MRAC Hamateur Chatter

The Milwaukee Radio Amateurs Club

September 2014 Volume 22, Issue 9

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

Presidents' Letter

I recently spent time in Salem, New Hampshire for work and training. Salem is located in the southeastern New Hampshire between Manchester and Boston, Massachusetts. From what I could tell, Salem didn't seem to have any advertised radio clubs. Although I did spend time listen to several different repeaters while in town, I wasn't able to find any active clubs in the area--either by listening or through web searches.

It made me realize that we as hams forget that we need to be more proactive in promoting our organizations if we want people to find us. I believe this is important for any club to survive. In fact, ham radio needs to do this if the hobby is going to survive the next 20 years.

This month's meeting will feature Tom KF9PU and me talking about the ARRL 100th anniversary convention. I left the convention feeling energized about our hobby and service. We should be proud that MRAC has a great legacy. We all need to make sure we continue the club's legacy moving forward.

We also need to return to promoting ham radio for the next generation. I would like to find people who are interested in helping with this idea.

On a final note about promotion: I am proud to say that I have made the cover of the September issue of CQ magazine. This was one of the pictures that was taken during our 2011 Field Day in addition to a brief article about me on the cover. It was great to mention my involvement in MRAC in the article, and I hope that it may spark future interest in the club.

'73 Dave, KA9WXN

MRAC Officers:

Terms Expiring in 2016

- President – Dave, KA9WXN
- V-President– Dan, N9ASA
- Secretary – MiBH, KC9CMT
- Treasurer – MBH,,KC9CMT
- Director – Vacant

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

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Board of Directors' Meeting Minutes

Board of directors meeting called to order at 7:01 pm by Dave Shank, KA9WXN club president.

Director's present: Michael KC9CMT, Dave KA9WXN

Absent: Dan N9ASA. Joe N9UX, Mark Morgan KB9RQZ, Hal, KB9OZM, Al KC9IJJ.

Preliminary Discussions: The board did not meet in July, so no record was read. Michael, KC9CMT the acting treasurer gave the treasurers report for the month of July 2014, the account total for the MRAC general ledger was $19.288.62. Sale of items from a Ham estate went well during the SMARC swapfest.

Meeting programs: In September, Tom Fuzzard will discuss his experiences at the ARRL National convention. In October Joe N9UX will bring in and discuss his Raspberry Pi based TNC. Novembers' meeting could be a presentation on the technicians test, a question and answer with Tom Fuzzard. Possible future presentations: Oscilloscope presentation sometime in the future. Technical radio specification explanation if of interest.

During the ARRL Convention Dave KA9WXN attended, a program model was presented that specified that club business should not be presented during the membership meeting. Other activities should be incorporated into the club philosophy. A handful of announcements can be made each meeting. Project management is the new idea that clubs across the country are experimenting with. The club needs more participating by its members. Summary, try to have fun and do stuff. Try to stimulate communities to form after school electronic groups that would emphasize Ham radio. The club needs a new member coordinator. Good idea, pitch idea of making small easy projects, and then having members talk about their experience of making circuits. The Joule thief is a very good project to start with.

Swapfest: The club wants to continue the use of the Yahoo table assignment spreadsheet for the 2015 swapfest. The idea was presented that the MRAC should invite all the area clubs to a county wide picnic in August of 2015.

Field Day: The farmers market will be at Konkel park in Greenfield again in 2015 during our field day effort. The dates in 2015 are the 28th – 30th of June.

Special Project Committees & Committee reports: Michael, KC9CMT has consented to stay on as the club secretary for another term. Dave, and Dan will also be staying in their present positions. The club needs to find a new treasurer. Michael, KC9CMT has agreed to fill the vacancy until a new treasurer can be recruited. Discussions regarding the new treasurer has been tabled until next month. The MRAC/MAARS joint picnic will be on August 10th, 2015 at Greenfield park. The FM Simplex contest in 2015 will take place on February 9th. The annual MRAC/MAARS food gathering will be during the February 2015 membership meeting on February 26th. Other activities; membership should get together more often than just the meetings. A yearly club calendar listing membership meeting presentations would be a good idea, Dave, KA9WXN has volunteered to work on this project. An attendance prize of some kind would be a good idea to build membership.

Our archivist, Dave, WB9BWP will be receiving some historical materials from the ARRL convention from Dave, KA9WXN. In addition, a number of HamChatters from antiquity have been discovered and will be given to Dave for review.

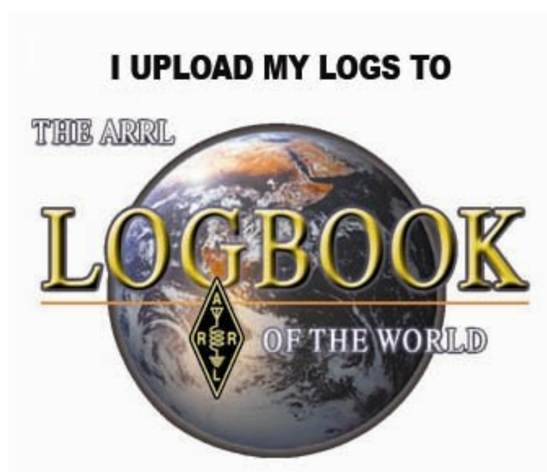
Repeater Report: The Fusion repeater on loan from Yaesu is offline. Dave, KA9WXN will be working on this problem. Dave, WB9BWP is the repeater trustee. The club would like more than one repeater control operator, at present we have only one. A club repeater control operator should have extra class privileges. The chosen operator to have the kind of privileges that are necessary to operate during field day to our fullest extent.

New Business:

Swapfest Committee: Next years Swapfest will fall on February 14th, Valentines day. The club does not think that this will be a problem. Next years complimentary tickets should be ready by the November membership meeting. Swapfest entrance tickets need to be ready by the first week on January.

Special Projects: The club needs someone to take over the FM simplex contest for February of 2015. The club now has a Facebook page, and encourages all members to join. All club members are invited to join in. The club is looking for a location for setting up a special event station. The USS Cobia at the Manitowoc maritime museum was mentioned as a overnight special event. An event at the Discovery museum at the Lake front has received considerable mention at board of director meetings. Dave, KA9WXN will be attending the ARRL 100th anniversary convention this year. We have contacted ARRL in the hopes of getting a framed document from them celebrating our clubs' being the oldest active amateur radio clubs' in the country. The club webpage was originally done in Microsoft FrontPage, now it is being updated using the SeaMonkey web browser platform.

A motion was made to adjourn the meeting at 7:45 pm by Dave, KA9WXN seconded by Michael, KC9CMT. Meeting adjourned at 7: 48 pm. The room was returned to an organized condition as it was when the room was opened.



Watch Out for Fall Driving Hazards

Sure, it's lovely out -- but be aware of the dangers of driving in autumn's quick-changing conditions

By Nigel Knowlton

When most drivers think of fall driving, they conjure up a near-idyllic driving experience complete with colorful fall foliage, empty highways and clear, cool days. Many fall days indeed live up to this classic description, but those picture-perfect days have a way of changing quickly during autumn.

Fall weather is often unpredictable and driving conditions can change from perfect to miserable within minutes. Additionally, during fall decreased daylight brought on by a return to Standard Time from Daylight Savings Time means that many of us will be commuting to and from work in darkness. Instead of being one of the better times of the year for driving, fall is actually one of the more treacherous times of the year to be on the highway. Vigilance is required if safety is to be maintained -- and the first place to start is in the driveway, before you hit the road.

Before starting on any trip, it is always a good idea to give your vehicle a pre-drive inspection. Make sure the tires are properly inflated and show plenty of tread, check to see all lights and turn indicators are working properly and make sure the engine has the correct fluid levels.

If you park your car outside, you've probably noticed that a warm body entering a cold car interior causes the windows to fog up. Clear all windows before you leave the driveway by running the defroster on high or wiping off the glass. Clean windows are essential for safety; even a small, fogged quarter window can severely limit visibility, especially when backing out into the street. Fog also tends to form on the exterior mirrors, so wipe those off while the other windows are clearing.

Once out on the highway, it is imperative to pay attention to weather and road conditions. Frosty patches, fog, black ice, rain, hail, sleet and falling leaves all present hazards to the unwary. Here's a checklist of fall driving hazards:

- **Bridges freeze first –** During fall and winter months, bridges can be very dangerous. Because they are exposed to weather on both top and bottom, they will freeze over before the rest of the road, and you may not be able to tell until it is too late. Use caution when transiting from the pavement to a bridge surface by steering smoothly, staying off the throttle and braking gingerly.
- **Frost –** When Jack Frost visits your living room window the effect can be magical. When he visits a shady patch of highway around a blind corner, the effects are often deadly. Use caution if your driving route takes you over bridges, down tree-lined streets, or anywhere else shadows cross dew-laden highways.
- **Black ice –** It's called black ice because it is invisible, as the black pavement underneath shows through and looks as dry as the rest of the road. Black ice usually forms below overpasses, on bridges, in shaded areas and where there is water running across the pavement. Because black ice in invisible, it is exceptionally dangerous and a driver who has been driving on clear pavement will be caught unaware. If you live in an area where frost occurs, black ice is always a possibility. Use extreme caution when driving on cold mornings where there is evidence of frozen moisture on the roadway.
- **Rain –** Fall rainstorms often tend to be sudden and heavy. Early fall storms are the worst from a driving perspective because highways that have a summer's worth of oil and rubber buildup from traffic become extremely slick when suddenly soaked. It usually takes a couple of really good downpours to wash this buildup away and in the interim the roadway is especially hazardous.
- **Hydroplaning --** Hydroplaning happens when excessive water buildup on the highway causes a vehicle to "float" on a layer of water. It occurs because the water buildup on the road is greater than the amount of water the tread channels can clear at a given moment. Usually, the hydroplaning lasts only a second or two as the vehicle is passing through a shallow puddle, but during heavy downpours the condition can be endemic. Because a hydroplaning vehicle has no direct contact with the road surface, it is difficult to impossible to steer and brake. In such conditions, slow down and avoid sudden movements of the wheel and quick stabs of the brake that can make your vehicle spin out of control. If you feel a floating feeling while driving on wet roads, steer straight and gently back off the throttle until you feel the tires make contact with road surface. In an especially heavy downpour, pull off the road and wait it out.

Weather Hazard Awareness

- **Fog --** Usually found in low places or areas surrounded by trees, hills or mountains, fog is statistically the single most dangerous condition a driver can encounter. It can severely limit visibility and change your perception of distance. When encountering fog, even just a small foggy patch in a hollow, slow down. There may be a stalled or slow vehicle hidden behind that wall of white. It is also smart to turn on your headlamps (low beam) or fog lamps to increase your visibility and your chances of being seen by other motorists. Most accidents happen in fog because the driver was going too fast for conditions and rear-ended the vehicle ahead. Slow down to a crawl if necessary, keep your lights on and use extreme caution.
- **Leaves –** As the fall season progresses, deciduous trees lose leaves that end up covering residential streets and country roads. While it is fun to blast through those colored leaves layering the highway, bear in mind that leaves can be slippery, especially when wet. Hard acceleration or braking, and sudden turns should be avoided when running over a pile of leaves, as they can lead to skidding. Additionally, like water, leaves often accumulate in low places. There may be a dip, pothole or other road hazard hiding under those leaves covering the roadway.

Nigel Knowlton has been writing on automotive topics for more than 20 years.

Fall Behind

The switch back to standard time means extra driving caution is needed

By Peter D. duPre

The turning leaves and cooler weather that indicate fall has arrived are also a signal to use extra caution when behind the wheel. As we head into winter, the number of daylight hours shrinks a little each day through the end of October. Then the switch from daylight savings to standard time robs us of an hour of daylight – and suddenly, most of us find ourselves commuting to and from work in darkness.

We all know that nighttime visibility is not as good as daytime visibility and when you add in the rain, sleet, fog and even snow storms that occur in the fall, visibility can drop to virtually nothing. Driving under these conditions means that extra caution is needed. To keep from becoming a statistic, you need to stay sharp and be careful. Here are a few tips that should help get you safely to your destination:

School's in session – In many areas, school starts early and children are walking to their bus stops and schools in total darkness just about the same time most of us leave for work. Sleepy school children forget to look for traffic and have a bad habit of bolting out between parked cars to catch the school bus. Keep your eyes peeled and slow down. Also, remember that when driving in a school zone, the speed limit in most areas is 20 mph and strictly enforced. Avoid both the accident and the ticket -- drive slowly.

- **Allow more travel time** – Slowing down in schools zones and driving cautiously in the dark means that it takes longer to get where we are going, especially during inclement weather. Take the stress off getting to work on time by leaving a few minutes earlier in the morning.
- **Inclement weather** – Unlike summer, when weather conditions are relatively stable, fall weather conditions can change abruptly. Thunderstorms, sleet, hail and even snow are not unusual. Roads covered with a summer's worth of grease become really slick when soaked with rain. Additionally, fall frosts and such slippery hazards as wet leaves on the roadway can contribute to traction nightmares. Make sure your tires are in good shape, go easy on the gas when starting out, and realize that your stopping distances will be increased.
- **Check the lights** -- See and be seen. Drive with your headlamps on, even if it’s not dark. Do a walk around your vehicle to see that emergency flashers, turn signals and headlights are all working properly. Have your mechanic aim and adjust the headlights. New cars are equipped with bright burning halogen headlights that increase visibility. On older vehicles, consider converting to halogen lamps. The extra cost is more than offset by improved visibility and increased safety.
- **Change the wiper blades** -- According to safety experts, wiper blades should be changed every 5,000 to 6,000 miles, or twice a year. Most of us don't change the blades even once a year. Check front and rear wipers. Examine the rubber; it should be flexible, without cracks or missing chunks and should clear the glass without leaving any streaks. If the blades aren't performing perfectly, replace them.
- **Check the brakes and tires** -- If the tires and brakes aren't in good condition, you won't be able to stop on slick roadways. Tires should have plenty of tread on them; if the wear bars are showing, its time for new rubber. Most tire and brake shops will inspect your tires and brakes for free so there is no excuse for not getting them looked at.

Weather Hazard Awareness

- **Heater and defroster check** – Fogged-up windows limit visibility and are a safety hazard. Make sure both front and rear defrosters are working properly. Front blower hoses sometimes get knocked off the defroster vents and electric wire in the rear defogger can break. Most auto parts stores sell special kits to repair these breaks. While you are at it, have the heating system inspected. A cold car is an uncomfortable distraction to safe driving.
- **Look under the hood** – Don't get stranded in the dark. Have your mechanic check the condition of the coolant, belts and hoses. Get the chassis lubed, air filter replaced, oil and filter changed and battery inspected. A little work now can save a big towing bill later.
- **Wash and wax** -- A vehicle's first line of defense against the elements is a good wash and wax job. It helps protect the metal surfaces from pitting and corrosion and keeps your car looking its best. Get rid of that summer grime and apply a thick coat of protective wax.
- **Relax** – It may seem like there is a lot to do to get your vehicle ready for fall/winter driving. Don't stress over it; rather, pick one or two things to do each week so that by the end of November, your vehicle is ready for winter driving. Seeing and being seen in the darkness is vital: check the lights first, then do the tires, brakes, and wiper blades. Start your day 10 minutes earlier, have that second cup of coffee and leave the house 5 minutes earlier so you start the commute as relaxed as possible -- good advice at any time of year.

The Experimenters' Bench

Basic Circuits

The principles of electric circuits, how to draw circuit diagrams, and how to solve circuits
The electric circuit is a device for transferring power from a source at one point to a sink at another, either the small amounts used for signaling, to the large amounts used to produce heat or work. It consists of a closed loop around which the flow of electric charge takes place in response to electrical fields, which exert forces on them. At no point in the circuit can a net electrical charge build up, since this would bring the flow of energy to a halt. Although the electrical potential is different at different parts of the circuit, only very small net charges are necessary to produce these differences, and the circuit as a whole remains electrically neutral, with equal charges of both signs.

It was very difficult to understand the properties of the electric circuit at first, after copious sources of current at low potentials were found around 1800. Only after the energy concept was established was much understood about the electric circuit, through the work of Ohm, Joule and Wheatstone and others. Now it is easy to think of an electron's gaining energy when pushed to a higher potential by chemical or inductive action and moving to some other point, where the energy is given up either by agitating matter as it is drawn to a lower potential, or against a counter-emf in a magnetic field, or indeed by producing chemical action by electrolysis.
Because the things that occur in electric circuits, and electromagnetism at large, are well-removed from daily experience, analogies have been used to give concrete expression to the mysterious goings-on. There is the hydraulic analogy of water given energy by a pump, through being raised to a higher pressure or elevation, flowing through a pipe, and giving up its energy by turning a wheel and doing useful work, or simply chaotically cascading down a beautiful but useless waterfall. In fact, electric potential is sometimes actually called "pressure." Other analogies are the "cutting of lines of force" to generate electromotive force, and the view of "lines of force" as elastic bands. Such analogies are helpful, and under many circumstances true, but cannot be pushed beyond a certain limit. The hydraulic analogy led some early workers to regard insulation as a kind of pipe, and they assumed that a bare wire would leak electricity. Not until this misapprehension was overcome was long-distance telegraphy possible.

In this paper will be an elementary discussion of direct-current circuits, emphasizing the role of the *circuit schematic* or *circuit diagram* that is an extremely valuable aid to thought and reasoning. The circuit diagram shows *lumped elements* with certain simple properties connected by conductors, wires, along which the electrical potential is constant. This is an idealization, which is only approximately realized in practice. In most cases the idealization is very close to the truth, which is what makes it useful.

Electrical potential has already been mentioned several times, so it is high time to say what it is. It is energy per unit charge. Energy is measured in joule, J (1 kilowatt-hour is 3 600 000 J, 4.196 J is a small calorie, 1 Btu is 1055 J), while charge is measured in coulomb, C. It takes 6.24×10^{18} electrons to make up a coulomb. Electrical potential, therefore, is measured in J/C, and this unit is given the name volt, V. It is one of the curiosities of energy that it always refers to some reference level. Kinetic energy, energy of motion, is referred to the state of zero velocity. There is no such simple zero for most energy. In electric circuits, the most we can say is that an electron at point b has a certain amount of energy more than an electron at point a. The difference of energy, divided by the charge, gives the difference in electrical potential E_{ba} or V_{ba}. E and V are the usual letters used to denote a difference of electrical potential. The first subscript (if used) shows which point is more positive when the value is positive, and the second subscript the reference point. Instead of "difference of electrical potential," it is usual to speak of "voltage," and we shall do so from now on.

Current is just the net charge in C/s flowing past any point, just like the amount of water in the hydraulic analogy. The usual symbol is I, and the unit C/s is called the ampere, A. When water, or crude oil, flows through a permeable rock like sandstone, the rate of flow is proportional to the pressure gradient between any two points (pressure difference divided by distance). The flow through the pores of the rock is viscous, and the fluid gives up its energy by friction. This heats the rock up slightly, an effect generally ignored but quite valid. When electric current flows through a conductor, the electrons collide with the atoms of the material and give up energy to them. G. S. Ohm (1787-1854) around 1827 conceived that this was exactly like the fluid case, and the current would be proportional to the voltage gradient. For a certain sample of length l and uniform cross section A, a current I would require a voltage $V = I (\sigma l/A)$, where σ is a constant characteristic of the material called the *conductivity*. The quantity $R = \sigma l/A$ is the *resistance* of the conductor. Its unit, V/A, is called the ohm, Ω.

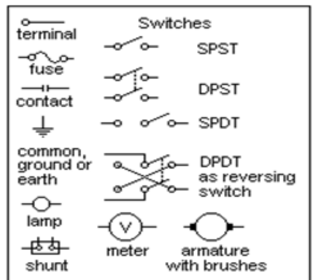
We now have the three basic quantities in DC circuits: the voltage V in volts, the current I in ampere, and the resistance R in ohm. The units are the *practical* units, originally defined without reference to other electromagnetic quantities for technical use. The standard ohm was the resistance of a uniform column of mercury 1 meter long, of cross-section 1 mm^2, and the volt was the voltage between the terminals of a Daniell cell. The ampere was the current that one Daniell cell would cause to flow in the standard ohm. By only slight changes, these units were redefined in absolute terms in the Giorgi, or MKS, consistent system of units that now makes part of the SI unit system. The relation between them, $V = IR$, is Ohm's Law.

Two other basic components are *inductance*, L, and *capacitance* C. Inductance is exhibited by a coil of wire. When a current flows in the wire, it produces a magnetic field in the region of the coil. If this field changes, it induces a voltage in the wire by Faraday's Law. L is the constant in the relation $V = L (dI/dt)$, and its unit (V-sec/A) is called the henry, H. Capacitance is exhibited by two conducting surfaces close together. When charges collect on the surface, an electric field in created between the surfaces, or plates. A current results if this electric field changes. C is the constant in the relation $I = C (dV/dt)$, and its unit, C/V, is called the Farad. The henry and the farad are impractically large. Millihenry, mH, and microfarad, μF are often convenient in practice. In DC circuits, V and I are constant, so an inductance acts like a short circuit, and a capacitance like an open circuit.
The term "short circuit" means a connection of small resistance, so that a large current will flow if there is a potential difference. An "open circuit" is a connection of high resistance, usually no connection at all, so that no current flows.

The lumped components R, L and C are available in small packages with two *leads*, and are connected by wires with negligible R, L and C themselves. What is negligible depends on the situation. In DC circuits, only R is significant, and the usual resistors, available in values from less than an ohm to 10 MΩ, behave very much as expected. Symbols used in circuit diagrams for these components are shown at the right. At the top are the symbols used in power engineering in the past. The resistor (R) symbol recalls a line of spools of resistance wire. The inductor or winding (L) symbol looks like a helix seen from the side, without curved lines. The capacitor (C) symbol recalls the Leyden jar, an early capacitor. These symbols are all easy to draw with a 30-60 triangle. The next line shows the symbols typically used in radio or electronics in the same era.

The resistor symbol is a zigzag of 60° lines, and the capacitor is now two lines, one straight and one curved. The inductor symbol has small loops, and is hard to draw. Circuit diagrams of this era showed that conductors crossed with no connection by the semicircular jump, and connected if the lines joined. The standard symbols now used in the US retained the zigzag resistor, but the capacitor has two straight lines and the inductor no loops. The new inductor symbol is somewhat easier to draw, but still inconvenient.

These symbols are in ANSI standards. Internationally, the ISO uses only a rectangle to represent a circuit component, whose type is shown by the value or identifying symbol next to it. In both ANSI and ISO standards, joining of two wires is explicitly shown by a dot, and lines that simply cross do not imply any connection. At the bottom of the box a popular way of labeling of the value of a component is shown. The k or M replaces the decimal point for resistors. A decimal point implies microfarad, μF (10^{-6} F) for capacitors, and millihenry, mH for inductors, while no decimal point means picofarad, pF (10^{-12} F) or microhenry, μH.



Miscellaneous Symbols

Some miscellaneous circuit symbols are shown in the box at the left. The meaning of many symbols is obvious from their form and use, but many can remain mysterious. There were many variations in these symbols with date and field of application. For a full list, refer to the ANSI or ISO specifications. The ground or earth symbol refers to a common reference potential. It can be the potential of the metal chassis on which a circuit is mounted, the "ground" trace of a printed circuit board, a busbar serving the same purpose, or even the potential of a copper rod driven into the earth, from which it took its name. A contact looks like a capacitor, except that the lines are short. The letter inside the circle representing a meter shows what kind of meter it is. V = voltmeter, A = ammeter. A shunt is a low-resistance link used with an ammeter to extend its range. The symbols for switches are easy to understand. SPDT means "single-pole double-throw," and the other designations can be worked out easily. The DPDT switch is shown wired as a reversing switch, which connects pairs of wires in two ways.

Finally, we can look at a circuit. The box at the right shows a simple circuit consisting of a battery and four resistors. The symbol for the battery is the traditional one. The long line represents the copper electrode, and the short line the zinc electrode, of an early battery. The + shows that this end of the battery is at the higher potential, and the voltage is represented by E. There is no significance to how many "cells" are represented in the battery, except that more cells can be used to imply a higher voltage. One cell is usually sufficient. The resistors are identified with the letter R and a subscript. If there were more than one battery, the E's would have subscripts. L and C are used for inductors and capacitors. Every component should have a designation. On an actual circuit, the values of the components are usually given, either beside the component, or in a table. The resistors R_1 and R_2 are said to be in *series* since the same current flows through each, and the voltages V_1 and V_2 across them add. The resistors R_3 and R_4 are said to be in *parallel* since there is the same voltage across each of them, and the currents I_3 and I_4 through them add. The points a and b where wires connect are called *nodes*, labeled for easy reference. The voltage of node a with respect to node b is V_{ab}, and is the voltage across the parallel resistors. A continuous path can be traced from the + terminal of the battery through the circuit back to the - pole of the battery. It is not usually necessary to mark both + and -.

For concreteness, let us assume that $E = 3.0$ V, $R_1 = 1000\ \Omega$, $R_2 = 220\ \Omega$, $R_3 = 470\ \Omega$ and $R_4 = 330\ \Omega$. We wish to "solve" the circuit, which means to find all currents and voltage drops. Let us start with the parallel resistors. If V_{ab} is the voltage across them, then $I_3 = V_{ab}/470$, and $I_4 = V_{ab}/330$. Solving for V_{ab}, we find $V_{ab} = (I_3 + I_4)\ [1 / (1/470 + 1/330)] = 193.9\ I_1$. This is the same as the voltage across a single resistor of resistance 193.9 Ω, which may be considered the *equivalent* resistance of the parallel combination. The same current, I_1, flows through the resistors in series. Therefore, $V_1 + V_2 = 1000I_1 + 220I_1 = (1000 + 220)\ I_1 = 1220I_1$.

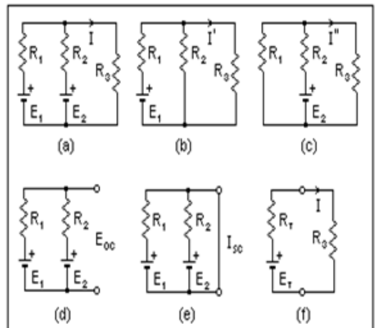
This is the same as the voltage drop across a single resistor of resistance 1220 Ω, which may be considered the *equivalent* resistance of the series combination. Now we can combine the resistance of 1220 Ω with the resistance 193.9 Ω, which carries the same current, to find a total equivalent resistance of 1414 Ω. The voltage across this equivalent resistance is 3.0 V, so the current is $I_1 = 3.0 / 1414 = 2.12$ mA. The voltage across R_1 is 1000 x 0.00212 = 2.12 V, across R_2, 220 x 0.00212 = 0.47 V, and V_{ab} = 193.9 x 0.00212 = 0.41 V. These voltages add up to 3.0 V, which they must. Then, $I_3 = 0.41 / 470 = 0.872$ mA, $I_4 = 0.41 / 330 = 1.244$ mA. These currents add up to 2.12 mA, as they must. The circuit has now been completely solved.

The method demonstrated above can be used for a class of circuits called *series-parallel* circuits in which the resistors are arranged in series or parallel combinations. The way we found the equivalent resistances can be generalized to make the work easier. The equivalent resistance of resistors in parallel is given by the reciprocal of the sum of the reciprocals of each resistance. The equivalent resistance of resistors in series is the sum of the individual resistances. To solve a series-parallel circuit, we just combine resistors until we wind up with one resistor across the battery, then work backwards to the individual resistors.

A general method of solving *any* circuit can be based on principles we have already used in the series-parallel circuit. These principles are: (1) the sum of the voltages around any closed loop is zero, and (2) the sum of the currents flowing into any node is zero. These are called Kirchhoff's Laws. The first expresses the conservation of energy, and the second the conservation of electric charge. To use these principles, we select a sufficient number of unknown independent currents to specify the current in any wire of the circuit, then use Kirchhoff's Laws to write the same number of linear equations involving the currents, which can then be solved to find the unknown currents. It is always possible to do this, and there are some clever methods to ease selecting the currents and writing down the equations. The details will be left to the references. In practice, one seldom goes further than two or three unknowns for a hand solution. People are too error-prone to carry out the analysis in any more complex problem, so the work is best left to computers. In any case, resist the temptation to use determinants to solve the equations.

For *linear* circuits, there are some useful theorems that can ease the solution in many cases. The first is the Superposition Theorem: in a linear circuit, the current at any point is the sum of the currents due to each voltage source taken separately, the others replaced by their internal impedances.

Another is Thévenin's Theorem: with respect to any two terminals, a linear network can be replaced by a voltage source in series with a resistance; the voltage is equal to the open-circuit voltage between the terminals, and the resistance is equal to the ratio of the open-circuit voltage to the short-circuit current at the terminals. Norton's Theorem is similar, except that the equivalent circuit is a current source in parallel with a resistance, where the current source supplies the short-circuit current at the terminals, and the resistor is the ratio of the open-circuit voltage to the short-circuit current (the same as in Thévenin's Theorem). The Reciprocity Theorem says that if a voltage source E produces a current I at some point in the network, then the source and the current can be interchanged (the internal resistance of the source stays where it was). Of these theorems, the first two are by far the most useful. The Wye-Delta equivalent circuits are often useful; see the references.



Batteries in Parallel

To illustrate how the theorems can be useful, and to obtain a result that is important in its own right, suppose we wish to connect a 2 Ω load, represented by R_3 in diagram (a) in the box at the right, across two 1.5 V D cells in parallel, hoping that the two cells will share the load equally. However, suppose that one cell is fresh, with a voltage $E_1 = 1.5$ V and an internal resistance R_1 of 1 Ω. The other cell is old, however, and its voltage is only $E_2 = 1.4$ V, but its internal resistance is also 1 Ω (for simplicity). This is not a series-parallel circuit. It can be solved by Kirchhoff's Laws, but we will use the Superposition Theorem instead. Circuits (b) and (c) show one electromotive force (emf) set to zero. Each of these circuits is a series-parallel circuit, and can easily be solved. Superimposing these circuits means to add the currents. The voltages at the nodes in the two circuits are different, and are not the same as those in the actual circuit. Once the currents are known, however, we can calculate the actual voltages.

If you solve the circuits, you find that E_1 contributes a current of I' = 0.30 A in the load, and E_2 a current of I" = .28 A, for a total I = 0.58 A. The load voltage is 1.16 V. However, the current in E_1 is 0.34 A, and the current in E_2 is 0.24 A. The cells do not share the load equally, the weaker cell taking less load. This is probably acceptable in the present case. Now work the problem again, assuming that the internal resistances are 0.1 Ω instead of 1 Ω. You will find that the load current is 0.342 + 0.365 = 0.707 A. This is higher, as expected, because of the lower internal resistances. However, something remarkable lurks in the problem. Cell 1 supplies 0.85 A, *more* than is supplied to the load. The difference, about 0.14 A, is forced *backwards* through the weak cell! If we removed the weak cell, the load current would be 0.714 A, a little higher, but more importantly, the good cell would be relieved of supplying 0.14 A. We see that one must take care in connecting sources of emf in parallel, and in general some series resistance is necessary to equalize the load. Lead-acid cells, car batteries, have very low internal resistances, so connecting them in parallel is risky, unless all are at the same state of charge and in equally good condition.

The Experimenters' Bench

We can also solve the circuit by using Thévenin's theorem. Circuit (d) is the open-circuit case, and circuit (e) is the short-circuit case. We can see without calculation that the open-circuit voltage is the average of the emf's of the two cells, since the internal resistances are equal. Hence, E_{oc} = 1.45 V = E_T. The short-circuit current is 2.9 A if the internal resistances are 1 Ω, so R_T = 0.5 Ω This is just the same as calculating the equivalent resistance of the circuit with the emf's reduced to zero. Two 1 Ω resistances in parallel are equivalent to 0.5 Ω. The Thévenin equivalent is shown in (f) feeding the load, and the current is seen to be 1.45 V / 2.5 Ω = 0.58 A, as we found using Superposition. The case of 0.1 Ω internal resistance is just as easy, and we find the current 1.45 V / 2.05 Ω = 0.707 A. Note that the Thévenin equivalent gives no hint of the problem with the cells in the second case. The equivalent is only equivalent as far as the *external* circuit goes, and tells nothing about conditions in the supply network.

Now that you can find the currents and voltages, you can determine the power furnished by the voltage source and the power dissipated by the resistors. Since volts are joules per coulomb, and amperes are coulombs per second, VI is joules per second, or watt, W. EI is the power furnished by the battery; note that the current comes out of the + terminal. VI is the power dissipated in a resistor; note that the current goes into the + terminal. One is an energy source, the other an energy sink. Since V = IR, the power P = I^2R. The power dissipated in resistance is proportional to the square of the current. We also have P = E^2/R, but this is less useful. P = VI is called Joule's Law, after J. P. Joule, who established its truth experimentally in the 1840's.
In our series-parallel circuit above, the power furnished is 3.0 V x 2.12 mA = 6.36 mW. The powers dissipated in each resistor are 4.49, 1.00, .36 and 0.51 mW, which adds up to 6.36 mW. These are very small powers, and will not heat a common 1/4 W resistor enough to be noticeable. If we connected the 1000 Ω resistor across 10 V, it would dissipate 100 mW, and would become warm. If we connected it across 100 V, the dissipation would be 10 W, at least for a short while before it destroyed itself. Electrical things generally fail from overheating, so it is best to watch the power dissipation closely.
In electronics, milliamperes and kiloohms are the usual thing, so they are directly used in Ohm's Law and Joule's Law, together with volts and milliwatts.

References
Many books in electrical engineering include circuits as introductory material. Texts on circuits alone have become rather rare, and their emphasis has changed. Older texts were often quite good, with a great deal of practical information on things like batteries, conductors and other practical apparatus. Books for schools are very bad, if they exist at all. Perhaps an encyclopedia would be a good place to start if you are taking this up for the first time.

McGraw-Hill Encyclopedia of Engineering, 2nd ed (New York: McGraw-Hill, 1993), articles Circuit (electricity), Direct current circuit theory.
G. Lancaster, *DC and AC Circuits* (Oxford: Clarendon Press, 1974)
P. Horowitz and W. Hill, *The Art of Electronics*
AC Essentials: AC circuits and the Wye-Delta transformation.

Early Radio: Military Communications

Left Alone

By-Allen B. Allcock "K.C."

Only a short time after I had been in country with Delta Troop, 3/4 Air Cavalry, I was asked to become a team member of a reactionary/recovery squad. Although I don't know for certain if "reactionary/recovery" is the proper name that was used, but it does describe somewhat the mission. It had become the SOP of our unit to perform many of the "rescues" of our troop's aircraft, especially those that were downed from mechanical failures that could be quickly repaired and flown out to safe areas for better, permanent repairs. Enemy engagements also brought about flight failure. Sometimes in enemy infested areas, maintenance crews were flown to the sites to make repairs so that the helicopters could be flown out.

One good thing about the helicopter is that it has the ability to autorotate down to somewhat of a safe landing without the power of an engine driving its rotating wing. Altitude and the quick action of well trained, experienced pilots and crew could make a landing area out of practically nothing. If altitude wasn't present, in most cases the landing would be rather abrupt. Damage and injury would be certain, and recovery of injured crewmembers would be a priority. Our smaller areo-scout, "loach" aircraft, we could sling load under our UH-1, "slicks" and do our own recoveries, but when our larger aircraft, such as the UH-1H, or the Cobra gunship came down, about all we could do would be the performance of minor, quick maintenance, getting it airborne again under its own power, or else call in a recovery helicopter unit that had the large, "Chinooks".

It was in June/July of '69 when I was used for the first time to work on an aircraft that was down in the, "boonies". I can't remember if Captain "twinkle-toes" Dixon was the maintenance officer still yet, or if he had rotated home already? (twinkle-toes was a nickname that many of the Officers and EM used to refer to the little rock upon his toes he used with each step) But, for sure, Captain Mack was the officer who I recall as getting us to and from the "downed" aircraft. A cobra that was flown by Mr. Bobo. They were down not to far from the base of the famous, "black virgin mountain", in somewhat an open area. There had been a failure of the 42 degree gearbox located at the base of the vertical fin, and with the right tools, a couple of aircraft mechanics, spare part and a few long, "eternal" moments, we could have the cobra flying "before sundown". Sp/4 Richard Waite, and I were, "volunteered", and away we went. The flight up from Cu Chi was great, and as we flew onto location, we noted some perimeter defenses had been set up for our protection and the downed aircraft protection. By perimeter defenses is best described as a couple of squads of infantrymen encircling the downed aircraft, and keeping "charlie" from moving in to close to "snipe" at the aircraft or those working on it. Then, some of the infantrymen were making a sweep of the area just to reinforce those who were protecting us.

Early Radio: Military Communications

All of this could be clearly seen from the air as we approached but when we landed, that was the last we saw of our, "defenses". For when we were on the ground, the sweep patrol seemed to be swept out of sight. Feverishly, Rick and I went to work removing access panels and taking bolts loose and hoping we would not drop and loose anything. At every moment I could feel the searching eye of an enemy sniper upon my being. Finally, after about an hour, we were ready for a test run-up and very ready to get out of there. We got the attention of a circling scout ship, and communicated to them that we were ready for the Cobra flight crew to return and fly the downed aircraft out of harms way. That burned more time off of the already dimming evening hours, but it wasn't before long that they returned, firing up the cobra, giving us the "thumbs up" and flying off. In those moments, other "slick" choppers started arriving and our security also started pulling out.

None of these helicopters came close to the place where Rick and I were waiting with our tools and we began to get somewhat concerned. We were armed with M-16's and plenty of ammo, but I believe it would have been a short battle. We just hunkered down and waited. After what seemed to be an eternity, (probably about five or ten minutes), we finally heard the buzzing sound of a scout ship and saw Captain Mack quickly land and motion us aboard. Phew! were we relieved. A red sunset was blazing in the west as we flew and it wasn't until we were safely heading toward Cu Chi that my heart rate began to slow down. However, the flight home was not without incident. As we were flying back to Cu Chi, I starting noticing tracers arcing up from the left side of the aircraft and toward the front of us. And, it seemed like we were flying closer and into their path. Captain Mack, seated on the right side of the aircraft, didn't seem to notice. Finally, as the tracers kept coming closer, I remarked to Captain Mack, "I believe we are being fired at!" He took notice, pulled in a little pitch, made adjustment in direction, and silently flew us on home. (He was cool under fire)

Several times over the next few months, I got to practice the "art of recovery" a few more times. Delta Troop had an outstanding record as far as good mechanical operations on the choppers, and it was a rare thing for the choppers to fail mechanically. However, the enemy would hit a vulnerable spot now and again and bring one down, especially one of our scouts. Since the majority of the areo-scouts work was much of the time flying at very low levels, buzzing back and forth along suspected enemy trails and bunkers, Charlie would occasional "bag" one. Somehow, regardless of how hard one might try so as to not become real close and personnel with flight crews, more times than not, you considered the pilots, crew chiefs and gunners of Delta troop as your brother, friend and ally and any loss was personnel. Many times we were successful in snatching a downed crew and aircraft out of the grasping reach of the enemy. And just as often, those doing the recovery were elated with joy and relief.

But the strangest incident occurred about February of "70. I say about, because I can't narrow it down, but by mentioning the names of one of the scout ship's crew, someone might be able to tell me an exact date. Normally I flew on all test flights that came out of our hanger. A Warrant officer by the name of Tom Shirley usually shared that duty with me. This was his third tour of Vietnam, his second as a pilot.

On this particular morning, we had a "slick" readied for test flight following a hundred hour P.E. Mr. Shirley, had gone to an early appointment to a dentist, so they gave me a new pilot to fly the test flight with me. He was a "new guy", in our unit, and did not know me, nor did I know him. To me, he just looked like any other soldier in OD green, and I guess I looked like any other to him.

Especially, when you put on a flight helmet, and slide the tinted visor down covering the eyes. It was while we were on that test flight when we got the call to return ASAP. Being only a few miles out with the helicopter, we returned to the base and I was quickly briefed on the emergency. One of our scout ships had crashed and needed to be recovered. I told the new pilot about my duties regarding the expected recovery and ran into the maintenance hanger, grabbed the tools and recovery slings and loaded the items aboard the awaiting helicopter that we had just returned to base in. I was flying in the A/C seat and the new guy was at the controls on the right side, and we headed for a spot near the Cambodian/ Vietnam boarder.
It was there that the "loach" had lost a tail rudder blade to a tree, and the aircraft had spun to the ground. During the "hard, spin-in landing", Chester Stanley, one of the crewmembers aboard the downed aircraft, had been thrown from the aircraft and was injured. Chester at one time had been one of my men before becoming one of the elite scouts for our unit. A team member cobra gunship was still flying large circles above the downed scout ship to give it protection when we arrived, but had to leave station soon after because of running low on fuel. What we needed to do was simple. We land, I grab the sling, a couple of tools, run over to the crumpled scout ship, pull the rotor blades, pin on the slinging device, position myself high enough for the "Slick" to hover directly above me, and once I slip the eye of the sling over the cargo hook of the slick, the pilot hovers it a little sideways, As we came in for a landing, we could see the downed helicopter in edge of the bush and the crew members of the aircraft huddled around a prone body at the edge of a nearby clearing.

The downed pilot flagged us safely in for a landing among the trees. I vacated the pilots seat I had occupied on the trip out, grabbed the recovery sling and the essential tools, and headed for the downed aircraft. Since it was back in the bush a ways, it did not take long for the foliage to swallow me up. While I was headed to do what I needed to do, the downed crewmembers loaded the injured crewman aboard, and the other pilot from the downed aircraft climbed into the left side pilot seat, which I had just vacated. I heard the Huey pulling in pitch, so I climbed deeper into the underbrush and all vision was lost of me. Then, to my sickening surprise, as they pulled pitch, they turned away from me and flew off. I thought surely that someone would notice there should be five aboard, but I guess that there was such relief in the thoughts of the rescued crew and concern for the injured crewmember, that no one noticed I was not aboard. After all, put a helmet on, the familiar OD green on, we all looked about the same, especially to a new guy not familiar with any of us. Since the cobra had flown off of station, and the "loach" had not been shot down, recovery of the downed aircraft took second precedent over the injured crewmember. Nevertheless, I was terrified. In fact, terrified is to small of a word to really describe how I felt, because the only thing I had removed off of that aircraft before it had left, was the recovery sling, and a couple of tools. My M-16 and all ammo was aboard. I did have a knife, but somehow I didn't feel confident in my abilities to survive very long with only that, although in reality, I would probably last about as long with a knife as I would with a rifle. The clock seemed to stop, yet it was my heart that beat faster. I begin to look around for some place to hide, and hope that soon someone would add things up, and come back. I just knew that by a short time, I would either be dead, or a prisoner. Off in the distance I heard the rattle of a short firefight, and knew that the enemy was coming to have a peek at this downed aircraft. It wasn't going to be flyable, but they might want to rob it of some of its gear.

When the downed crew had been picked up, they had loaded their machine guns aboard along with the injured crewmember, so there was no danger of "Charlie" getting any arms, but things such as radios they would steal. Probably thirty minutes later I heard the rumble of a tracked vehicle squeaking towards me. Since there was a quite a bit of foliage in the area, and the approach of this vehicle was from Cambodian boarder side, I could not determine if it was friend or foe. Certainly I wasn't feeling very positive about my situation, so I figured that it was foe. Moments later, in a distance, I heard the tracked vehicle(s) pull up, and then as the moments ticked by, I heard the approach of humans by foot tromping toward my hiding area and the downed aircraft. All life simply drained from me. I knew I would never see my beautiful bride back home ever again. How would my mother take my disappearance? In fact, I just wondered if the enemy would keep me alive, or just kill me and my body would never be identified. I felt totally whipped.

Then, all at once, I thought I heard English being spoken. Then, again from another point. GREAT! I headed out of my hiding place, jumping for joy, elated about having someone with the same nationality being so close to me. About that same time, instantly all of my elation vanished, because all the bullets in the world begin to zing in and impact all around me. I realized what a stupid move I had made. The English speaking soldiers were firing at me, not knowing what the noise they heard coming from within the bush meant. They didn't know if I was friend or foe. I hugged the ground, and finally when somewhat of a calm had taken back over, I yelled out. "Hey! I'm An American!" After a short silence, I heard a voice yell back to me! ""Aright, come on out, and boy, you'd better be American." I did, and the next statement I heard was, "What, and Who (blank-a-dee, blank-a-dee, blank) are you...doing here!! To this day, I can't remember what "tank" unit these boys were from, but there commander was a red headed 1st lt. If he is a 3/4 Cav.. guy, I sure would like to shake his hand and buy him a steak dinner somewhere.

To end this nightmare, around noon we hear a chopper beating the air coming toward us. When it made its flare, I could see a familiar face, Tom Shirley at the controls, and all by himself. It seemed that he asked a few questions, put two and two together, took all the little things that was slipping through the cracks, and started making corrections. We got the "tankers" to slip the eye of the recovery sling into the eye of our cargo hook, and flew back to Cu Chi base camp.. What a beautiful sight. Delta Troop got their downed aircraft back, I got back, and no one ever knew the difference.....

All blunders were covered, which was something that seldom happened, and everything was intact except for the hair on my neck, which stood for years. After I was separated from the army, I looked up Tom Shirley and stay in some type of contact to this day. We are forever friends. One thing for sure, I learned a lesson! Today, whatever I do, I like to size up the situation, and let all know who are involved, what I am going to do. I don't like the idea of being left alone.

This is a true story, no names have been changed, and I am sorry for the lack of memory on some of the others in this incident. Regardless, I am very proud of the unit I served with, and it people.

EMP Attack and Solar Storms: A Guide

Kevin Hayden

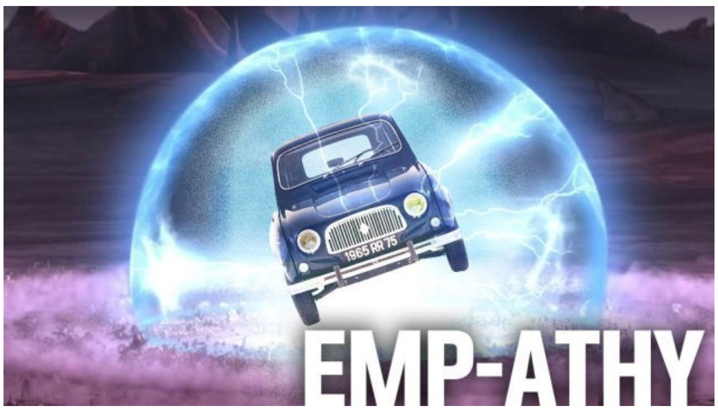
An EMP, or Electro Magnetic Pulse, is generated from the detonation of a nuclear device or quite possibly, extreme solar activity, such as that which was experienced in 1859, 1989, and as recent as 1994. The US Government and military have studied these phenomenon extensively and several reports have been issued regarding EMP effects on vehicles, computer networks, critical infrastructure, and more. In this report, we'll cover many of the topics discussed and researched in regards to geomagnetic anomalies, solar storm activity, and the effects of an electromagnetic pulse. It should be noted, however, that Congress has largely ignored the EMP Commission's warnings and our hospitals, trucking industry, and critical infrastructure remain highly vulnerable. In the late summer of 1859, a great solar storm hit the planet. This storm was the product of a coronal mass ejection from the Sun. While the science and physics behind these coronal ejections is interesting, it can also be long winded for some readers so I'll keep this brief.

Once in a while – exactly when, scientists still cannot predict – an event occurs on the surface of the Sun that releases a tremendous amount of energy in the form of a solar flare or a coronal mass ejection, an explosive burst of very hot, electrified gases with a mass that can surpass that of Mount Everest. I encourage you to research this more if you would like a deeper understanding of the charged plasma that is ejected from the Sun's surface occasionally.
What you need to realize is that these solar storms are not only electrically and magnetically charged, but they bring radiation – across the spectrum, from microwave radiation to gamma rays.

On September 1st and 2nd, 1859, Earth's inhabitants experienced the greatest solar storm in recorded history. The electrical grid was in it's infancy, consisting mainly of a few telegraph wires in larger cities. This storm short circuited the wires and caused massive fires. The typical light show in the far north, known as the Aurora Borealis, was seen as far south as Cuba, Rome and Hawaii. Due to society's minor dependence on any form of an electrical grid at the time, this did not disrupt the world substantially.

In 1989 and 1994, minor solar storms knocked out communication satellites, shut down power plants, and disrupted the electrical grid. These were *minor* solar flares. Imagine if a solar storm the size of 1859's struck our modern society. Delicate wires run everywhere nowadays.

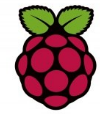
Filaments, computer chips, hard drives, cell phones, and electrical lines that stretch thousands of miles. Have you stopped to think about your vehicle's computer system? The details might surprise you. We'll get to that in a minute, but first, let's talk briefly about a man-made version of the Perfect Solar Storm – the nuclear EMP event.



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, September 25th, 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:

October 30th, 2014 7 pm

Please do not call the church for information!

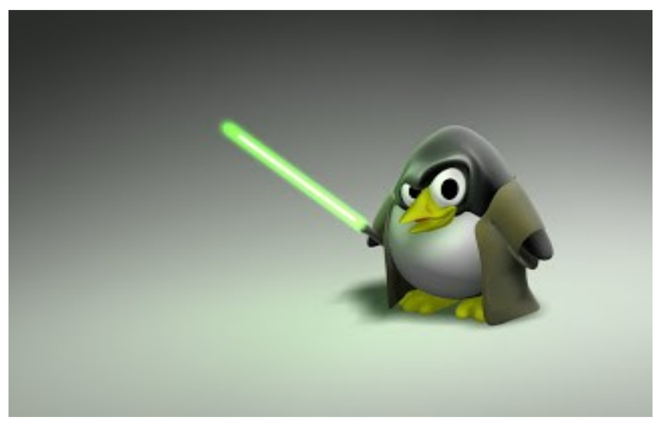
Club Nets

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: **Kc9cmt@earthlink.net**

or by Post to:

Michael B. Harris

807 Nicholson RD

South Milwaukee, WI 53172-1447

VE Testing:

September 27th, 9am— 11:30am

No testing: June, July 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

Sept. 27th, ORC fall swapfest Location: Cedarburg , WI Fireman's' Park, 6am—noon
Website: ozaukeeradioclub.org

Oct. 11th, 9th Annual Central Wisconsin Swafest Location: Colby, WI **Type:** ARRL Hamfest
Sponsor: Black River Amateur Radio Association
Website: https://www.facebook.com/events/1450268595210397/

MRAC Working Committees
100th Anniversary:

- Dave—KA9WXN
- Dan—N9ASA

Net Committee:

- Open

Field Day

Dave—KA9WXN, Al—KC9IJJ

FM Simplex Contest

- Joe – N9UX
- Jeff – K9VS

Ticket drum and drawing

- Tom – N9UFJ

Newsletter Editor

- Michael-KC9CMT

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 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, 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.8:45 PM 147.165- ARRL Audio News

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

Mon. 8:30 PM 442.875+ WARC W9CQ net also on EchoLink 576754

Mon. 8:30 PM 442.150+ 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, link to FM-38

Thur. 8:00 PM 50.160, 6 Mtr SSB 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. 8:00 PM 146.910+ YL's Pink HAMsters Net

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

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 — Florida Net 7 am, 14.290 mhz.

Thursday's 8:00 PM 448.300+ Tech Net

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