnings.

This trips a lot of people up, but the difference is pretty simple: A tornado watch is issued by the National Weather Service when weather in a particular area could produce tornadoes (often this means thunderstorms are in the area). But it doesn't mean tornadoes will definitely occur, it just means you need to be alert and paying attention to weather updates. If you're under a tornado warning, it means that a tornado has been spotted on the ground in your area or that the storm circulation seen on Doppler radar could produce a tornado. Now is the time to seek shelter. It's entirely possible that the tornado will miss you or that one won't form, but it's best to be safe.

To boil that down: If there's a tornado watch, be watching the weather. When there's a warning, that's your warning to take shelter.

3. Don't open your windows. Or shelter under an overpass.

There are a lot of tornado safety myths out there, and many of them can put you in danger instead of making you safer. Here's what you need to know:

Opening your windows doesn't help, it just makes it more likely debris will fly through them into your house. Sheltering under a bridge or overpass if you're on the road is very dangerous, as a tornado's winds could blow you out from underneath or the [structure could collapse](#) on top of you. No topographic features or the fact that you're in a big city are barriers against a tornado strike, as plenty of big cities have been hit in the past and likely will be again in the future.

If you're under a tornado warning, or see a tornado near you, and you're in a building, you want to get away from any windows and any shelves or other things that could fall on you. Basements and cellars are good places to take shelter, but if you don't have either, an interior space on the lowest floor of the structure is probably your best bet. Bathtubs can also provide shelter and covering yourself with a mattress is a good tip. For more safety tips and ideas on making a tornado safety plan, visit the [SPC tornado safety site](#).

4. Tornado season can't be forecasted.

Again, unlike with hurricane season, there's no forecast for the whole of tornado season, though various large-scale atmospheric patterns, such as the El Niño-La Niña cycle, can affect how a tornado season plays out. Tornado season starts roughly in March and is at its most active from May to June, but plenty of tornado outbreaks buck that pattern. While some tornado seasons start out busy, they can peter out, [like the 2012 season did](#). Atmospheric patterns last year put the jet stream farther north than it might typically sit in spring. This meant that the air on its southern side wasn't as laden with Gulf moisture and tamped down the tornadic fireworks.

Climatologists can look at the likely atmospheric patterns that will come into play in a given spring to deduce whether it might be a blockbuster year or a quiet one, but individual tornadoes are just too small to be able to predict far in advance.

Effectively, forecasters can only say when and where a given storm system is likely to produce tornadoes with the next few days or hours, then watch for signs of them on radar or for spotters to see one on the ground and send a warning that generally only amounts to a few minutes. But those few minutes can be crucial. So if you're under a tornado warning, pay it heed.

12 Twisted Tornado Facts

Despite improved warnings and forecasts over the past few decades, tornadoes still cause many deaths each year. To learn a little more about these violent storms, here are 12 facts that illustrate how destructive tornadoes can be, where they can occur and how to prepare for them.

1. How do tornadoes form?

Tornadoes form where warm moist air is trapped underneath a layer of cold, dry air. This instability is upset when the warm bottom layer gets pushed up — either by heating near the ground, or by an influx of cold air.

As the moist air rises, it cools, forming clouds and thunderstorms. If the conditions are right, the rapidly rising air will spin around a central funnel, at speeds sometimes exceeding 250 mph. A tornado technically is born when this funnel cloud touches down on the ground. Although tornadoes are more frequent in the afternoon, they can happen anytime, even at night.

2. Where do tornadoes form?

Tornadoes can occur almost anywhere in the world, but the United States is the country with the highest frequency of tornadoes. About 1,000 tornadoes hit the United States each year. Twisters strike predominantly along Tornado Alley — a flat stretch of land from west Texas to North Dakota. The region is ideal for tornadoes, as dry polar air from Canada meets warm moist tropical air from the Gulf of Mexico.

3. Do tornadoes occur only in the spring?

While tornado season — the time of year that historically produces the most tornadoes — runs from early spring through mid-summer, tornadoes can happen [any time of year](#) if the conditions are right. Essentially, this is any time when warm and cool air masses collide.

4. What state gets hit by the most tornadoes?

That would be Texas, which averages 125 tornadoes every year. Oklahoma comes in next with about 57 tornadoes per year, with Kansas and Florida following close behind with 55 each. Florida of course is much smaller, and therefore has more twisters per square mile than anywhere else.

5. What month has the most tornadoes?

May is typically the month in which most tornadoes occur, followed by June. The record for most tornadoes in any month (since record keeping began in 1950) was set in May 2003, with 543 tornadoes confirmed in the final numbers.

6. How much damage can tornadoes cause?

That all depends on how big the storm is and how fast its winds are whipping around.

The Fujita scale, named for the scientist who developed it, ranks tornado strength based on the damage they cause. The scale runs from F0 to F5; the most violent tornadoes, F4 and above, account for less than 1 percent of all tornadoes, but account for 70 percent of tornado-related deaths.

These terrifying twisters can level a house and lift up a car and fling it 100 yards away. F2s and F3s can tear off roofs, destroy mobile homes and lift cars off the ground. F0s and F1s will break tree branches, damage signs and take off a few roof shingles.

7. What's the difference between hurricane and tornado damage?

It's mostly a matter of scale. Tornadoes have much higher wind speeds, so most of the damage wrought by them is wind-related. But they are much smaller and so cause damage over a smaller area than hurricanes. Most damage from hurricanes comes from flooding and storm surge.

8. What was the deadliest tornado outbreak?

The deadliest outbreak came on April 3, 1974, when a two-day "Super Outbreak" of 147 tornadoes killed 308 people in 13 states. The deadliest single tornado was the "Tri-state" tornado that killed 695 people along a 219 mile long track across parts of Missouri, Illinois and Indiana on March 18, 1925.

9. What city has been hit by the most tornadoes?

Oklahoma City has been hit by a staggering 100 tornadoes; the earliest recorded tornado there was in 1893. The most-hit city count can change based on how city limits are defined, but when considering a 20-mile radius around a city of 100,000 or more, Oklahoma City is in the lead, followed by Huntsville, Ala.

10. What is the highest elevation a tornado has occurred at?

This isn't known for sure, but scientists with the National Weather Service say it is at least over 10,000 feet above sea level. The NWS website lists a tornado observed and photographed by a hiker at 12,000 feet in Sequoia National Park, California, on July 7, 2004, as the likely candidate for highest elevation tornado known. The highest altitude ever recorded for a violent tornado was between 8,500 and 10,000 feet elevation in Wyoming — an F4 tornado struck there on July 21, 1987.

11. How do I prepare for a tornado?

Keep abreast of local weather forecasts and listen for watches and warnings. Having a weather radio in the house is also a good idea.

Have a family plan in place so you can quickly find shelter. Basements and storm cellars are the best place to take shelter, but if you don't have either one, head to a bathroom, closet or any other interior rooms away from windows. Don't bother opening windows to equalize the pressure in the house — it's a waste of time and the tornado will take care of that for you if it does hit your house.

If you're in a car, get out and head for sturdy shelter or a low, flat spot. Don't take shelter under a bridge, which is highly dangerous.

12. What's the difference between a tornado watch and a tornado warning?

A tornado watch defines an area (usually displayed on meteorologists' maps) where tornadoes and other kinds of severe weather are likely in the next few hours. If you're in such an area, be alert.

A warning means that a tornado has been spotted or that radar has shown circulation in a storm that could spawn a tornado. Warnings mean you should seek shelter immediately.

Disaster Preparedness

NOAA WEATHER RADIO ALL HAZARDS



NOAA Weather Radio All Hazards (NWR) is a nationwide network of radio stations broadcasting continuous weather information directly from the nearest National Weather Service office. NWR broadcasts official Weather Service warnings, watches, forecasts and other hazard information 24 hours a day, 7 days a week.

Working with the Federal Communication Commission's (FCC) Emergency Alert System, NWR is an "All Hazards" radio network, making it your single source for comprehensive weather and emergency information. In conjunction with Federal, State, and Local Emergency Managers and other public officials, NWR also broadcasts warning and post-event information for all types of hazards – including natural (such as earthquakes or avalanches), environmental (such as chemical releases or oil spills), and public safety (such as AMBER alerts or 911 Telephone outages).

Known as the "Voice of NOAA's National Weather Service," NWR is provided as a public service by the National Oceanic and Atmospheric Administration (NOAA), part of the Department of Commerce. NWR includes 1025 transmitters, covering all 50 states, adjacent coastal waters, Puerto Rico, the U.S. Virgin Islands, and the U.S. Pacific Territories. NWR requires a special radio receiver or scanner capable of picking up the signal. Broadcasts are found in the VHF public service band at seven frequencies (MHz):

Using NWR SAME Radio Coding

After buying an NWR [SAME](#) receiver, you must program your county, parish, independent city or marine area into the radio. Do NOT program your radio for a louder or clearer station not designated as a SAME channel. You will not receive alerts. Once programmed, your NWR will then alert you **only** of weather and other emergencies for the county(s)/ area(s) you chose. NWR receivers with SAME, alert for emergencies anywhere within the coverage area of the NWR transmitter, typically several counties, even though the emergency could be well away from the listener.

- When an NWS office broadcasts a warning, watch or non-weather emergency, it also broadcasts a digital SAME code that may be heard as a very brief static burst, depending on the characteristics of the receiver. This SAME code contains the type of message, county(s) affected, and message expiration time.
- A programmed NWR SAME receiver will turn on for that message, with the listener hearing the 1050 Hz warning alarm tone as an attention signal, followed by the broadcast message. At the end of the broadcast message, listeners will hear a brief digital end-of-message static burst followed by a resumption of the NWR broadcast cycle.

SAME is also used in the Emergency Alert System (EAS). See [EAS fact sheet](#) for more information. Using SAME, broadcasters may receive NWR warning messages for rebroadcast in accordance with [EAS rules](#).

Programming Your Receiver

To program NWR SAME receivers with the proper county(s) and marine area(s) of choice, you need to know the 6-digit SAME code number. Then follow the directions in your radio's user's manual. You can get your SAME number two ways:

Online at the [United States and Territories Table](#).

By telephone at 1-888-NWR-SAME (1-888-697-7263) for a voice menu.

Description of Columns

From the United States and Territories Table, clicking on a state or territory will bring up a table of eight columns.

1. **State identification Column:** Identifies the state for the county listed in column two.
2. **Counties Column:** Counties in a specific state listed alphabetically. If a county is covered by more than one NWR transmitter, the county will be listed *on multiple rows*. If a county is not covered, it will be listed with a remark of "--No NWR Coverage--" in the Transmitter Column (4).
- 3.

NWR SAME Code Column: This 6-digit sequence uniquely describes each county. For coding of a *whole* county, the first digit is zero. For coding of a *part* of a county, the [first digit is a non-zero number](#). The 2nd through 6th digits use the [Federal Information Processing Standard](#) (FIPS). The 2nd and 3rd digits are the 2-digit state/equivalent territory identifier; the last three digits are the county or equivalent area identifier.

1. **Transmitter Location Column:** City and state of the NWR transmitter covering the county. Some counties are covered by a transmitter in an adjacent state.
 2. **Transmitter Frequency Column:** Frequency the transmitter broadcasts on. There are seven frequencies (in MHz) used throughout the NWR network: 162.400, 162.425, 162.450, 162.475, 162.500, 162.525, 162.550.
 3. **Transmitter Call Sign Column:** Station call sign of the transmitter.
 4. **Transmitter Power Column:** Peak power of the transmitter in watts.
- Remarks Column:** Used when a transmitter covers only part of a county.

What is EAS?

The Federal Communications Commission (FCC), in conjunction with the Federal Emergency Management Agency (FEMA) and the NWS, implements the EAS at the federal level. The EAS is the nation's public warning system requiring broadcasters, cable television systems, wireless cable systems, satellite digital audio radio service (SDARS) providers, and direct broadcast satellite (DBS) providers to provide communications capability for the President to address the American public during a national emergency. FEMA is responsible for a national-level activation of the EAS, tests, and exercises.

The FCC prescribes rules establishing technical standards for the EAS, procedures for EAS participants to follow when EAS is activated and EAS testing protocols. Additionally, the FCC ensures EAS state and local plans conform to FCC EAS rules and regulations. Detailed information on the EAS is documented in the Code of Federal Regulations, 47 CFR Part 11.

The NWS activates the EAS most frequently for imminent and dangerous weather conditions. The NWS uses NWR as its primary means to activate EAS. The EAS is also activated to enable state and local authorities to communicate important non-weather emergency messages, such as AMBER alerts and Civil Emergency Messages. With the exception of national-level activation of the EAS, it is voluntary for EAS participants, such as radio and television stations, to further relay NWS-generated messages.

EAS and NWR use identical digital protocols. The complete list of current EAS Event Codes (also known as NWR-Special Area Message Encoding (SAME)) is provided [here](#). There are some NWR receivers that do not provide SAME capability. In addition, there are some older, SAME-enabled NWR receivers--generally manufactured before 2004--which may not display some of the event codes implemented in 2004; in this case, the newer event codes will be displayed as unknown codes, but the receiver should still play the audio portion of the message. Check your receiver's manual or the manufacturer's website for more information. If you do not receive all of the event codes below, you may wish to consider purchasing a newer NWR model.

Note that if new Event Codes are approved for use by the FCC, the NWS will issue a Service Change Notice well in advance of implementing the new codes.

Early Radio: Military Communications

A Good Ambush

Kregg Jorgenson

In the spring of 1963 most of the world, with the exception of France, couldn't tell you where Indochina was let alone pin the tiny nation of South Vietnam down on a map without squinting or being off by a country or two.



The French had lost their bitter colonial war nine years earlier and were still reeling over the painful lessons learned while the U.S. was in the process of taking a more active role in the region. For years America had covertly bankrolled the French in their struggle and now was squarely behind the Diem regime in Saigon in its opposition to reunification efforts being militarily promoted by Ho Chi Minh. For the United States it wasn't a difficult wedge to drive home since there was little love lost between North and South Vietnam. Traditional anger and resentment were already hundreds of years old, so when the South Vietnamese government requested more than just [financial assistance](#) from the U.S., President John F. Kennedy quickly responded by sending Military Assistance Groups or advisory teams from the Army's newly established Special Forces, the Green Berets.

Corporal Richard Keeton was the enlisted half of one of those two-man advisory teams. When he arrived in country, a stocky, leather-faced veteran NCO with two wars under his belt briefed him, offering a few words of advice.

"First of all," he told the young corporal, "don't think you're going to pump up these people with God and country speeches, except for maybe the Cao Dai who worship damn near everybody."

"The others, and there are plenty of other clusters of people here, got a variety of Gods and we don't look like any of them. Besides, they've been fighting each other for a 1,000 years or so, give or take a century. Some of the soldiers you'll be 'advising,'" he added in a tone heavy with sarcasm and bordering on anger, "are corrupt, lazy, worthless pieces of water buffalo scat, who tolerate you only because you represent Santa Claus to them."

"You can buy and sell rank in this army for the price of a smoked ham, and the sad part is that some of these soldiers who are under the Saigon Army command are some of the most gung-ho and well meaning you'll ever find....some," he added, emphasizing the point.

"The rest, well, besides the ones who don't trust either their own officers or the enemy because they've been f***ed over by both sides for damn near forever, like I said, they only listen to us because of the goodies we have to offer; vehicles, weapons, equipment and s**t. Not to mention the televisions, cameras and jewelry found in our soon-to-be-built Post Exchanges."

When you're out on patrol, that is 'If' you can get your South Vietnamese Army hosts to go on patrol in the first place, then watch out for the enemy. Keep an eye on your back, these units you'll be advising are the enemy or have relatives in the Viet Cong.

"Let's see? Have I forgotten anything? Oh yeah, don't expect too much sympathy from the local population either because foreigners have been screwing them over for years too. We're just the latest folks to arrive. Any questions?"

Keeton shook his head, adding, "Other than that, Mrs. Lincoln, how did you like the [play](#)?"

"You got it, Corporal."

The informal but prophetic welcoming speech followed by a detailed and more formal briefing covering the mission specifics and the roles they would play in it, was straight forward enough. They were advisors. "You advise," said the briefing NCO.

"You try to work with them on strategy and tactics. You tell them which part of a grenade to throw. Hopefully you can get your South Vietnamese Army unit out in the bush and away from their rear area camps, and teach them to take the fighting seriously. No problem for you young studs."

However, there was a problem and the difficulty arose when the young officer, who was the second American attached to the Military Assistance team, and Corporal Keeton realized the South Vietnamese Army company they were assigned to wasn't exactly thrilled about finding the enemy or winning the war anytime soon. The South Vietnamese captain in charge of the infantry company seemed to be indifferent about the "advise" proffered by his U.S. advisors, which through his interpreter, a thin-faced, wiry little man who reminded Keeton of a ferret, the captain frequently chose to ignore altogether. Physical fitness was out of the question, as were map reading, jungle training, reconnaissance missions, road marches, small arms familiarization and patrolling, unless that is, the captain wanted to ransack a nearby village or two for booty. Ambushes were also out, which didn't leave the advisors much else to offer.

"Captain say too dangerous," explained the ferret-faced interpreter. "Too dangerous, he say! Much too dangerous. Too, too dangerous."

Frustrated and more than a little annoyed after too many ignored suggestions and too much disregarded military advice, the two Americans decided to try another tact.

It was blackmail. Sort of!

The unit was due for a re-supply of American goods and equipment, which meant the ARVN Captain would soon have new merchandise to sell on the "black market", a fact not lost on either advisor. The two Americans couldn't help but notice that when the supplies were dropped off nearly one third of them mysteriously disappeared a day or two later, and that a day or two after that the Captain disappeared for the weekend while his "ferret" appeared to be higher stakes when he gambled.

The key lay in the re-supply mission and the advisors knew it.

"So here's what we do," explained the Lieutenant to the Corporal. "We delay the re-supply, telling the little f****r that if we don't go out on at least one combat operation then we won't be re-supplied. We'll say our people ...no, better yet, our general in Saigon is unhappy with our efforts and that we have to offer him something...a patrol at least."

"You think it will work?" asked Keeton.

"It's worth a shot, which damn well may be the only one we'll see on this tour!" answered the Lieutenant.

When the American officer explained it to the ARVN Captain through his ferret-faced interpreter, Keeton nodded in solemn agreement to back him up. "He is unhappy!" added Keeton, trying to keep a straight face. "Beau coup unhappy. No mission, no supplies"

Reluctantly and after much discussion between the two Vietnamese, they agreed on a single combat operation.

"One mission," announced the ferret.

"A night ambush," added the American officer.

"Day!" countered the interpreter, not missing a beat.

"One platoon," came the Lieutenant.

"No, the entire company," screamed the ferret without waiting for the Captain.

"Let me guess...too dangerous?" asked the Lieutenant.

The ferret nodded. "Camp not safe with one platoon gone. Too dangerous. Many VC."

Okay, but we pick the ambush site added the American officer.

"Okay, you pick but the Captain in charge. He say too dangerous for people who do not know Vietnam."

Keeton wanted to tell the little s**t that maybe they could get to know it a lot better if they could go out on patrol once in a while, but he let it ride. It was as good as it was going to get. Both he and the Lieutenant knew it, so they gave in to this final condition.

"No problem. The Captain's still in charge on tomorrow's ambush. Say...first light?"

"No, too dangerous," announced the ferret. "Must plan. Next week sometime. After supplies come."

But this time the Lieutenant held his ground.

"No, before supplies come. No patrol, no supplies. How about the day after tomorrow?"

The ferret sulked, but he knew he was stuck. The two Americans had their answer.

In a makeshift briefing in the Captain's bunker the two U.S. servicemen selected the proposed ambush site—a fork in a jungle trail a few clicks north near a natural ford across a narrow river.

"It's a good spot. It's a main trail that comes out in the open to cross the stream. And maybe, just maybe, we can hide the entire company on this side of the river, not to mention his worship here," the Lieutenant nodded toward the reflective ARVN officer.

While the Vietnamese interpreter's English was least passable, his sense of recognizing sarcasm had not developed at all, at least not in his adopted language. To the ferret, 'his worship' sounded respectful.

"Captain say okay, but just one patrol..."

"Yeah, I knowtoo dangerous?" answered the Lieutenant.

"Correct!"

"Now how did I know that?"

So on the day of the ambush, as the warm morning gave way to a scorching afternoon, Keeton and the Lieutenant led the Vietnamese company towards the proposed ambush site. It would take nearly an hour of marching to reach it, and know the Captain wasn't about to remain the jungle overnight, the ambush would only have an hour or two to prove successful. After that they would have to return to camp.

"Well, at least it's an ambush sir," Keeton said, trying to sound positive. "And it is a good spot."

The young officer only shrugged. But the corporal was right. It was a good ambush site. One of the few real likely locations. They both know that the Viet Cong were very active in the area, and it was one of the few natural crossing sites.

A delay of several days, and the failure to get launched during the morning had cost them their advantage. The Americans knew that this had occurred because the Captain wanted to give the enemy every opportunity to he could to clear the area. It was general knowledge that the VC moved in the early morning or just prior to sunset.

By the Keeton and the Lieutenant reached the stream they were far ahead of the others, and they hadn't been in that big a rush. The jungle they found themselves in was surprisingly dense. As they waited for the ARVN company to come up, the two Americans cautiously checked out the immediate area, crossing the stream to see what immediate cover they had to work with. The underbrush was choked with vines and limbs woven together in a nearly impenetrable wall of vegetation. The trail itself showed recent signs of enemy use. Footprints and bicycle tracks were only a few hours old. It was indeed a good spot for an ambush. Satisfied, they sat back to wait for the ARVNs.

"Anytime now would be nice!"

Keeton whispered to the young officer at his side. The Lieutenant only nodded in response, staring back across the stream and down the narrow trail. He had intended to save the world from communism, beginning with Southeast Asia, but lately he was beginning to wonder if he lacked the necessary patience.

"Think they'll show?" asked Keeton.

"They'll have to if they want us to lead them back to camp" the officer replied. The jungle began to moan and ooze under the heat of the afternoon sun.

Suddenly, a loud 'crack' caught their attention. The two Special Forces soldiers whirled with weapons ready, scanning the jungle for whatever had made the sound. Tense seconds later, a large lizard croaked close by. They relaxed and let their guard down a bit.

As the day wore on the heat rose even higher, turning the jungle in to an oven as the two Americans waited for the ARVN company to arrive. It was nearly forty minutes later before they heard Vietnamese voices announcing their arrival.

"It can't be the Viet Cong," Keeton quipped. "They don't make that much noise.."

"...nor are they stupid enough to move this late in the day," added the Lieutenant.

As the first South Vietnamese soldiers cleared the bend in the trail, he spied the two Americans. Throwing up his hand, he waved at them and grinned. The soldier behind him was looking back over his shoulder, busy in conversation with someone else. All of them seemed oblivious to the threat of combat.

The second Vietnamese soldier carried his rifle in what could only be described as "the luggage grip," and scratched his a** absent-mindedly when he finally spotted the two advisors waiting on the other side of the river.

Like a 'Keystone Cops' parody unfolding, several soldiers walking directly behind the point man his back up, bumped into each other, then bunched up on the bank of the slow-moving river.

After a lengthy discussion, one soldier used his rifle to test the depth of the water at the crossing only to fall in to the river, spitting and sputtering as he surfaced. Laughter erupted immediately from his comrades, as Keeton and the Lieutenant could only shake their heads.

"Come on!" the Lieutenant called.

The expressions of mirth on the faces of the ARVN soldiers changed to looks of annoyance as they realized they would have to wade across the river. The soldier who had fallen tried to climb up the stream bank only to slip at the top and tumble back in to the river.

A second volley of laughter was short lived as the first rounds of a VC machine gun ripped through the trees above the ARVNs.

The gunfire was coming from the same area that the two Americans had spotted the lizard, which was a pretty good indication that it wasn't the reptile that had snapped the twig. The suddenness of the VC small arms fire sent the South Vietnamese soldiers scrambling for cover as they returned fire in a totally disorganized fashion. Within minutes Keeton realized that the VC had quietly slipped away, leaving the ARVNs to shoot up a now empty jungle. For the two Americans the trick now was to stay down and try to avoid being hit by "friendly fire."

Keeton and the young officer began yelling for the South Vietnamese to ceasefire.

"VC GONE! VC GONE!" Keeton shouted over the sound of the firing until the ARVNs finally got the message and the small arms fire subsided.

VC gone?" they yelled back as heads peeked out slowly to make sure the enemy had in deed left the area. The South Vietnamese point man stood up slowly and waved again, but refused to go anywhere near the stream bank again.

"Come on!" The Lieutenant yelled, motioning the South Vietnamese soldiers forward in pursuit of the fleeing VC.

"No," answered the hidden ARVN interpreter from somewhere back in the jungle across the stream. "Too dangerous! Captain say, you come back."

"Unbelievable," Keeton growled, shaking his head as he looked around the ambush site. "Think we'll ever get them back out on patrol again?"

"Maybe with a crowbar. Still, at least the VC agreed with us that this was a good ambush site..."

"Yes, sir, and they did a damn good job sneaking up on us too. Real professional. Now, if only they had stayed a little longer..."

"Uh-huh, and spread out in an L-shaped..."
"...and concentrated their fire..."

"That's right Corporal. Then they would have had one hell of an ambush"

"You think maybe the French forgot to tell us something?"

"You mean, like which side actually gives a shit about winning?"

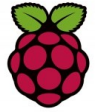
"Yes sir. Little things like that".

"Oui," said the Lieutenant. "Come on. Lets go before the Viet Cong figure out they screwed up more than our guys did."

Name of Net, Frequency, Local Time	Net Manager
Badger Weather Net (BWN) 3984 kHz, 0500	W9IXG
Badger Emergency Net (BEN) 3985 kHz, 1200	NX9K
Wisconsin Side Band Net (WSBN) 3985 or 3982.5 kHz, 1700	KB9KEG
Wisconsin Novice Net (WNN) 3555 kHz, 1800	KB9ROB
Wisconsin Slow Speed Net (WSSN) 3555 kHz, Sn, T, Th, F, 1830	N1KSN
Wisconsin Intrastate Net - Early (WIN-E) 3555 kHz, 1900	WB9ICH
Wisconsin Intrastate Net - Late (WIN-L) 3555 kHz, 2200	W9RTP
ARES/RACES Net 3967.0 kHz, 0800 Sunday	WB9WKO
* Net Control Operator needed. Contact Net Manager for information.	

Next Regular Meeting

The next meeting will be on Thursday, April 30th, at 7:00PM. We meet in the Fellowship Hall of Redemption Lutheran Church, 4057 N Mayfair Road. Use the south entrance. Access the MRAC Yahoo group for important details about the February Meeting.



Meeting Schedule:

May 28th, 2015- 7 pm

Please do not call the church for information!

Club Nets

Please check in to our nets on Friday evenings.

Our ten meter SSB net is at **8:00 p.m.** at **28.490 MHz USB** Our two meter FM net follows at **9:00 p.m.** on our repeater at **145.390 MHz** with a minus offset and a **PL of 127.3 Hz.**

Visit our website at: www.w9rh.org

Or phone (414)-459-9741



Chatter Deadline

The **DEADLINE** for items to be published in the **Chatter** is the **15th of each month**. If you have anything (announcements, stories, articles, photos, projects) for the 'Chatter, please get it to me before then.

You may contact me or Submit articles and materials by e-mail at: W9rhmrac@Gmail.com

or by Post to:

Michael B. Harris

807 Nicholson RD

South Milwaukee, WI 53172-1447

VE Testing:

May 30th, 9am—11:30am

No testing: June, August, or December

**Location: Amateur Electronic Supply Time: 9:30 AM
(Walk-ins allowed)**

ALL testing takes place at: Amateur Electronic Supply 5720 W. Good Hope Rd. Milwaukee, WI 53223

Area Swapfests

May 2nd, [ORC Spring Hamfest](#)

Location: [Cedarburg](#), WI Type: ARRL Hamfest

Sponsor: Ozaukee Radio Club

Website: <http://www.ozaukeeradioclub.org>

MRAC Working Committees

100th Anniversary:

- Dave—KA9WXN
- Dan—N9ASA

Net Committee:

- Open

Field Day

Dave—KA9WXN, Al—KC9IJJ

FM Simplex Contest

- Joe - N9UX
- Mark - AB9CD

Ticket drum and drawing

- Tom - N9UFJ

Newsletter Editor

- Michael-KC9CMT

Proofreader

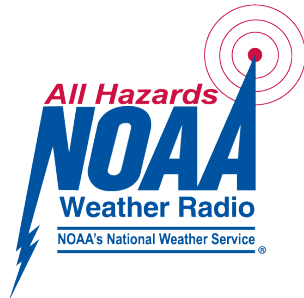
- Pancho-KA9OFA

Webmaster

- Dave, KA9WXN

Refreshments

- Hal—KB9OZN



Membership Information

The Hamateur Chatter is the newsletter of MRAC (Milwaukee Radio Amateurs' Club), a not for profit organization for the advancement of amateur radio and the maintenance of fraternalism and a high standard of conduct. MRAC Membership dues are \$17.00 per year and run on a calendar year starting January 1st. MRAC general membership meetings are normally held at 7:00PM the last Thursday of the month except for November when Thanksgiving falls on the last Thursday when the meeting moves forward 1 week to the 3rd Thursday and December, when the Christmas dinner takes the place of a regular meeting. Club Contact Information

Our website address <http://www.w9rh.org>

Telephone **(414)-459-9741**

Address correspondence to:



MRAC, PO Box 26233, Milwaukee, WI 53226-0233

Email may be sent to: w9rh@arrl.net . Our YAHOO newsgroup:

<http://groups.yahoo.com/group/MRAC-W9RH/>

CLUB NETS:

- The Six Meter SSB net is Thursday at 8:00PM on 50.160 MHz USB
- Our Ten Meter SSB net is Friday at 8:00PM on 28.490 MHz \pm 5 KHz USB.
- Our Two Meter FM net follows the Ten meter net at 9:00PM on our repeater at 145.390MHz - offset (PL 127.3)



The MRAC HamChatter is a monthly publication of the Milwaukee Radio Amateurs' Club. Serving Amateur Radio in Southeastern Wisconsin & all of Milwaukee County

Club Call sign – W9RH

MRAC Website: <http://www.W9RH.org>

Editor: Michael B. Harris, kc9cmt@Earthlink.net

Milwaukee Area Nets

Mon.8:00 PM 3.994 Tech Net

Mon.8:00 PM 146.865- ARRL Newsline

Mon.8:00 PM 146.445+ Emergency Net

Mon.8:00 PM 146.865- Walworth County ARES net

Mon. 8:00 PM 442.100+ Railroad net, also on EchoLink

Mon.8:45 PM 147.165- ARRL Audio News

Mon. 8:30 PM 442.875+ WARC net also on EchoLink 576754

Mon. 8:30 PM 146.820 Waukesha ARES Net on the 1st, 3rd, and 5th Monday of each month.

Mon. 9:00 PM 147.165- Milwaukee County ARES Net

Tue.9:00 AM 50.160 6. Mtr 2nd Shifter's Net

Tue. 9:00 PM 145.130+ MAARS Hand Shakers Net

Tue. 8:00 PM 7.035 A.F.A.R. (CW)

Wed. 8:00 PM 145.130+MAARS Amateur Radio Newsline

Wed. 8:00 PM 147.045+ West Allis ARC net

Wed. 8:00 PM 147.270+ Racine County ARES net

Wed. 9:00 PM 145.130+MAARS SwapNet, Allstar FM-38

Thur. 8:00 PM 50.160, 6 Mtr SSB Net

Thur. 8:00 PM 443.800+ Tech Net

Thur. 9:00 PM 146.910+ Computer Net

Fri. 8:00 PM 28.490 MRAC W9RH 10 Mtr SSB Net

Fri. 9:00 PM 145.390+ W9RH 2 MTR. FM Net

Sat. 7:30 AM MW Classic Radio Net , Frequency—3885 AM

Sat. 8:00 PM 146.910+ YL's Pink HAMsters Net

Sat. 9:00 PM 146.910+ Saturday Night Fun Net

Sun 8:00 AM, State ARES Net 3967/3977.5/145.470

Sun 8:30 AM 3.985 QCWA (Chapter 55) SSB net

Sun 9:00 AM 145.565+ X-Country Simplex Group

Sun 8:00 PM 146.910+ Information Net

Sun 8:00 PM 28.365 10/10 International Net (SSB)

Sun 9:00 PM 146.910+ Swap Net

Daily: Milwaukee — Rag Chew Net: 7:00 AM, 3850 SSB + Florida Net 7 am, 14.290 mhz.

2meter repeaters are offset by 600KHz - - 70 centimeter repeaters are offset by 5 MHz

SSB frequencies below 20 meters are LSB and for 20 Mtr and above are USB.

