MRAC Hamateur Chatter

The Milwaukee Radio Amateurs Club

May 2015 Volume 23, Issue 5

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

Presidents' Letter

Summer is almost upon us, so this is a friendly reminder that our next meeting--May 28 at the Redeemer Lutheran Church Fellowship Hall in Milwaukee--is our annual Club Auction. Everyone is welcome to buy, sell, or just enjoy the show. You don't have to be a member to participate, and this event is FREE to all (of course, donations are graciously accepted). This is always a popular event that brings many visitors to our club, especially since sellers get to keep every penny raised for their items. Dave WB9BWP will once again serve as our auctioneer. Don't forget to bring your cash for some new treasures.

The summer also means that Field Day is right around the corner. We will again have our joint site for MAARS and MRAC at Konkel Park in Greenfield, which is located at 5151 W Layton Ave, on June 27 and 28. One new addition to our setup this year will be a pneumatic mast that can support 200 pounds (a key find during our trip to the 2015 Dayton Hamvention). We still need to do some testing, but the hope is that the new mast will make setup, operating, and tear down much easier.

Our goal every year at Field Day is to have a fun showcase for ham radio and make some contacts. So we are inviting you to join us for either of the days (or the whole weekend). If you have a radio or antenna you want to try, you are welcome to bring it along. As in years past, the clubs will provide food/drinks to those who operate and help with the setup/tear down efforts. Plus, you don't want to miss our late-night disco tent.

Finally, mark your calendars for the Maker Faire Milwaukee on September 26 and 27 at State Fair Park. This is the second year for the event, which showcases the "maker movement": the global community of do-it-yourselfers bringing creativity and innovation to different fields of technology, crafts, and entrepreneurship. Last year, more than 35,000 people attended this free event, which was pretty impressive for its inaugural year. We are working with the organizers to have a ham radio setup at the event. If you are interested in participating, please let me know. We will be looking for ideas for the best way to present amateur radio to the general public.

'73 Dave, KA9WXN

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The Experimenters' Bench

Design and construction of radio frequency oscillators

Some people regard the design of RF Oscillators to be something akin to a "black art" and after many years of swearing at "cranky" oscillators I'm not all too sure they are all that wrong. I suggest you ensure you remember this old saying:

"Amplifiers oscillate and oscillators amplify" - unknown

Introduction

When I was a kid, yes I can remember back to the late 1940's, we collected all manner of junk. Cool was anything remotely electrical and, of course bicycle dynamos, lamps or motors were even "extra cool".
We as precious little seven year olds conceived - all budding nuclear physicists that we were - of this real smart idea, obviously nobody had ever thought of this before.
"Why don't we connect a motor to a generator, so the motor drives the generator, providing electricity for the motor, which continues to drive the generator and it'll go on, and on, and on for a hundred years and we'll become world famous!"

Of course we had no concept of frictional losses (I think that's right) way back then. Nor had the words "perpetual motion" passed our ears.

The whole point of that little story is to crudely demonstrate the principle of how an oscillator works. If you can follow that childishly naive concept then you will kill them in this.

Principles of Oscillator operation

Every oscillator has at least one active device (smarties don't complicate matters for me - just read on) be it a transistor or even the old valve. This active device and, for this tutorial we'll stick to the humble transistor, acts as an amplifier. There is nothing flash about that. For this first part of the discussion we will confine ourselves to LC Oscillators and I'll keep the math to an absolute minimum.
At turn on, when power is first applied, random noise is generated within our active device and then amplified. This noise is fed back positively through frequency selective circuits to the input where it is amplified again and so on, a bit like my childhood project. Ultimately a state of equilibrium is reached where the losses in the circuit are made good by consuming power from the power supply and the frequency of oscillation is determined by the external components, be they inductors and capacitors (L.C.) or a crystal. The amount of positive feedback to sustain oscillation is also determined by external components.

Hartley Oscillator

I decided to lead off with this one for the simple reason it's my favorite. Recently it was discussed that your favorite oscillator was likely the one which worked best for you and I think that is quite true. So here it is in it's most simplified form.

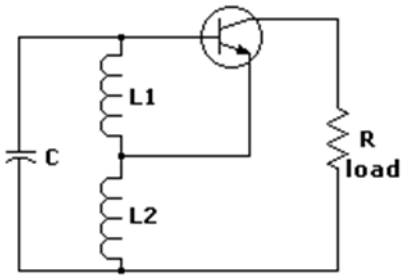


Fig. 1

Colpitts Oscillator

The basic Colpitts oscillator circuit look like this and you will see some similarities.

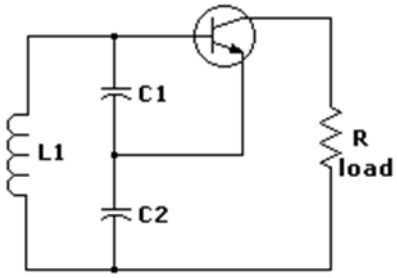


Fig. 2

If you consider positive feedback is applied to compensate for the losses in the tuned circuit, the amplifier and feedback circuit create a negative resistor. When Z1 and Z2 are capacitive, the impedance across the capacitors can be estimated from a formula I won't lay on you here because it includes beta, hie, as well as X_{C1} and X_{C2}. Suffice to say it can be shown that the input impedance is a negative resistor in series with C1 and C2. And the frequency is in accordance with:

$$f_o = \frac{1}{2\pi [LC_1C_2/(C_1+C_2)]^{1/2}}$$

Fig 3.

Frequency or Phase Stability

Frequency or phase stability of an oscillator is customarily considered in the long term stability case where frequency changes are measured over minutes, hours, days even years. Of interest here are the effects of the components changes, with ambient conditions, on the frequency of oscillation. These might be caused by changes in the input voltage, variations in temperature, humidity and ageing of our components.

Never underestimate the effects of these variations on the frequency of operation. I've gone nuts working on so called precision designs, with precision components, where the frequency wandered at random over several kilohertz over several minutes. Needless to say I'd "messed up".

Short term stability is also of great interest and, again I could lay some real heavy maths on you but I won't. I'll simply say it can be mathematically proven that the higher the circuit Q, the higher this stability factor becomes. The higher the circuit Q, the better the ability the tuned circuit can filter out undesired harmonics AND noise.

Reducing Phase Noise

1. Maximize the Qu of the resonator.

2. Maximize reactive energy by means of a high RF voltage across the resonator. Use a low LC ratio.

3. Avoid device saturation and try to use anti parallel (back to back) tuning diodes.

4. Choose your active device with the lowest NF.

5. Choose a device with low flicker noise, this can be reduced by RF feedback. A bipolar transistor with an unby-passed emitter resistor of 10 to 30 ohms can improve flicker noise by as much as 40 dB.

6. The output circuits should be isolated from the oscillator circuit and take as little power as possible.
Effects of ambient changes on stability
A frequency change of a few tens of hertz back and forth over a couple of minutes would mean nothing to an entertainment receiver designed for the FM Radio band. Such a drift in an otherwise contest grade receiver designed to receive CW (morse code) would be intolerable. It's a question of relativity.

Minimizing Frequency drift
These are random and not in any particular order.

- 1. Isolate the oscillator from succeeding stages with a well designed buffer stage followed by a stage of amplification. Large signals can often then be reduced by a 3 or 6 dB attenuator which also has the benefit of presenting a well defined load impedance to the amplifier. If the stage is feeding a mixer, as is most often the case, then another benefit is the mixer (you are using double balanced mixers?), also see a source impedance of 50 ohms.
- 2. Ensure the mechanical stability of your oscillator is such that mechanical vibration can have no effect on components, especially those frequency determining components.
- 3. Supply the oscillator with a clean well regulated supply. If using varactor tuning, doubly ensure the tuning DC voltage is as clean as possible, a few hundred micro volts of noise can be imposed on the oscillator signal. Use back to back diodes for the variable element. Air variables are hard to come by although they offer far superior Q figures. DC tuning tends to be more versatile.
- 4. Minimize circuit changes from ambient variations by using NPO capacitors, polystyrene are dearer but excellent, silvered mica in my opinion are not what many people believe and are highly over rated.
- 5. The inductor should be air wound on a coil form with a configuration to maximize Qu. If you must use a toroid, where possible try to use the 6 type as it offers the best Q. Sometimes, for other reasons you might have to use a slug tuned form.

6. Parallel a number of smaller value NPO capacitors rather than using one large one in frequency determining components. For trimmers try and use an air variable. Keep an eye out for small value N750, N1500 capacitors, < 15 pF, when available and are found to be dirt cheap. These are sometimes useful in taming drift in an oscillator.

7. Bipolar or FETS for active device seems to be a matter of personal preference and I've seen some ferocious arguments over that one. Consensus seems to come down in favour of FETS. Me, I'm a bipolar man because FETS hate me pure and simple.
So there are some of the things to keep in mind. Hopefully at this point you have discovered the broad idea of an oscillator, I've outlined broadly two types Hartley and Colpitts. I spoken about frequency stability and listed ways to combat phase noise and reducing frequency drift. Now let's proceed to the main course.

Designing a Hartley Oscillator
Here I'll present the schematic for my old favorite, together with a buffer stage and an amplifier stage which should deliver about 5V P/P into a 50 ohm load. We'll discuss each relevant stage and produce some rule-of-thumb design info. Because the consensus comes down in favor of FETS and I'm big enough to lay aside my prejudices in the noble cause of advanced education we'll use a FET oscillator. Nothing to do with a few friends who might belt me up!

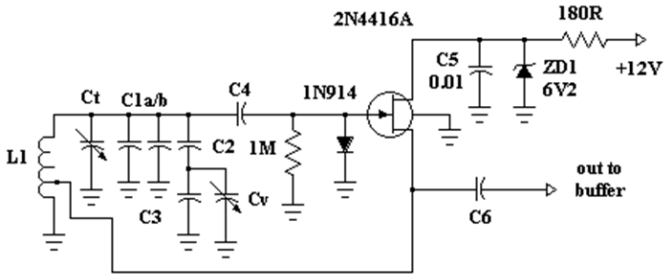


Fig 4.
For this design I'm going to say we will be constructing a general purpose VFO to operate at 5000 - 5100 Khz no particular reason, pick anything you like.

Now I chose a 2N4416A FET purely because I bought a big bag of them years ago and have them on hand. You could use any general purpose JFET you can readily obtain. Note the 2N4416A is a metal can and the case is grounded.
The frequency determining components are L1, Ct (a nominal 10 pf trimmer), C1a, C1b, C2, C3, Cv and C4.

Note: I have been asked a number of times the function of C4 in this circuit. Capacitor C4 is to reduce the loading on the tuned circuit components. It may be as small as possible consistent with being able to provide sufficient drive to the succeeding buffer amplifier stage. Often the home constructor will often make C4 a trimmer.

The other components are bog standard. The two resistors, silicon diode and zener diode need never change, capacitor C5 is about right for this frequency. C6 can be selected to give higher / lower output to the buffer amplifier. Smaller C6 values give lower output and conversely higher values give larger output.

The silicon diode I'll explain later, the zener diode is to give a regulated 6.2 volt supply

Now there is NOTHING sacred about my frequency determining capacitor combination O.K.? Too many people look at these kind of circuits and think they must duplicate everything literally, not so. This is just a typical representation. C1 to C3 plus Cv and Ct are just a combination of parallel and some series capacitors all designed to give us a bit of flexibility with the tuning range. Cv could easily be replaced by two back to back tuning diodes.

What you need to do to get the circuit to work is to have an inductive reactance for L1 of around about 180 ohms. At 5 Mhz this works out at about 5.7 uH and, if you don't know how I arrived at that figure I seriously recommend you spend some time on my other tutorials on my new site such as Basics and LC Filters.

The important aspect is that the feedback point from the source of the JFET connects to about 25% of the windings of L1 from the ground end. Now I've depicted an air cored inductor. It could be, just as one example among a great many, 18 - 19 turns of #20 gauge wire on a 25.4 mm (1") diameter form spread evenly over a length of about 25.4 mm (1"). The tap would be at about 4 1/2 turns. Check that out with the formula's I taught you elsewhere.

Alternatively, with degraded performance, you could use a T50-6 toroid and wind say 37 turns of #24 wire (5.48 uH) tapping at 9 turns. The A_L factor for a T50-6 is 40. Again do the other tutorials if necessary, I'm not going to repeat old work and it's going to be even harder from here on. I'll thoroughly explain new concepts, not the old.

So if we are to have our oscillator working at about 5 Mhz, we know the LC is 1013 and if L is say 5.7 uH then total C for resonance (just like LC Filters eh!) is about 177 pF. We want to be able to tune from 5000 to 5100 Khz a tuning ratio of 1.02 which means a capacitance ratio of 1.04 (min to max.). Let's fiddle with some numbers! I have a Jackson Bros. air variable capacitor (very Rolls-Royce) which swings from 10.5 pF to 105 pF, a typical 10:1 ratio in air variables. This I will use for Cv.

If the total swing is 1.04 (actually 1.0404:1) and Cmax is 177 pF it follows Cmin is 170 pF. A variation of only 7 pF (roughly). Now we're treading on unsafe ground here with such a large variable capacitor. We could:

A) rip plates of it to reduce capacitance (don't even think about it)
B) go to varactor diodes with a small swing. That's O.K. but performance becomes degraded.
C) obtain a smaller air variable with Cmax of say 25 pF.

Just to prove I'm a glutton for punishment and if you're still here so are you, we will purely for the mathematical exercise, persevere with the 105 pF variable. What if we eliminate C3 and make C2 = 15 pF NPO then the series combination of C2 and Cv swing 6.176 pF to 13.125 pF, a variation of over 6.9 pF - are you lost? Go back to the other tutorials.

If our Cmax was 177 pF then 177 - 13.125 = 163.875 and the 177 pF was approximate anyway. I'd make Ct a 10 pF air trimmer (if available, if not, a ceramic or whatever the supplier offers but 10 pF max.).

That leaves about 154 pF to make up. How about making C1a and C1b into 3 NPO capacitors of say 2 X 47 pF and 1 X 56 pF all NPO types. In total that comes to less than 177 pF max. but don't forget there are stray capacitance's in the circuit. In the final wash-up you could simply use 3 X 47 pF.

FCC Proposes to Permit Amateur Access to 2200 and 630 Meters

Amateur Radio is poised to gain access to two new bands! The FCC has allocated a new LF band, 135.7 to 137.8 kHz, to the Amateur Service on a secondary basis. Allocation of the 2.1 kHz segment, known as 2200 meters, was in accordance with the Final Acts of the 2007 World Radio communication Conference (WRC-07). The Commission also has proposed a new secondary 630 meter MF allocation at 472 to 479 kHz to Amateur Radio, implementing decisions made at WRC-12. No Amateur

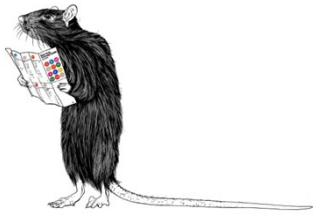
Radio operation will be permitted in either band until the FCC determines, on the basis of comments, the specific Part 97 rules it must frame to permit operation in the new bands. Amateur Radio would share both allocations with unlicensed Part 15 power line carrier (PLC) systems operated by utilities to control the power grid, as well as with other users.

In addition, the FCC has raised the secondary Amateur Service allocation at 1900 to 2000 kHz to primary, while providing for continued use by currently unlicensed commercial fishing vessels of radio buoys on the "open sea."

The allocation changes, associated proposed rules, and suggested topics for comment are contained in a 257-page FCC Report and Order, Order, and Notice of Proposed Rulemaking addressing three dockets -ET-12-338, ET-15-99, and IB-06-123 - which affect various radio Services in addition to the Amateur Service. The FCC released the document on April 27.

With respect to the new LF sliver band at 135.7-137.8 kHz, the FCC concluded that Amateur Radio and PLC systems can coexist there. "Since the Commission last considered this issue, amateurs have successfully operated in the band under experimental licenses without reported PLC interference," the FCC said. "We are also encouraged by the fact that numerous fixed radio navigation beacons, which operate at much higher powers, share spectrum with PLC systems without reported interference."

In 2003 the FCC turned down an ARRL proposal to create a 135.7-137.8 kHz Amateur Radio allocation, after utilities raised fears of a clash between Amateur Radio and PLC systems operating below the AM broadcast band. This time, the FCC said, "It is clear that we will have to establish appropriate requirements for amateur use of the band.



The Rat Paths of New York

How the city's animals get where they're going.

By RYAN BRADLEY
April 23, 2015

Most New York animals stay close to home. Yes, itinerant coyotes will traverse the parks by night, and raccoons might travel half a mile in search of better trash, skunks a little less. But feral cats won't stray three blocks beyond where they were born, and few mice will venture more than a hundred feet from their burrows in a lifetime. Rats seldom stray far from home, either. But they get where they're going more easily than other New York animals, because they are more like us. The city suits them.

"With rats, the map is almost three-dimensional: the surface, the buildings, everything underneath," Jason Munshi-South told me. We were rat-spotting in Lower Manhattan, and Munshi-South, an urban ecologist who is an associate professor at Fordham, was explaining what he'd discovered after studying New York rats, also known as Norway rats or brown rats, for three years. They cannot, as legend has it, collapse their skeletons to fit through cracks, nor are they especially bold; indeed, they're "neophobic," which means they won't touch a new object, even unfamiliar food, for at least two days and sometimes as long as a week. They nearly always follow the same routes to their food sources. They sleep, on and off, for about 10 hours a day, and the rest of the time they travel in tight, well-worn paths. Munshi-South's back-of-the-envelope estimate is that they take at least 2,800 steps a day, compared with the average American human's 5,000 or so.

Rats live in colonies of 40 or 50 and sometimes relocate to new homes, but over the course of their one-year life span they rarely walk more than 600 feet from their birthplace. When they do, they seem to move north and south, with the subways, but, Munshi-South emphasized, no one is sure exactly how they do it. "We don't even know if they move between stations, under- or above-ground," he said. "That's something we hope to figure out."

We walked north from City Hall Park into the southern edge of Chinatown. Munshi-South was confident we'd see some rat activity, even on this bright, crisp morning. In the city, rats hug structural edges ("feeling" the walls with whiskers), and their routes are marked by sebum, oil from their hair that rubs off and darkens the concrete landscape. Pay attention, and you'll see these lines on walls, an inch or so above the sidewalk, sometimes smattered with little clumps of fur. Rats build their colonies wherever they can burrow: in dirt, certainly, but really anywhere crumbly and close to constant food, usually in the form of trash, which is more or less everywhere. (A few pockets of the Upper East Side are free of large permanent rat colonies, but that's about it.) Every few minutes, Munshi-South pointed to a lumpy mound, usually under a bush or near a trash can, pocked by silver-dollar-size holes. Rats tend to use just one entry and exit, but they like to build extra escape routes just in case.

"This is insane," Munshi-South said. "It looks like a prairie-dog town." We had reached Columbus Park, an asphalt playground near the original Five Points, the slum where men would pay up to $5 during the 1870s to watch fox terriers battle rats in the backs of saloons. Now a few seniors practiced tai chi, while others set out bowls of rice as offerings to passing spirits. What small patches of green remained had been scraped flat by rats. They weren't eating the grass, Munshi-South explained, just dragging a lot of trash across it. "I bet if we just wait, they'll come out," he said.

Not more than a minute passed before a big rat emerged from under a bush and approached a woman who was putting out rice bowls. He inched forward slightly — it was a male; we could see his testicles — then rested, waiting. A minute passed, and a bigger rat emerged, also a male. He ignored the rice, though, and instead ambled from one rathole to the next, occasionally snapping up a loose crumb. There was a practiced efficiency to his movements, but he was old and missing an eye. "He's making the rounds," Munshi-South said — looking for the scraps that more successful rats had discarded. "He'll probably be dead in a few days." For now, though, the city would provide.

New York is the rat's ideal habitat. Our idea of what a park or public space should look like mirrors its native environment, which, contrary to the animal's common name, was almost certainly the grassy Asian steppe. We mow grass, plant a few shrubs and low bushes, a line of trees. Then we improve on nature by adding a constant source of food, our trash. Now at least two million rats live here, maybe millions more, depending on which scientist you ask. If we'd like fewer of them around, we might start thinking about how to make the city more attractive to other animals.

But most animals have a hard time getting around the city. When Munshi-South first moved to New York eight years ago, he studied white-footed mice, which live in heavily wooded parks, where there are many fewer rats. (Rats eat baby mice.) He took genetic samples from hundreds of mice that had been trapped in 15 parks, on a hunch there might be some differences among them. A mouse in Pelham Bay, after all, would rarely if ever interbreed with a mouse in Central Park; the journey would simply prove too daunting. His results confirmed the disconnection: White-footed mice so rarely leave their forested home territories that, over time, each population of city mouse became for practical purposes marooned, and genetically distinct. A white-footed mouse from the Bronx, indeed, never makes it to Manhattan or any other borough.

Still, new animals do show up from time to time — turkeys, red foxes, coyotes. Leslie Day has been watching them come and go most of her life. She lived on a houseboat at the West 79th Street Boat Basin for nearly 40 years, falling in love with the wilder aspects of this urban space. A middle-school science teacher, she eventually got her Ph.D. in science education and wrote three books drawing on her observations and research, including the "Field Guide to the Natural World of New York City," with entries on, among other city animals common and uncommon, Eastern gray squirrels, rabid wolf spiders, opossums, red-backed salamanders, cabbage white butterflies, common snapping turtles, the Northern rock barnacle, the double-crested cormorant, little brown bats, big brown bats, the American eel, the pyralis firefly and, inclusively, earthworms, which, she notes, "were brought to North America by the early European settlers."

Day recently moved to land, in Washington Heights, near the George Washington Bridge. Down at the basin she watched raccoons and squirrels, but up in Washington Heights she follows skunks. "Oh, my God, we have a million of them," she said when we met at her apartment. Skunks have terrible eyesight and live their lives low to the ground, smelling, smelling and being startled. One had taken up residence under Day's front stoop, she said, and we went out to take a look. There were hundreds of tiny, perfect divots in the lawns surrounding her apartment building, where skunks had stuck their noses into the soil, rooting for bugs.

We walked over to the Heather Garden in Fort Tryon Park. Day pointed to a gap along the terrace — last summer, she said, she had been walking past this very spot with her friend Mike Feller, who worked as the chief naturalist for the city's Parks Department for 31 years, and they noticed something unusual: a mound of brilliant white sand pierced by a pinhole leading down into the earth. Day thought it might be a sand trap made by an ant lion, a predatory insect, but Feller told her no, it was probably just plain ants. He'd bet anything, he continued, that it was sand someone dredged from the Rockaways and trucked up long ago to make this terrace. The ants go down and excavate it, reminding us of our past. Like the rats, and the woodchucks, and the skunks, and all the burrowing creatures, even us, the ants don't just walk back and forth, but up and down, through time.

When I got home I called Feller, and he told me about another small but significant journey that happens each spring, one that has been happening since not long after the glaciers retreated thousands of years ago. It isn't historic, Feller said. Just beautiful.

Illustration by Louise Zergaeng Pomeroy

"On warm, rainy nights, the spotted salamanders emerge from underground and walk 100 yards down to vernal ponds — wetlands that only exist in the spring and beginning of summer — to breed," he said.

"It's a highly ritualized, synchronized thing that they do: Coming up out of the forest floor, they amble down to the water's edge, and a male and female do this very intricate nose rubbing. They swim together, then apart, and the male swims down and leaves a little mushroom, a sperm-containing sack, and the female dives down, picks it up and implants it in her. It is a bizarre, aquatic ballet. In a few small spots in the city, it's happening, right now."

Most animals make city living better, or more interesting, but animals that eat rats might be especially welcome. Coyotes from the Bronx have devoured many rats in Riverside Park and Central Park, and in April a coyote was sighted all the way down in Chelsea. Smaller rat catchers, like foxes, are not uncommon in London, but they are rare in New York. We don't make it easy for them. If you're a fox or a coyote coming in from the countryside, you might try to stick with what you know: dirt, low cover, bushes that hug the ground. You would follow the rail lines, which are open to the air but still overgrown in places, or the parkways, the great green strips that Robert Moses built, or even the older, abandoned Long Island Motor Parkway, between Alley Pond Park and Cunningham Park, in eastern Queens. You would follow them until the concrete takes over completely. And then? Well, it gets harder. (It's worth noting that probably the greatest predator of rats in Manhattan right now is the red-tailed hawk, which of course moves with far more freedom.)

In Central Park, I met Timon McPhearson, a professor of urban ecology at the New School. McPhearson studies how animals and plants get from one place to the next; for the last 10 years, he has been thinking about how to connect big "reservoirs of biodiversity," like Central Park, to everything else. Even things as small as the walled-in tree pits all along the sidewalk outside the park. "That's a dot," he said, pointing to one. "I want to connect the dots."

Sometimes, as in the case of the tree pits, connecting the dots can be as simple as adding a green strip between them. Open up the sidewalk a little, add some dirt, pull a few benches apart and, presto, all kinds of animals suddenly have a space for darting and hiding. Or run a pipe under the road, maybe put some soil in there to make it slightly more comfortable. "It's all open," McPhearson said. "You just need to start thinking about negative spaces, spaces that aren't being used for anything else."

Most of McPhearson's proposals for building a connected city are modest ("If you can imagine where to put a bike rack, you could imagine where to put a green element"). But he has a larger vision of what the city might be, which begins with turning five blocks of Midtown into a pedestrian plaza with a natural, historic creek running through the middle. "That would be the new, future park," McPhearson said. "The whole world would gasp." It wouldn't be cheap, but the countervailing revenue potential in real estate is huge; according to McPhearson, a tree in front of a house increases that house's value by as much as 15 percent.

A new ecological infrastructure could have an impact worth billions of dollars, not just in the form of pricier lofts and storefronts but in the form of better mental and physical health. We are fundamentally natural beings, as McPhearson points out,

Social Commentary

and we are drawn inexorably to wild spaces, no matter how small — an affinity that E. O. Wilson, drawing from Erich Fromm, called biophilia. ("Mysterious and little-known organisms live within walking distance of where you sit," Wilson wrote in 1984. "Splendor awaits in minute proportions.") McPhearson's fundamental point is that spaces where animals can move freely are good for people too.

The animals will come if we let them. Northern Manhattan alone has six large parks, and it is connected by five bridges to substantial woodlands in New Jersey, the Bronx and the forested suburbs beyond. In recent years, woodchucks have begun to make their way into Manhattan from the north. They are leaving the suburbs for the same reason rats began heading uptown long ago: overpopulation. As farming near the city has subsided, the woods have returned, and with the woods the wildlife. It's natural dispersal, driving the woodland creatures to follow the landscape into the city.
Soon, thanks to a series of city- and state-sponsored greenway projects, the woods in the highlands that spill down to the Hudson will be interconnected, and a path will run along the river from the northernmost point of Manhattan down to the Battery — a great route for a bike ride or run, and a new, complete byway for the wild things coming down from the north. A fisher, a sort of weasel that preys on rodents, was seen in the Bronx last summer. That was unusual, but there could be more, moving farther south, as the paths into the city ease.

When I was walking with Leslie Day through Fort Tryon Park, the heath was beginning to come in, shades of purple and lavender against the brown and gray. We stared out at the great gray river, treetops tumbling down to its shore, and I mentioned how it was interesting that all these animals would come into the city, and that so many would choose to stay. "Oh, but just look at what's here!" Day said, and she swept her arm across the vernal la.

Severe Weather Awareness

The Long-Term Dangers of Hail Damage

Hail occurs within large storm clouds known as cumulonimbus clouds. When part of the clouds are at freezing or below freezing temperatures, rising water droplets freeze and fall to earth as hailstones. Hailstones are typically small, a centimeter in diameter or less, but can be much bigger. Hailstones as big as golf balls are sometimes reported, and any hailstones greater than two inches in diameter are likely to cause damage to buildings.

While the temperature in the clouds where hail originates must be freezing, the temperature on the ground can often be quite temperate. Hailstorms occur throughout the United States during summer. The severity of a hailstorm is often measured according to the size of the hailstones, as this is typically proportionate to the amount of damage sustained by homes and property.

When large hailstones are seen, the biggest fear for homeowners is that their roof will be damaged. The roof is the first line of defense against most severe weather, and shingles are often broken or torn off by the hail and by the strong winds present during the storm. Wooden houses and houses with siding are also affected by severe hailstorms. Gutters and decks can be badly damaged as well, with gutters occasionally being knocked loose from the home.

When hailstorms damage a home, many repairs need to be made immediately. The roof must be inspected to assess the extent of the damage and determine what repairs will be necessary. Sometimes only a few shingles need to be replaced, and other times the entire roof may need attention to fix cracks, leaks, or sagging roof supports. The walls of the house also need to be inspected, not only for paint damage, which is likely, but for structural damage as well. If hailstones knock pieces of siding askew or cracks the wooden siding, a home may be susceptible to further damage.

One of the biggest dangers from hailstorms comes from the immediate damage caused by the hailstones. Because the damage done by hailstones is obvious and easy to see, it is also easy to do cosmetic repairs. The danger comes from the unseen damages. If a hailstorm has weakened a roof's supports and caused slight misalignments and cracks between shingles, it may not be repaired properly. If there appears to be no damage, a homeowner may never realize rain water is seeping into the attic with every summer shower. By the time mildew or mold smells signal water in the home, the roof supports could have rotted and the entire roof may require replacing.

Similarly, the damage done to the sides of a house, while initially appearing cosmetic, may have weakened or shifted the siding enough to expose the wood beneath. When the wood is exposed to the elements, it is susceptible to water damage and pests that could quickly and silently cause extensive home damage. Inattentiveness and unwillingness to fix what doesn't appear to be a serious problem could lead to expenses and hassles you had not planned for.

Severe Weather Awareness

WHAT ARE STRAIGHT-LINE WINDS?

There are several terms that mean the same as straight-line winds and they are convective wind gusts, outflow and downbursts. Straight-line wind is wind that comes out of a thunderstorm. If these winds meet or exceed 58 miles per hours then the storm is classified as severe by the National Weather Service. These winds are produced by the downward momentum in the downdraft region of a thunderstorm. An environment conducive to strong straight-line wind is one in which the updrafts and thus downdrafts are strong, the air is dry in the middle troposphere and the storm has a fast forward motion.

A storm with a strong updraft will tend to have a strong downdraft. When the CAPE is very high then strong or severe convective wind gusts could occur. Dry air aloft will entrain into the downdraft. This promotes evaporative cooling and this further enhances the negative buoyancy of a parcel. A cold parcel of air surrounded by warm air will sink since the cold air is more dense. The colder the parcel is compared to the surrounding air then the faster it will sink. Dramatically cooler air is often noticed at the surface when the downburst air reaches the observer. When a storm has a fast forward motion the rate that the downdraft is moving is added to the storm motion. This can produce strong to severe winds out ahead of the storm as the storm approaches.

When the National Weather Service does a storm damage survey they distinguish between straight-line wind and wind produced from a tornado. Straight-line wind damage will push debris in the same direction the wind is blowing (hence the creation of the term straight-line). Tornado damage will scatter the debris in a variety of different directions since the winds of a tornado are rotating violently. This type of survey can be used to determine if straight-line wind occurred instead of a tornado or vice versa. Straight-line wind intensity can be as powerful as a tornado. Because of this some people in the general public will believe a tornado occurred when it reality one did not occur.

To reduce the damage from straight-line wind it is important to secure objects that can be blown by the wind. It is also important to keep trees well pruned. Tree branches falling on cars or houses produce a significant amount of damage in high wind events. Also make sure you are in a safe place when the straight-line wind strikes such as in the interior of a brick home. Storms with severe straight-line winds often also have hail and tornadoes.

Early Radio: Military Communications

Hill 65

Chuck Truitt - Watch Him - January, 1970

"Roger That! Echo Five Tango, Over and Out." I had gotten the word that we were moving down to DaNang and 1st Radio Battalion Headquarters. This was all happening there at the end of January 1970. From Bn. Hqs. we'd be split up and sent "to the winds;" that is, to wherever we were needed individually. Of course, that was the nature of the work that my MOS (Military Occupational Specialty) did. We were usually sent out and attached to, or worked closely with some other Combat Unit. I had worked with the 4th Marine Regiment at Vandergrift Combat Base, and on Dong Ha mountain, except for the past few weeks when it was with the "doggies" of the 1st Brigade / 5th Infantry Division (Mechanized). This shift further south and away from the DMZ was in conjunction with the 3rd Marine Division permanently leaving Vietnam. It's my understanding that since I had been "in-country" just under six months, I got to stay; looking back on it though, I think probably that no one from 1st RadBn would be included in that 6 month ruling.

Everything that I owned, was on my back. I got a C-123 "Provider" out of Dong Ha and went to Battalion Hqs. at DaNang for several days while they figured out what to do with me. Now let me tell you, I was really leery of riding in the back of that "Provider." They had proven great aircraft over the years, and they were used for about every kind of mundane job that the military could come up with in the transportation category. This particular aircraft that flew a "milk run" between Danang and Dong Ha was in pretty rickety shape. It wouldn't even hold pressurization due to the shrapnel and bullet holes. There were no kind of seats, not even web seats, everyone just got in and sat on big metal pallets that covered the whole floor, with nylon straps from side to side as a seat belt for the whole bunch in that row. The whole problem with me was that the last time I flew on one of these things, I almost lost the ends of my fingers on both hands. I had been sitting down cross legged on the thin metal pallet with the edge just behind me. My arms were out behind bracing me with my hands on the floor/pallet, and my fingers curling over the edge.

There was a space of an inch or two before the leading edge of the next pallet behind. As we were about to land, I moved my hands to grasp the tether across my lap. As the plane touched down (must have been a Marine pilot who had recently been landing on a carrier, because when we hit the deck all the pallets shifted forward and that gap between the pallets closed with a loud smack. I'm sure glad that my fingers were no longer there, and I definitely made the crew chief aware of the potential hazard. With all those folks, both Vietnamese civilians and American military, I have wondered all these years if anyone was ever hurt from just such a hazard. that stuff was all just useless baggage!

Early Radio: Military Communications

"Sgt. Truitt you're going to An Hoa to work with 1st RadBn's 1st Platoon, and you'll be going down in that 6-by over there. There are a couple things of recollection concerning my trip to An Hoa that day as I rode in the back of the truck. I remember heading SW out of DaNang and seeing Hill 55 sticking up off to our left, and Hill 10 off on the right, and somewhere between there and the river there was a village that would play a marked role in one incident of my life a few months later. Crossing the river was Liberty bridge, and in the vicinity was hill 37, although we never went into the RadBn compound there. After leaving the liberty bridge area the road proceeded south to An Hoa (5th Marines TAOR), and the Que Son mountains on beyond (that was the 7th Marines TAOR after about August 1969). I think that I'd rather operate with the 5th Marines and in their primary nemesis, The Arizona Territory, than the 7th Marines who had to traipse through the mountains. Humping those hills would be the pits, as if the rice paddy's, rice paddy dikes, and the nasty tree lines of the 5th Marines were a "walk in the park."

Before, pulling into An Hoa, we made a short stop at Hill 10. No, it's the other hill 10, the little knoll just outside of An Hoa. It was nothing, I mean "whoopee do" this place was just a bump alongside the road south. I got out of the truck and looked around a bit, seems like there was a hole in the ground with a Pig antenna sticking up, that was about the highest thing. Everything here was just at ground level. Everyone lived in holes covered with poncho liners, it reminded me of a community of ground hogs. There was concertina wire strung around the whole place but nothing above ground, nothing at all.

There was a big hole right over there. That's where the little people blasted in a Lob Bomb just last night; no one was hurt though. I guess it was lobbed in from a hundred yards or so outside of the wire; a Lob Bomb is a piece of unexploded ordinance, usually a 100 or 250 pound aerial bomb dud that is rearmed and hand carried to its launch point where a charge of some kind is used to lob the ordinance on to its target some short distance away. They are very inaccurate, but capable of creating one heck of a lot of "hate and discontent" if they "by-chance" land on or near something. Well, we didn't stay long, just long enough to drop off some supplies to our RadBn personnel, of which there were two. I believe hill 10 was an OP of 2/5 Marines.

There was just a little ways yet to An Hoa, and we approached it from the east. I could see the concrete and steel skeletons of buildings from an old factory, evidently in its "heyday" during French Colonial rule, off to the south side of the road as we entered An Hoa. What really sticks in my mind about entering An Hoa was the big open field that we drove across as we entered. Because the monsoons were nearly finished, there was a lot of water laying all over the place. The whole field, in fact, was covered with a layer of water several inches deep. It was dark red muddy water from the red earth that was there.

As we drove across the field the tires created a red wave that proceeded out from the 6-by and eventually crashed on the shores at the farthest limits of the big field. About two months later I was coming back from a resupply run to DaNang with Top Fitzgerald in a PC vehicle, and as we came upon the open field about to enter An Hoa Combat Base there was a CH53-A, SeaStallion helicopter hovering near the far end of the field at about 30 to 40 feet. The field was all dried up and the red mud had turned to a very fine, red talcum powder. That dust was swirling and circulating in an amazing thick red cloud through those chopper blades. It was all a quite impressive site. That red dust settled everywhere and permeated everything. I'll bet that air crew was really hating it.

Upon entering the outer perimeter of An Hoa from the East, we had to traverse through the 2nd Battalion, 5th Marine Regimental (2/5 Marines) area first, then through part of 3/5's area before arriving at the 1st Platoon, 1st RadBn bunker. Right next door was the 5th Marines S2 bunker (Regimental Intelligence) who we were attached to, or at least working very closely with. I remember my mailing return address was, Hq Co, 5th Marines, S2 (RB), FPO San Francisco, 96602. The southern perimeter of the base wasn't very far, but it was a few hundred yards to the eastern perimeter. Just a little east and near the southern perimeter was that big tower with the RPG net in front of it. Almost underneath of that tower was were my first An Hoa abode would be. It was a CP tent which I had all to myself. There were several hardback hootches all around, but the tent was right in the middle of a small clearing, all by itself; but not yet!

When I reported inside our Ops bunker, I was immediately chewed upon by one, totally grouchy Gunnery Sergeant, Max Kerr. "Sergeant Truitt, you-are-a-dirt-ball" (that's not really what he said, but I don't want to write it down here). "Well, Great Gobs Of Gravy 'Guns', I just got cleaned up in DaNang before coming down here. I haven't even had time to sweat this crud out of my pores yet." Woe, Woe, Woe, let me tell you something folks, if you ever meet up with Gunny Max Kerr, DO NOT, I say again, DO NOT call him 'Guns,' even if he is still a Gunnery Sergeant "Sergeant Truitt, don't unpack! Get your gear and get over to the LZ. You're going to Hill 65. They've got a Corporal and a Lance Corporal there who are linguists. They are using a KY-38 with an encryption key, KYK-38. That new Secret Radio has to have a Sergeant watching it, and you are the Sergeant that's gonna watch it. The only thing you have to do is protect that radio and change the key settings each day. Don't screw up!" Whew, I musta had bad breath or something!

Needless to say, I abruptly found myself at the LZ where I caught a ride back Northwest a little ways to Hill 65, right next to Charlie Ridge. The Gunny told me to wait by the Hill 65 LZ till one of the guys came down and showed me where the 1st RadBn hootch was. So I waited, and waited. I carried everything I owned under a lean-to waiting area that was in the shade, a "doggies metal framed ruck pack, with one pair of cammies, socks, and an extra pair of boots, a WP bag half full of stuff, and my M-79 w/one claymore bag of HE rounds, a 45 Auto w/ 200 rounds and 4 magazines, my issued M-16 and two bandoleers of magazines with 18 rounds in each mag. I was loaded for bear and there would never again be an opportunity to use either the 45 or the M-79 again. Gone were the good times; now

While I waited to be picked up, I saw a very interesting sight. There under the cover of the lean-to was a big dog and his handler, a Corporal, who were watching a captured Viet Cong. He sure was a little guy, just waiting in that funny squatting position; he wasn't even tied up. The Marine was waiting for a bird to take the VC to DaNang, and the dog was resting at the handlers feet. That Corporal said to me, "check this out" and then he said two words to the dog. "Watch Him" immediately that dog came alive and was right in front of that VC, face to face, and about four inches apart. That dog didn't move at all, and I guarantee you, that VC didn't flex a muscle, not even a little bit. Well, I was definitely impressed, and that "zipper head" appeared to be rather impressed too, in a funny sort of way. The Corporal walked out into the open and smoked a cigarette; neither the dog nor the gook moved at all. I'm absolutely sure the dog could have devoured that little guy in no time, and still had dinner as a chaser.

In a little while, my guide, Joe Gagliano, finally showed up. Walking! He was the Corporal. Dusty Rhodes was the Lance Corporal. Di Dah, Di Da Dit Chuck Truitt sends.

Tim Lundberg - No Water on the Hill - Late Summer, 1970

As you will recall, we drew water from the river ... and I think went through some type of purification process in those holding tanks that you see on many of the pictures. Well, for a while during my stint on the Hill, the VC were into severing the pipe from the river each night ... causing a pretty serious water shortage. We had water buffalo brought in for the vital stuff ... like brushing teeth and drinking ... but showers were scarce.

At least the bad guys didn't cut off really vital supplies ... like beer. Dave McWatters - Dead Man's Corner - Late Summer, 1970 I was at the so-called Officer's Club on Hill 37 and learned the story from the grunts: LtCol Rose wanted desperately to get out of that bunker. It was on a finger of Hill 37 and had the nickname, "Dead Man's Corner" because it used to get all the short rounds fired at the Dai Lac District Chief's house. They (the grunts) thought it was hilarious that LtCol Rose conned Radio Bn into taking over his Hq. Tim Lundberg - The 50 Caliber Swap - November/December, 1970 Is it myth or real?

I never knew for sure. As the story goes, one of our guys hitched a ride back to Hill 37 on a chopper which was mainly occupied by some grunts. Anyway, the grunts left a 50 caliber machine on the chopper. It is my recollection ... although this is a bit hazy in my memory ... that one of 1st Radio rangers (after failing in his/our efforts in finding the rightful owner of the 50 cal) took on the role of trade ambassador with some local Seebees and managed to swap the 50 cal for an early 1950's vintage Philco refrigerator painted Canary yellow. I also recall that he got the Seebees to throw in a pallet of beer ... I remember the Miller High Life in rusty cans well. Of course, with our generators, we could put this refrigerator to good use ... I think that we had the only cold beer on the Hill. I wonder if any ex-Hill 37ite can help me confirm this story ... and also help me remember the name of our trade ambassador because he should get a medal for these heroic efforts. In my view, this story has to be true ... otherwise, how would could you possibly explain having access to so much beer!

Also, it would be interesting to know if anyone could explain why the Seebees always had beer. Tim Lundberg - The Monsoon - November/December, 1970

I was exchanging emails with Jerry Stephenson this morning (2/2003). We were reminiscing about the monsoon season that we experienced on Hill 37. It was incredible ... I think that it rained for 40 days and 40 nights ... hell, maybe it was 60 days and 60 nights. It sure seemed like it. I had never seen anything like it before. The whole valley flooded and we had to accept refugees from the Ville and elsewhere in the locale until the water receded. They occupied the hootches on the backside of the Hill near the river. The Hill was just one big mud pit ... but I think that it was the only thing above water for miles. My feet were constantly wet and I attribute this monsoon season to being the root cause of a foot fungus condition that still flares up from time to time even to this day.

Tim Lundberg - Fuzzy's Socks - Fall, 1970

The VC were masters of creating inconvenience … On Hill 37, a pipe was run up the Hill from the river to provide us with our water for showers. The VC got on a kick where they would sever this pipe during the dark of night … despite the grunts increasing efforts to patrol this critical supply line. It wasn't long and they had seriously depleted our water supply … old wooden holding tanks near the old French bunker on the top of the Hill. Showers were few and far between.

Sometime during the Fall of 1970, Fuzzy Linck announced to the population of Hill 37 that he was mad and wasn't going to take it anymore. The time had come to fight back! He further announced that he was not going to wash his socks for six months!!

Well, incredibly … he stuck to his word. He became the source of much amusement as day after day he crawled into the same old dirty socks. Those old, green, woolen, now moldy things became a monument of our defiance … well, at least Fuzzy's defiance. As you could imagine, they stiffened with age … until he could stand them up alongside his cot when he retired at night. They were monuments in and of themselves.

I have suffered with nasal congestion for much of my life and often wondered if the source of this affliction was Fuzzy's socks. For sure, you didn't have to hear Fuzzy coming … you could identify him a good distance away with olfactory glands.

Dave McWatters, Mike Netto and I were laughing about this episode in our Hill 37 lives recently … as we recalled Fuzzy's socks. Little did we realize at the time, but we had the ultimate weapon at our disposal … WMD circa 1970. Actually, maybe it's okay that we didn't use these socks to our advantage

because instead of being with us today, Fuzzy may still be serving time for war crimes … unauthorized use of biological agents.

Fuzzy Linck - Horse Ck Salute - Fall, 1970**

There was a mess hall down by the ARVN compound. I think I ate there maybe a half dozen times. Greek and I were walking back one Sunday morning looking down at Dai Loc village and the only second story building in the village became a one story when the top blew off.

We stood there gawking at the site and then LtCol. Rose (1/1 commander) comes walking down the path....so we said, "Good morning sir." And he says can I trouble you for a salute...and we told him we didn't think it was a good idea 'cause there might be a sniper out there.

So the Col. Says, "Hell risk it", so we saluted him smartly....and he says can you try that again without the sandwich. We had made some horse c**k sandwiches to take back for lunch and forgot we were carrying them after just witnessing the top of a building get blown away... so... we militarily shifted the sandwiches to our left hands and tried the salute again... this time he liked it and moved on.

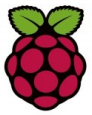
It was one of those things that made the whole experience of being there unique.

Field Day: MAARS and MRAC at Konkel Park in Greenfield, which is located at 5151 W Layton Ave, on June 27 and 28.

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, May 28th, 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:

June 25th, 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

June 7th Starved Rock Radio Club's (W9MKS) 2015 Hamfest Location: Princeton, IL
Type: ARRL Hamfest
Sponsor: Starved Rock Radio Club
Website: http://www.w9mks.org

June 21st Six Meter Club of Chicago
Location: Wheaton, IL
Type: ARRL Hamfest
Sponsor: Six Meter Club of Chicago
Website: http://k9ona.com

MRAC Working Committees

100th Anniversary:

- • Dave—KA9WXN
- Dan—N9ASA

Net Committee:

- Pancho, K9OFA

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 ± 5 KHz USB.
- Our Two Meter FM net follows the Ten meter net at 9:00PM on our repeater at 145.390MHz - offset (PL

All Hazards NOAA Weather Radio
NOAA's National Weather Service

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, 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+ WiARC net also on EchoLink 576754

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

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

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.