# HAMATEUR CHATTER

The Milwaukee Radio Amateurs Club

April 2012, Volume 20, Issue 4

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

## Presidents Letter

The April meeting will feature a presentation by one of the engineers at West Mountain Radio. If you couldn't make it to Superfest and see his forum, or get a chance to talk to the factory personnel at Superfest or have more questions for them, here's your chance to get up close and personal with the company (a ham radio manufacturer located right here).

As if February wasn't enough what with the FM Simplex Contest (MRAC finally took top club honors again), the successful hamfest and the meeting featuring a celebration of all things MRAC with free food, we thought we would cram a number of things into March as well.

First was the meeting. For the fourth time Gordon West was our featured guest. Attendance was a bit up from recent meetings and we even had some new people and picked up another new member. That's a trend I hope continues.

Speaking of new members we have had a few new ones in the last few months including the Markstrom Family - Jim KB9MMA, Cathy, KC9EOW, Sam KC9POP. Jim has had some health issues lately and we wish him well. Other new members include Bill Saterlee KC9VAF, and Matt Widup KC9UDX. All have their certificates and other new member stuff except for Matt.

After the March meeting was AES Superfest. During Superfest AES graciously let us use their FT-5000 demo radio along with their antennas (we did all our operating on the beam) for another part of our 95th anniversary celebration, this an HF Special Event operation (thanks to Dave Schank KA9WXN for getting this set up).

We did some setup and practicing on Friday and using Gordon West to kick things off we worked somewhere over 200 stations, all on 15 and 20, including a good number of DX stations, during about a bit over an hour Friday and not quite 6 hours Saturday. A total of 8 people took a turn at the radio. Are you one of them?

I don't know about you, but that was one of the few chances I will have operating over $6000 of radio (the microphone alone costs $400) and that's not counting tower and antennas. I have already sent an operator certificate to Gordo and will have certificates for the other operators at the meeting in April.

The club wishes to thank AES for allowing us to have at the radios (with some help from the Yaesu rep) and to have our club table up front, right where everyone walks in (or goes to the men's room). The club also wishes to thank Gordo and Bob Heil for talking up the club and the special event operation (and yes, they did mention my name and call - twice) on their Internet video program Ham Nation. Wow, between the CQ calendar and Ham Nation, MRAC has had a bunch of international PR in the last few months.

Any other club around here have any of that? Sorry for bragging a bit.

How about a bit more bragging? The city of Milwaukee has issued an official proclamation commemorating the 95th anniversary of MRAC. An MRAC member was responsible for getting that to happen, but they wish to remain somewhat anonymous.

**MRAC Officers:**

***Terms Expiring in 2012***

- President – Dave,WB9BWP
- V-President– Vacant
- Secretary – Mike, KC9CMT
- Treasurer – Joe, N9UX
- Director – Mark, AB9CD
- Director – Dave,KA9WXN

***Terms Expiring in 2013***

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

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

**(414) 332- 6 7 2 2**

Visit our website at:

www.w9rh.org

Mail correspondence to:

**M. R. A. C.**

P.O. Box 240545

Milwaukee, WI 53223

# Letter From The President, Continued….

They know who they are and I do and a few other people (and if you were on the Friday night 2M net a few weeks back you would know too).

And to them I, on behalf of MRAC issue a big thanks for his efforts. This is not the first time the city has officially recognized MRAC. Again, can any other club around here say that. Wouldn't you like to be part of a group that does get noticed beyond local hams (city government, Ham Nation, CQ, ARRL).

Now some business. Elections. April is the new month for the official "annual" meeting of the club. That is when the club holds elections for the board of directors. From 1917 - 1951 the elections were for a collection of directors who then picked a president, VP, etc. from their own (the group of directors). From 1951 - 2011 (sort of) the 4 officers - President, VP, Secretary, Treasurer were directly elected along with a number of directors.

Over the years the club has had as many as 13 people on the board and will now have 7. Actually for a number of years, for various reasons, the board has operated at less than full capacity.

The latest change to the election process, the changing of the by-laws at the January 2011 meeting, had for the first time in recent memory some disagreement among members and the need for a precise count vote. It is interesting that there was some concern about the election process yet there hasn't seemed to be any great concern about not having a full compliment of officers running the show. Over the last 10 years, for a number of those years, the club has operated without an official Treasurer. Yet the membership has not been very concerned with exactly who, if anyone, is handling the club's money (and no I don't have any new radios - yet).

Something I must also express in writing all this. Some people may want to stand up and point at us and say look at those fools and what kind of organization are they part of when their administration is so screwed up.

Ever hear the saying about glass houses? I look at the willingness of MRAC to talk about our messes and try to deal with them and fix them as taking the high road and operating with some class compared to any behind the scenes manipulations, political games and even name calling that some people or groups may engage in. I remember someone "announcing" the "real" elections taking place at another group last year. This year there were no "elections" as they could "only" muster up enough names to put one to each office. I guess we are not so bad after all.

Anyway, if you want to be a part of the oversight of the club's business activities (the running of the club is up to all members), come to the April meeting and nominate yourself or someone else (they must be present to get railroaded, er, nominated or have their approval in writing).

So, April meeting is West Mountain Radio and elections for 4 board members.
May is the annual auction, June brings us Field Day (interested in some of the event planning?) and a meeting which needs some details worked out yet.

We will be taking July and August off (for meetings, not club activities - the new incarnation of Picnic Ham is August 11). Sure we could just sit around a table every month and shoot the breeze with each other, but what fun would that be (Doing stuff, doing radio, having fun - interesting concept).

One last item I feel like talking about at this time (even though this column is probably already too long). Let me cover some of the reasons why MRAC is a viable amateur radio organization and deserves your participation.
Just because we are 95 years old, while notable, isn't reason enough to be considered important. A lot of business have long lives only to suddenly wither and die because they couldn't remain relevant. Of course you can read the official history book (it is available on the club web site as well as the club Yahoo group), but that is 113 pages it does take some time. While in discussions with the city of Milwaukee about our proclamation (as well as creating a summary sheet for the special event radio operation), I created a short list of club highlights. Even that is too long to list here, but allow me to step on a few toes and point out some of MRAC's history:

Weekly meetings - MRAC did that in the 1920's and 30's even into the 1950's.

Auctions of radio and electronics stuff - MRAC has done that since at least the 1930's (every May meeting, by the way and without a selling fee). Communications van - 1952~1960.

Founded Milwaukee County Amateur Radio Emergency Service (then Amateur Radio Emergency Corps) 1950s.

Organized, built and installed equipment (in area Police stations), and operated in the War Emergency Radio Service 1942-1945 Hamfests, conventions, etc - 1936 ARRL Central Division Convention (in Chicago no less as one of a number of sponsoring clubs), 1940 Wis ARRL Convention, 1948 ARRL National Convention, 1967 ARRL Central Division Convention (with assistance from 2 other area clubs) a number of "QSO Stag Parties (dinners with up to 300 attending from all over Wisconsin).

Sponsored Wisconsin state QSO party - 1950's. Cover of CQ Magazine - May 1952, CQ Amateur Radio Calendar - cover and 4 months of pictures 2012.

QSL Manager of Space Shuttle Amateur Radio events (SAREX) - 1983, 1986. Amateur Radio license classes (electronic theory and often Morse code also) - First in 1922 and many years in every decade since including a continuous run from 1976 - 1996.

Founded one of only 14 Volunteer Exam Coordinators (VEC) in the country 1984 (after a couple of years operating as a VE only) Operated in every ARRL Field Day since the first in 1930.
Had a number of ARRL officials (Section Managers, Division Directors, Emergency Coordinators, even ARRL employees) over the years.
Work with another club in organizing a Christmas Party (as well as a hamfest and Field Day operations - cooperation between clubs, what a novel concept) - all of that within the last 3 years.

## Letter From The President, Concluded

Work with another club in organizing a Christmas Party (as well as a hamfest and Field Day operations - cooperation between clubs, what a novel concept) - all of that within the last 3 years.

I could go on, but other things must be in this newsletter. That was a short list of things we have done. We have a list of things we would like to do (besides the hamfest, FM Simplex Contest, Field Day, Friday night nets, repeater stuff and more). Would you like to do some interesting stuff? Want to do some radio? Then come join us and let's go on a long and enjoyable ride. Want to start planning things for the 100th anniversary?

## Board of Director's Meeting Minutes

Board of directors meeting called to order at 7:05 pm by Dave DeFebo WB9BWP, club president.
Director's present: Mark, AB9CD, Al KC9IJJ, Dave WB9BWP, Michael KC9CMT, Dave KA9WXN, Hal, KA9OZN, Dan, N9ASA, Joe, N9UX.

Absent: None.

Preliminary discussions:

Joe, N9UX passed around copies of the FM Simplex contest certificates for review along with a primer for the W9RH Special event station that will take place this Saturday at AES SuperFest.

Certificates for new members were signed by the president and the club secretary prior to the meeting.

March meeting will be on the 29th, the day before the AES SuperFest. Gordon West will give a presentation along with perhaps some more guest appearances. Perhaps someone else from the SuperFest crowd will come along with Mr. West. The AES SuperFest will start the next day, March 30th,

Milwaukee City Hall called Dave, WB9BWP and will send samples of certificate templates for the clubs approval. The certificate will be given by the city to commemorate the 95th anniversary of the MRAC.

Joe, N9UX has now been officially installed as the new club treasurer. Joe, gave a treasurers report for the month of February and a partial report for March. February's swapfest was a success for the second strait year. A larger location is being sought for next year. The treasurers report was accepted by voice vote of 8-0. The club would like to recognize Joe, N9UX and Dan, N9ASA as new board members. Al, KC9IJJ was compensated for his food supplies and preparation at the February membership meeting.

April is also scheduled to be the election month for the club. Terms are up for four directors this election cycle. No candidates or committee has been formed to advance this election cycle. Elections are now deemed tentative for the April meeting due to the low number of candidates again this year.

At the May board meeting, the board of director's will decide among themselves who will fill the vacant club officer positions. The club hopes that there will be enough elected director's to fill the expected positions. As of yet, there are no interested parties. More work will be done on this topic at the membership meeting this Thursday. Dave, WB9BWP has offered to host the April meeting at his house. This used to be the standard according to club history. The Board Meeting will be moved to Dave's house by unanimous vote of 8-0.

The March membership meeting will be this Thursday. Food & condiments will be provided from left overs from the February meeting. Unfortunately, the cocktail wieners have been expended.

May will be the club auction night. The club will need Joe, N9UX to preform this treasurer's function at the club auction. June will be a show & Tell night regarding antennas but nothing yet is official. It could turn out to be a Field Day summary. No meetings in July or August. Our joint picnic with the MAARS will be August 11th this year at Greenfield park, across from the cool waters part of the park. Nothing yet on the agenda yet for September through November.

The club special event station will be this Saturday, March 31st, at AES SuperFest. We need to pass around a volunteer list at the membership meeting.

FM Simplex Contest: Tentative results suggest that the MRAC will be the winner of the FM contest point total this year, replacing Badger contesters from prior years. Dave, WB9BWP has a club seal that will be used to certify the certificates. The club seal dates back to the 1960's.

Club certificates: Make changes to certificate to make it useable from year to year. A large print job is more efficient that smaller print jobs. New life members were discussed. Their may be someone that qualifies this year.

AES SuperFest: A roster is needed for this years SuperFest. One will be provided by the club secretary. Mark, AB9CD will write something about badges for this years fest.

Our clubs Anniversary Special event station will occupy the AES Corporate station on Saturday, March 31st. We are expecting some of the dignitaries that attend the AES SuperFest to work for a few minutes at the station. Volunteers from the club roster are needed to man the station for the entire day. Dave, KA9WXN will talk to the AES people as to whether our club can move its table to a area adjacent to the special event station. Photos will be taken and perhaps sent into CQ magazine for publication. ARRL will be their and perhaps also take pictures. A laptop is needed for logging contacts for the special event station. Our website should list suggested frequencies for contacts. Mark, AB9CD will work on this.

Frequencies 28.490, 14.290, 21.315. Dave, WB9BWP is working on a history highlights page to hand out during the special event. The club president would like to send out contact QSL notification via the internet, but QSL cards will more than likely be made up and sent out. Operating times for station are 9 am to 3 pm Saturday, March 31st, 2012. Friday 2 pm to 6 pm will be intermittent operating at the event station. Does club still have an account at QRZ.Com that we can use to log contacts and for address information. Volunteers are also needed for the club table in the club area of the AES warehouse.

## Board of Director's Minutes Concluded.

Field Day: ARES has not committed to taking part in our club's field day event, due to prior historical commitments. Even though, some talk has been circulated regarding having the ARES truck at the MRAC/MAARS Field Day event. The ARES truck is stationed at the Greenfield fire station. Paperwork needs to be submitted to get a time slot for the truck to appear anywhere. LaFrog is going to be at pioneer village during Field Day. They are not a subgroup of this club. The clubs' equipment is still sitting at the pioneer site along with radios that are at Dave, WB9BWP's residence. If the club decides to lone out equipment, rules must be established.

Club Equipment: Club equipment still resides at the pioneer village basement. Mark, AB9CD has brought up the idea of loaning out club owned equipment to help attract new hams and develop relationships with working hams.

Club Hamfest: We would like to use the same facility as we have in the past. February 16th, Saturday will be the date of the 2013 swapfest. We definitely need to start advertising by the SMARC swapfest in July.

SuperFest Handouts are being worked on by Dave, WB9BWP. There may be chatter archives available for the fest also. New banners are available from places like Copy & Print Depot. Our is getting old and tattered from extended use.

Phone Service: The Milwaukee VEC will be asked to contribute to the expense of the clubs phone line answering machine.

A Motion made to adjourn meeting at 8:50 pm by Mark, AB9CD, seconded by Michael KC9CMT. Meeting adjourned at 8:55 pm. Room returned to good condition as prescribed by the Library.

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) 332-MRAC or 332 - 6722**


## Next Regular Meeting

The next meeting will be April 26th 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.

***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 **8:30 p.m.** at **28.490 MHz USB.**

## 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

# Membership Minutes



The MRAC membership meeting was called to order at 7:04 pm by Dave, WB9BWP, club and board president.

Preliminary discussions:

Our presentation guest tonight is Gordon West WB6NOA, visiting from California for tomorrows AES SuperFest opening. SuperFest runs from March 30th through April 1st. The MRAC will be having a special event station at the AES SuperFest under the call sign of W9RH. The club will be sending out QSL cards and/or certificates for out of area contacts on the bands worked. Gordon West WB6NOA was taken out to dinner by some of the MRAC Board of Directors' members.

A YouTube video of Ham Nation broadcast was played before the actual meeting commenced. Our club was given a mention during the Ham broadcast announcing our special event station this Saturday. Attendance was quite good at this months' meeting. Area Hams are excited about the upcoming AES event. At the start of the meeting the mic was passed for introductions. Al, KC9IJJ provided the sound equipment for tonight's meeting along with his camera equipment to document the event.

The MRAC will also be staffing a club table for the event starting tomorrow. New member certificates were presented by club president Dave, WB9BWP. Joe, N9UX announced the winners of the recent February FM Contest. The club winner this year was our club, W9RH. Warren, K9IZV won the single band rover, 2 meter category, and tied for the 7cm contact category. Quite a good showing for our fellow club member Warren. Bill, KX9M one the HT category. Base station W9GA, Ken own that slot. Bill, KX9M won the 6 meter category. Jerry, K9FI and his spouse were recognized as working the contest and creating a pileup. All hams like to work YL's due to their rarity in the Ham community.

A new station in Richmond, Illinois sent in a log with one point along with a favorable comment about our contest. Joe and the MRAC would like to thank everyone would made the FM simplex contest a success again this year.

A new edition of the Club history DVD is available this year and has been uploaded to the club Yahoo group. It was noted that KA0XTT a station in California has been working the last man standing show in some way, to advertise Ham radio to the general public. Pancho stated that the club nets are running well, but a group of operators' would be a good idea to keep the nets going into the future. The club raffle was talked up by Dave, WB9BWP. Members bring in items they no longer want to provide operating Capitol to the club. The MRAC/MAARS swapfest results were announced. It was a great success this year. The swapfest is getting bigger each year and a larger location is being investigated by the Board of Directors'.

Tom Fuszard, K9FU from the VEC gave a short talk about the upcoming testing to coincide with this years AES Fest. Saturday, 8:30 – 11 am. Fred Maia, W5YI passed away from Cancer last night. His notice of SK will be published in some of the various Ham Magazines in the coming future. Fee will be $5 as usual. Some other meetings were announced, the ARES and MAARS meetings are on the horizon. Charlie, stated that the Milwaukee Mayor, Tom Barrett will be presenting the club with a commendation to coincide with the clubs 95th anniversary this year.

The MRAC will be having a special event station at the AES SuperFest this Saturday. Certificates will be given to each operator.

Ham Nation is a weekly internet streaming show that is with Bob Heil, K9IEO and Gordon West, WB6NOA at ustream.tv/channel/SuperFest. WB6NOA@arrl.net, K9EID@arrl.net.

**Now on to the Gordon West show**; Gordon reports that there are 750K hams in the US as of now. Solar cycle 24 is at its most intense right now. California does not allow HF antennas in some areas. So, Hams put their antennas on at night. With Digital TV there is no TVI interference from Amateur radio. The TV will just pixelate or freeze. The Chinese are flooding the US Ham market with low cost very compact HT's, they are priced at around $100. Some hams are purchasing these instead of US built products.

In 1957, Sputnik was launched by the Russians as the first orbiting satellite. Our satellite system is based on the Russian system. Gordon went on to tell some jokes. HW101 Heathkit. Bandmaster was Harvey Wells. Gordon was very good in his presentation tonight. Lots of fun!

A short business meeting was called to order at 8:20 pm by Dave, WB9BWP.

Joe, N9UX gave a treasurers' report to the membership. Joe is the MRAC's new treasurer. Our club is running in the black again this year. The Swapfest in February was very successful. Both clubs sponsoring the fest did well. The financial books are healthy. The repeater fund is well stocked this year. Dave, WB9BWP reports that there are over a thousand PDF files on the club history DVD's.
Club meeting minutes were accepted as published in the March Ham-Chatter by a unanimous hand vote among the membership. The April elections were discussed. Dave our president asked for people who were interested in running for the position of directorship. Four are needed this election cycle.

Dave asked for volunteers for the special event station and club table this coming weekend. Field Day is at Konkel park in Greenfield again this year. Our June meeting is after field day again this year. You can just stop by, you are not required to work the contest if you do not wish too. Dave asked the membership if they had any questions to bring to the board of director's or himself. The Raffle will immediately follow the membership meeting. The MRAC FD from 2011 is represented in the CQ magazine 2012 calendar. Dave, KA9WXN had his picture along with the repeater site in both the CQ magazine and calendar. Our club has four photos' in the CQ calendar.

Dave accepted motions to adjourn the meeting at 8:45 pm. Motion made by Michael, KC9CMT, seconded by Al, KC9IJJ. Meeting adjourned at 8:48 pm. Room policed of trash and returned to an acceptable condition as found before the meeting commenced.

# Capacitors

Capacitors are common components of electronic circuits, used almost as frequently as resistors. The basic difference between the two is the fact that capacitor resistance (called reactance) depends on the frequency of the signal passing through the item. The symbol for reactance is $X_c$ and it can be calculated using the following formula:

$$X_C = \frac{1}{2\pi fC}$$

*f* representing the frequency in Hz and *C* representing the capacitance in Farads.

For example, 5nF-capacitor's reactance at *f*=125kHz equals:

$$X_C = \frac{1}{2 \cdot 3{,}14 \cdot 125000 \cdot 5 \cdot 10^{-9}} = 255\ \Omega,$$

while, at *f*=1.25MHz, it equals:

$$X_C = \frac{1}{2 \cdot 3{,}14 \cdot 1250000 \cdot 5 \cdot 10^{-9}} = 25{,}5\ \Omega \cdot$$

A capacitor has an infinitely high reactance for direct current, because *f*=0.

Capacitors are used in circuits for many different purposes. They are common components of filters, oscillators, power supplies, amplifiers, etc.

The basic characteristic of a capacitor is its capacity - the higher the capacity, the higher is the amount of electricity it can hold. Capacity is measured in Farads (F). As one Farad represents fairly high capacity, smaller values such as microfarad (µF), nanofarad (nF) and picofarad (pF) are commonly used.

As a reminder, relations between units are:

$$1F=10^6\mu F=10^9 nF=10^{12} pF,$$

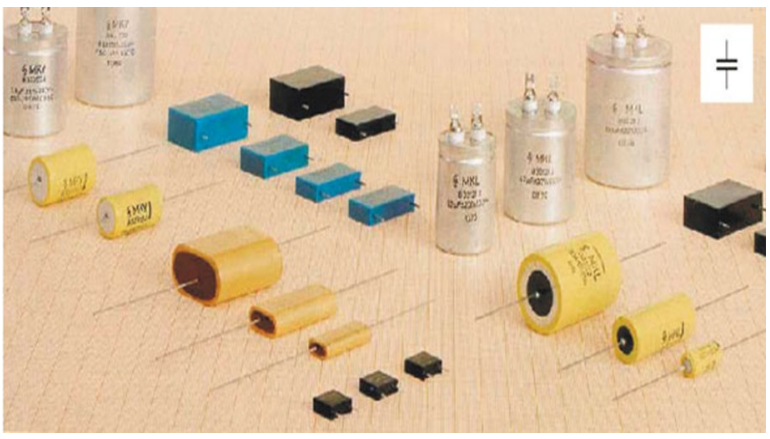
that is 1µF=1000nF and 1nF=1000pF. It is essential to remember this notation, as same values may be marked differently in some circuits. For example, 1500pF is the same as 1.5nF, 100nF is 0.1µF.

A simpler notation system is used as with resistors. If the mark on the capacitor is 120 the value is 120pF, 1n2 stands for 1.2nF, n22 stands for 0.22nF, while .1µ (or .1u) stands for 0.1µF.

Capacitors come in various shapes and sizes, depending on their capacity, working voltage, type of insulation, temperature coefficient and other factors. All capacitors can divided in two groups: those with changeable capacity values and those with fixed capacity values. These will covered in the following chapters.

## 2.1 Block-capacitors

Capacitors with fixed values (the so called *block-capacitors*) consist of two thin metal plates (these are called "electrodes" or sometimes called the "foil"), separated by a thin insulating material such as plastic. The most commonly used material for the "plates" is aluminum, while the common materials used for insulator include paper, ceramic, mica, etc after which the capacitors get named. A number of different block-capacitors are shown in the photo below. A symbol for a capacitor is in the upper right corner of the image.



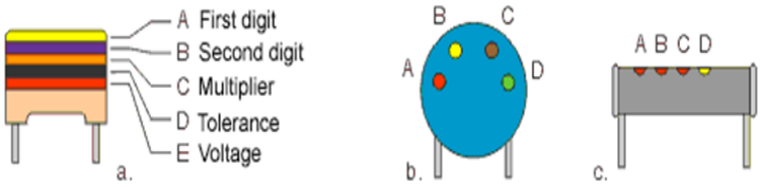
Most of the capacitors, block-capacitors included, are non-polarized components, meaning that their leads are equivalent in respect of the way the capacitor can be placed in a circuit. Electrolytic capacitors represent the exception as their polarity is important. This will be covered in the following chapters.

### 2.1.1 Marking the block-capacitors

Commonly, capacitors are marked by a set of numbers representing the capacity. Beside this value is another number representing the maximal working voltage, and sometimes tolerance, temperature coefficient and some other values are printed as well. But on the smallest capacitors (such as surface-mount) there are no markings at all and you must not remove them from their protective strips until they are needed. The size of a capacitor is never an indication of its value as the dielectric and the number of layers or "plates" can vary from manufacturer to manufacturer. The value of a capacitor on a circuit diagram, marked as 4n7/40V, means the capacitor is 4,700pF and its maximal working voltage is 40v. Any other 4n7 capacitor with higher maximal working voltage can be used, but they are larger and more expensive.

Sometimes, capacitors are identified with colors, similar to the 4-band system used for resistors (figure 2.2). The first two colors (A and B) represent the first two digits, third color (C) is the multiplier, fourth color (D) is the tolerance, and the fifth color (E) is the working voltage.

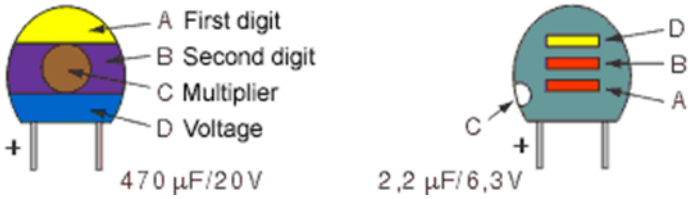
With disk-ceramic capacitors (figure 2.2b) and tubular capacitors (figure 2.2c) working voltage is not specified, because these are used in circuits with low DC voltage. If a tubular capacitor has five color bands on it, the first color represents the temperature coefficient, while the other four specify the capacity in the previously described way.




| COLOR | DIGIT | MULTIPLIER | TOLERANCE | VOLTAGE |
|---|---|---|---|---|
| Black | 0 | x 1 pF | ±20% | |
| Brown | 1 | x 10 pF | ±1% | |
| Red | 2 | x 100 pF | ±2% | 250V |
| Orange | 3 | x 1 nF | ±2.5% | |
| Yellow | 4 | x 10 nF | | 400V |
| Green | 5 | x 100 nF | ±5% | |
| Blue | 6 | x 1 µF | | |
| Violet | 7 | x 10 µF | | |
| Grey | 8 | x 100 µF | | |
| White | 9 | x 1000 µF | ±10% | |

**Fig. 2.2: Marking the capacity using colors**

The figure 2.3 shows how the capacity of miniature tantalum electrolytic capacitors are marked by colors. The first two colors represent the first two digits and have the same values as with resistors. The third color represents the multiplier, to get the capacity expressed in µF. The fourth color represents the maximal working voltage.




| COLOR | DIGIT | MULTIPLI-ER | VOLTAGE |
|---|---|---|---|
| Black | 0 | x 1 µF | 10V |
| Brown | 1 | x 10 µF | |
| Red | 2 | x 100 µF | |
| Orange | 3 | | |
| Yellow | 4 | | 6.3V |
| Green | 5 | | 16V |
| Blue | 6 | | 20V |
| Violet | 7 | | |
| Grey | 8 | x .01 µF | 25V |
| White | 9 | x .1 µF | 3V |
| Pink | | | 35V |

**Fig. 2.3: Marking the tantalum electrolytic capacitors**

One important note on the working voltage: The voltage across a capacitor must not exceed the maximal working voltage as the capacitor may get destroyed. In the case when the voltage is unknown, the "worst" case should be considered. There is the possibility that, due to malfunction of some other component, the voltage on capacitor equals the power supply voltage. If, for example, the supply is 12V, the maximal working voltage for the capacitor should be higher than 12V.

## 2.1 Electrolytic capacitors

Electrolytic capacitors represent the special type of capacitors with fixed capacity value. Thanks to special construction, they can have exceptionally high capacity, ranging from one to several thousand µF. They are most frequently used in circuits for filtering, however they also have other purposes. Electrolytic capacitors are polarized components, meaning they have positive and negative leads, which is very important when connecting it to a circuit. The positive lead or pin has to be connected to the point with a higher positive voltage than the negative lead. If it is connected in reverse the insulating layer inside the capacitor will be "dissolved" and the capacitor will be permanently damaged.
Explosion may also occur if capacitor is connected to voltage that exceeds its working voltage. In order to prevent such instances, one of the capacitor's connectors is very clearly marked with a + or -, while the working voltage is printed on the case.

Several models of electrolytic capacitors, as well as their symbols, are shown on the picture below.

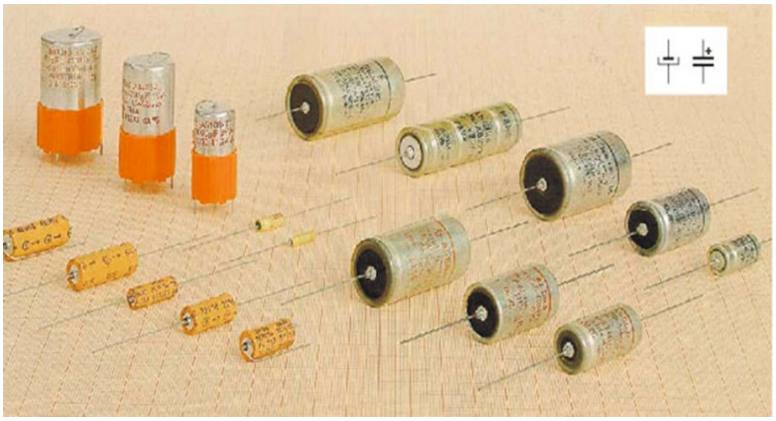


**Fig. 2.4: Electrolytic capacitors**

Tantalum capacitors represent a special type of electrolytic capacitor. Their parasitic inductance is much lower than standard aluminum electrolytic capacitors so that tantalum capacitors with significantly (even ten times) lower capacity can completely substitute an aluminum electrolytic capacitor.

## 2.3 Variable capacitors

Variable capacitors are capacitors with variable capacity. Their minimal capacity ranges from 1p and their maximum capacity goes as high as few hundred pF (500pF max). Variable capacitors are manufactured in various shapes and sizes, but common features for them is a set of fixed plates (called the stator) and a set of movable plates. These plates are fitted into each other and can be taken into and out of mesh by rotating a shaft. The insulator (dielectric) between the plates is air or a thin layer of plastic, hence the name variable capacitor. When adjusting these capacitors, it is important that the plates do not touch.
Below are photos of air-dielectric capacitors as well as mylar-insulated variable capacitors (2.5a).

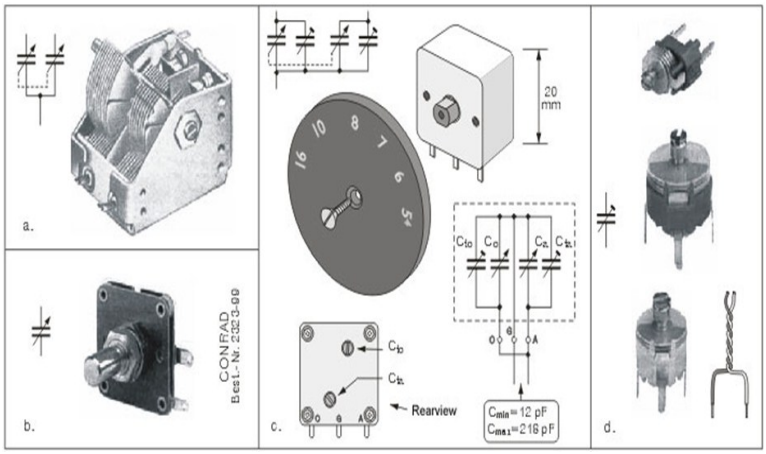



**Fig. 2.5: a, b, c. Variable capacitors, d. Trimmer capacitors**

The first photo shows a "ganged capacitor" in which two capacitors are rotated at the same time. This type of capacitor is used in radio receivers. The larger is used for the tuning circuit, and the smaller one in the local oscillator.

## The Experimenters Bench Continued

The symbol for these capacitors is also shown in the photo. Beside capacitors with air dielectric, there are also variable capacitors with solid insulator. With these, thin insulating material such as mylar occupies the space between stator and rotor. These capacitors are much more resistant to mechanical damage. They are shown in figure 2.5b.
The most common devices containing variable capacitors are radio receivers, where these are used for frequency adjustment. Semi-variable or trim capacitors are miniature capacitors, with capacity ranging from several pF to several tens of pFs. These are used for fine tuning radio receivers, radio transmitters, oscillators, etc. Three trimmers, along with their symbol, are shown on the figure 2.5d.

### 2.4 Practical examples

Several practical examples using capacitors are shown in figure 2.6. A 5µF electrolytic capacitor is used for DC blocking. It allows the signal to pass from one sage to the next while prevent the DC on one stage from being passed to the next stage. This occurs because the capacitor acts like a resistor of very low resistance for the signals and as a resistor of high resistance for DC.

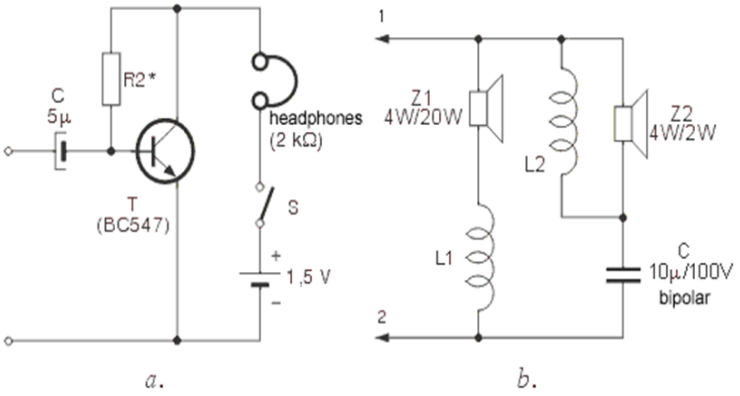



**Fig. 2.6: a. Amplifier with headphones, b. Electrical band-switch**

The figure 2.6b represents a diagram of a band-switch with two speakers, with Z1 used for reproducing low and mid-frequency signals, and Z2 for high frequency signals. 1 and 2 are connected to the audio amplifier output. Coils L1 and L2 and the capacitor C ensure that low and mid-frequency currents flow to the speaker Z1, while high frequency currents flow to Z2. How this works exactly ? In the case of a high frequency current, it can flow through either Z1 and L1 or Z2 and C. Since the frequency is high, impedance (resistance) of the coils are high, while the capacitor's reactance is low. It is clear that in this case, current will flow through Z2. In similar fashion, in case of low-frequency signals, current will flow through Z1, due to high capacitor reactance and low coil impedance.

.

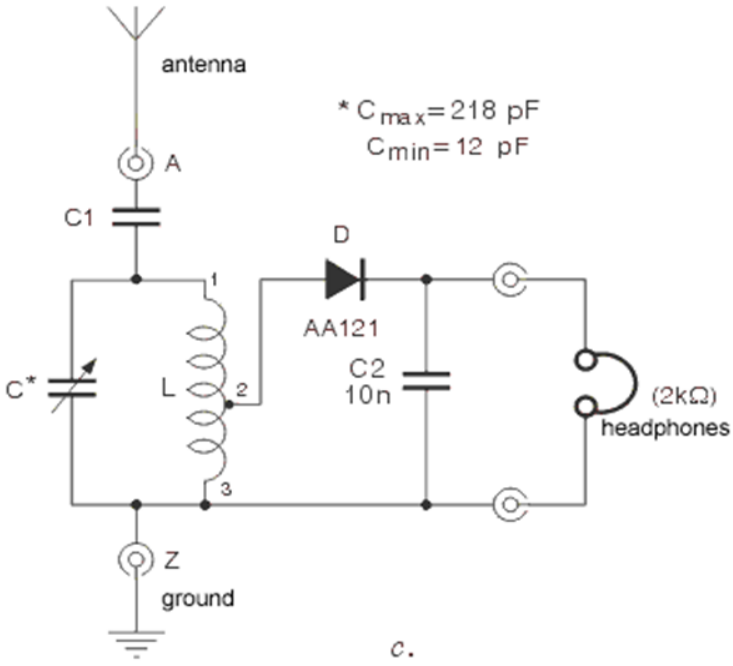



**Fig. 2.6: c. Detector radio-receiver**

The figure 2.6c represents a circuit diagram for a simple detector radio-receiver (commonly called a "crystal set"), where the variable capacitor C, forming the oscillatory circuit with the coil L, is used for frequency tuning. Turning the capacitor's rotor changes the resonating frequency of the circuit, and when matching a certain radio frequency, the station can be heard.

## Early Radio: Military Communications

### Assault On Patrol Base Diamond I

By- Bob Seger

One of the tactics employed by the 25th Infantry Division was to construct a patrol base out in the middle of nowhere, but generally close to an enemy concentration. These patrol bases positioned way out in "Indian Country" served several functions. A company of soldiers and a battery of artillery would be located there to provide artillery support in areas close to the border. Generally they were located to interdict the enemy's supply lines and the infantrymen would mount patrols in search of the enemy. They served another valuable purpose, in that they infuriated the enemy. These patrol bases would be placed in enemy controlled areas knowing they would be attacked. These attacks required a frontal assault and negated the guerrillas' tactics the enemy generally unitized. The Viet Cong could not ambush a patrol base. The American forces much preferred a frontal attack and built the defenses accordingly. In this fashion, the full weight of the division's firepower could be utilized against the attacking enemy forces.

These artillery pieces fired a four-inch shell of different varieties. Most common was the high explosive shell that also could have a VT fuse installed. VT stood for vertical timed and this fuse caused the shell to explode at a preprogrammed height above the ground. The shell exploding over the heads of attacking enemy was more effective than ground bursts. Another shell available to the artillerymen was the beehive round. It received its name from the sounds of bees buzzing around the hive. This round was the modern day version of the canister shot used during the Civil War. During the Civil War, a canister shot was nothing more than finding scraps from the battlefield and pushing them down the barrel of the cannon. Anything was used such as rocks, pieces of metal, broken glass, and anything found on the battlefield that could be crammed down the tube of the cannon.

When the round fired, it slashed to pieces any attacking enemy in front of it. It was extremely lethal. The modern beehive round contained thousands of small fleshettes, slightly over one inch in length and had tiny fins to stabilize it during flight. The fleshettes were miniature steel arrows and would kill upon impact. Anyone or anything in front of a beehive round would be impaled with hundreds of small arrows ripping apart their bodies. The sounds of the thousands of arrows humming through the air gave rise to its nickname of the beehive round.

The artillerymen certainly knew their mission and why the perimeter wall was so short. Soon the infantrymen would learn the reason for the low dirt wall surrounding their perimeter. The barrels of the cannons were about 4 feet above the ground and could shoot artillery rounds, particularly beehive rounds, just inches over the perimeter walls and pointblank into the attacking enemy. If the infantrymen wondered why the perimeter wall was so low, the reason would become apparent when the first beehive rounds fired slightly over the dirt wall would decimate any attacking enemy in front of howitzer.

The tactics of the 25th Infantry Division included placing soldiers deliberately in enemy territory inviting attack. Actually, the brass wanted the fire support base to be attacked, as all of the division's assets could be best used. Division artillery fire and gunships could be used to support the small outpost in the enemy's backyard. Additionally, Air Force fighter bombers were generally available for additional air support. The Wolfhounds were bait in a trap hoping Charlie would plan a ground attack. It was a fine military tactic, however, for those unlucky soldiers lodged in enemy controlled territory, they believed this tactic sucked. They knew the building of the camp invited an enemy response. Usually it didn't take long and would be certain and severe.

All during the day, additional Chinooks would arrive with ammunition, artillery shells, barbed wire, claymore mines, and anything needed by the men manning the patrol base. The Muleskinners flying the Chinooks brought everything but safety for these isolated soldiers. Sandbagged bunkers would be constructed for firing positions for the infantry manning the bunker line defenses. Soon claymore mines would be placed in strategic locations and the entire camp would be ringed with strands of barbed wire. Inside the barbed wire would be a series of bunkers ringing the compound. M-60 machine guns would be employed in many of them. However, the backbone of defense of the patrol base was the common infantryman manning the bunker line with his M-16 rifle. Defense of Diamond fell to the 25th Infantry Wolfhounds. These were the crack Infantrymen of the 25th Division.

In the span of just a few daylight hours, Patrol Base Diamond was forged out of the countryside. In only hours, Diamond was excavated into a defensive position far out in enemy controlled territory. From the air, it was an ugly sight. The bulldozer had scraped all vegation in the area and it had a reddish twinge to it and looked like red Georgia clay. From high up in the air, it looked like something the Aztecs Indians would have built for a ceremony honoring one of their gods, probably their God of War. The location afforded great fields of fire and for the VC to attack it, they would have to do it over open ground, and in the face of horrendous firepower. That never stopped the enemy before, why now. The stage was now set and the isolated Wolfhounds in Firebase Diamond nervously awaited the enemy's response. They would not have long to wait before the enemy responded.

I was a member of a Cobra fire team on duty sitting in the Scramble Shack on February 23, 1969. It was just three days after my 22nd birthday. The Scramble Shack was where pilots and crews waited for a mission and was manned 24 hours around the clock. Waiting in the Scramble Shack could be tedious at times. Crews were on duty 8 hours at a time and could not leave. When the telephone rang, everyone would spring into action, including our heart rates and adrenaline flow. The two copilot-pilots would stay behind to receive the information over the telephone which included the ground coordinates, radio frequency and call sign of the infantry commander. Meanwhile, the other crew members raced to their gunship where it quickly was fired up for combat. By the time, the two copilot-pilots had finished their telephonic briefing, the gunships were ready and all instruments were in the green. After a quick artillery clearance, the lethal gunships were last seen speeding down the runway at Cu Chi and quickly disappearing in the night sky. The gunships were expected to be airborne within a few minutes of the telephone ringing.

This night was no different. The Cobra fire team leader was CWO George Grinnell and I was flying with him. Since I was a copilot flying in the front seat of the Cobra, I stayed behind to receive the tactical briefing while George Grinnell started up the Cobra. After the briefing, I sprinted to my Cobra and before I was fully strapped into my seat, George had our Cobra speeding down the runway.

As we arrived on station I was struck by the sights of combat. Red tracers going out from the defenders of Diamond and green tracers were coming in. I could see an occasional enemy mortar explode in Diamond. Flares were being shot into the night sky to illuminate the battlefield. Artillery shells were exploding every few seconds. I could not imagine being on the ground in the middle of all that carnage.

It was obvious that Rule Number One of War was in effect for tonight. This rule states that young American boys go off to some strange land and die for the preservation of and restoration of freedom. There is no grand scheme to explain why one person lived and another died. It could mean just being in the wrong place at the wrong time. You can be the best trained and most experienced soldier and that alone will not prevent you from being in the wrong place at the wrong time. A bullet does not have to have your name on it to be deadly. I never was worried about the bullet with my name on it. What did worry me were the ones addressed, "To whom it may concern". There seemed to be many of them flying through the skies this night.

The defenders of Patrol Base Diamond were under heavy attack. The two artillery pieces must have had their barrels red hot from shooting so frequently. Artillery shells were constantly exploding across the battleground. Tracers were intersecting all over the ground. As George Grinnell made contact with the commander of Diamond, he requested the commander to notify us where to place our ordnance. We were pleased when he said he had pulled in all of his patrols and they were totally surrounded by "unfriendlies". He instructed us to make rocket attacks wherever we wanted, as he said was under attack from all directions. He only cautioned us to avoid hitting Diamond. It wasn't hard to distinguish the friendly positions, as incoming mortar shells had started several small fires in the compound. It was quite easy to see the outline of the firebase from the sky in the dim glow of the flares lighting the night sky.

As George Grinnell nosed over our Cobra, I already was on the trigger of my minigun. The minigun was an awesome weapon. It had a variable speed trigger, as the harder I pulled, the faster it would fire. When pulling all the way on the trigger, the minigun could fire as fast as 4000 thousand rounds per minute. That was way too much firepower, as four or five bullets would kill an enemy soldier as well as 50 bullets. Besides, firing at a much slower rate conserved the ammunition. Firing the minigun at about 600 rounds per minute was sufficient for my purposes. My Cobra carried 4000 rounds of ammunition for my minigun.

From the front seat of my Cobra, I had a great view of the battlefield. If it wasn't for the fact that men were in the process of dying, it would have been an awesome light show with the flares, explosions of artillery shells, and multi colored tracers shooting everywhere. I quickly was brought back to reality and began placing deadly minigun fire on the enemy machine gun emplacements. Tracers were needed to show where one was shooting at, but it also gave away your position. I concentrated my fire on several machine gun positions whose tracers were firing on Diamond. As I slowly pulled the trigger, a solid red streak stretched from the nose of my Cobra to the ground and into the enemy positions. There were so many tracers it appeared as if one could walk down them. Even thought it appeared as a solid red line, one must realize that only every fifth round was a tracer. Although the battlefield was utterly covered with tracers, only 20 percent of the rounds could actually be seen. Now that was a scary thought. I maneuvered the sights of my minigun to every machine gun emplacement I could see and unleashed a short burst of fire on each target.

There were no lack of targets for me to shoot at. Halfway through our dive I became aware of George Grinnell unleashing some of our 72 rockets we had onboard. The rockets left the Cobra with a flash of light and sped to the ground where they exploded with deadly efficiency. George most assuredly was superb when aiming those rockets. Now there were less of the enemy attacking Diamond than few seconds before. Seconds after George and I made our attack, down flew our wingman to add his arsenal of weapons to the destruction of the enemy. The copilot of that Cobra had a 40mm grenade launcher at his disposal. The 40mm grenade launcher could fire 240 rounds per minute. Each 40mm grenade was similar to the infantrymen's hand grenade and would kill anyone within a 5 yard radius of its explosion and wound those within 10 yards. It was an effective weapon against enemy troops out in the open. Tonight the enemy was out in the open and in full force.

Halfway through our next dive, a .51 caliber antiaircraft weapon opened up on us. The enemy gunners must have been asleep to allow each Cobra a gun run before opening up on us. Or it could be they had other duties attacking Diamond and they now switched to their secondary antiaircraft role. We had to dispose of this threat first, otherwise we could not support the fire support base. The VC gunner was cunning as he rarely fired except when we were pulling out of our dives, which incidentally was when we were most vulnerable to attack. Additionally, the VC had dug a hole into the ground and placed the .51 cal weapon below ground level. Only the barrel protruded above ground. That had the effect of negating our rocket attacks, as our rockets exploded up from the ground at a 45 degree angle. Since the enemy gunners were below ground level, only a rocket placed in the middle of this small hole in the ground could knock out this dangerous antiaircraft weapon.

The .51 cal antiaircraft weapon was a particularly deadly weapon. The American .50 caliber machine gun had an effective range of one mile. The enemy's .51 cal was only a millimeter wider but the shell casing was 3 inches longer and contained far more gunpowder. This gave it an increased explosive punch, velocity, and a far greater range when compared to our .50 cal machine gun. We pilots wore a hard ceramic flak jacket and sat in an armored seat for protection. They would provide absolutely no protection against an enemy .51 cal. There is no doubt the round would blast its way through my flak vest, body, and then through the back of my armored seat and then repeat this process going through George, his flak jacket and seat sitting directly behind me. Then the round would continue with only slightly reduced velocity. They were that dangerous and had to be eliminated first.

This .51 caliber was supported by a dozen or more machine gun emplacements. One round through the engine and we would be on the ground within seconds. Soon the sky was full of deadly tracers, both red and green. Since the enemy gunner was only sporadically firing, on our next gun run on the .51 cal, George formulated a plan. He instructed our wingman not to dive in on our next gun run to protect us, but to circle instead. George wanted our wingman to delay his next gun run as George would act at his wingman and switch places.

As our wingman rolled in on the target, George was waiting and delayed his dive. He had timed his dive slightly so that we were beginning our dive as our wingman was pulling up. At that moment the enemy gunner began firing at the exposed belly of the other Cobra. The timing was perfect and George screamed into the intercom, "Kill that bastard". I was able to place my deadly minigun fire right into the hole where the tracers were coming from. In my excitement, I pulled the trigger all the way. My first burst missed the target but I adjusted them to where the enemy's tracers were coming from. After a few seconds, only my tracers were seen going in and none were coming out. The enemy's tracers gave away his position and were his undoing. For good measure, George shot several pairs of rockets at it and in the process eliminated some of the machine nests protecting it. This deadly weapon of war was finished for the night.

## Early Radio: Military Communications

Now we could get down to the business of defending Diamond. We made numerous attacks on all points of the compass surrounding the small firebase. There was no lack of targets. We expended all rounds of ammunition and rockets. The firebase commander requested we refuel and rearm and return back on station. He assured us there would be plenty of targets remaining when we returned.

Flying back to refuel and rearm, I could not imagine how the enemy could possibly attack in such appalling conditions. If it wasn't artillery shells or our Cobra rockets exploding all around, then it was our minigun spitting out 4000 rounds per minute, or our 40mm grenade launchers spewing out hundred of grenades per minute. The Diamond defenders on the ground had their M-60 machine guns and M-16 rifles firing thousands of rounds per minute. Every minute of so, it seemed as if a ton of ordnance was exploding in a very small area of Vietnam. Yet the attacking enemy continually assaulted the perimeter. I could see why the infantrymen had given the name "Sir Charles" to the enemy. The enemy was a very determined and brave enemy.

After we refueled and rearmed, we returned back on station to see the defenders of patrol Base Diamond continuing to beat off attack after attack. The enemy soldiers hammered at the small outpost in a vain but persistent attempt to dislodge the Americans from "their territory". Two hours after the initial attack, the enemy was continuing to attack. However, the enemy was unable to penetrate the outer defenses of Diamond. The combat engineers had earned their pay in the construction of this tiny citadel.


Radio contact revealed that most of the enemy fire was coming from only one side of Diamond. As we concentrated our fire on that side of Diamond, this time there was no deadly .51 cal antiaircraft fire to greet us, as only AK-47's and a few machine gun emplacements were firing at us. However, there was no lack of AK-47's to shoot at us. We probably were easier targets than American infantrymen concealed behind the dirt wall. Dive after dive, both Cobras caused heavy casualties among the enemy forces. George Grinnell's rockets were exploding in the midst of the enemy and disrupting their attack. By the time we had exhausted our ammunition, there was little fire aimed at us or at Diamond.

Almost as soon as it started, the battle ended. As the enemy retreated into the surrounding countryside, they could not think but that they had entered a meat grinder. No doubt the once confident Viet Cong had been badly beaten and more importantly discouraged. Firebase Diamond was not attacked for several more weeks. The enemy had taken a mauling and it took then some time to recover their losses.

The night of February 23, 1969, was a bad night for the enemy but was a good night for us pilots. In the award of the Distinguished Flying Crosses, it was mentioned in the citations that the pilots exhibited "personal bravery, aggressiveness and devotion of duty" when confronted by "intense antiaircraft fire". The infantrymen were likewise impressed with our actions that night. A short time later, the enemy's .51 cal antiaircraft weapon was gratefully presented to George Grinnell and the rest of the Diamondheads in appreciation for our support. This magnificent war trophy was then proudly displayed in the middle of our company area.

## VE Testing:

Saturday, April 28th, 2012 - AES - 9:30 AM
Saturday, May 26th, 2012 - AES - 9:30 AM
Saturday, July 28th, 2012 - AES - 9:30 AM
***ALL testing takes place at: Amateur Electronic Supply 5720 W. Good Hope Rd. Milwaukee, WI 53223***

## Area Swapfests

**May 5th, 2012 Ozaukee Radio Club's May Hamfest Location: Cedarburg, WI Type: ARRL Hamfest**
**Sponsor: Ozaukee Radio Club**
**Website: http://www.ozaukeeradioclub.org**

**May 6th, 2012 The DeKalb Hamfest. Sandwich, IL**
**Type: ARRL Hamfest Sponsor: Kishwaukee Amateur Radio Club Website: http://www.kish-club.org**

**MRAC Working Committees**

**95th Anniversary:**

- Dave—KA9WXN

**Net Committee:**

- Open

***Field Day***

Dave—KA9WXN, Al—KC9IJJ

***FM Simplex Contest***

- Joe – N9UX
- Jeff – K9VS
- Brian— K9LCQ

***Ticket drum and drawing***

- Tom – N9UFJ
- Jackie – No Call

***Newsletter Editor***

- Michael-KC9CMT

**Webmaster**

- Mark Tellier—AB9CD

**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) 332-MRAC (6722)**

Address correspondence to:

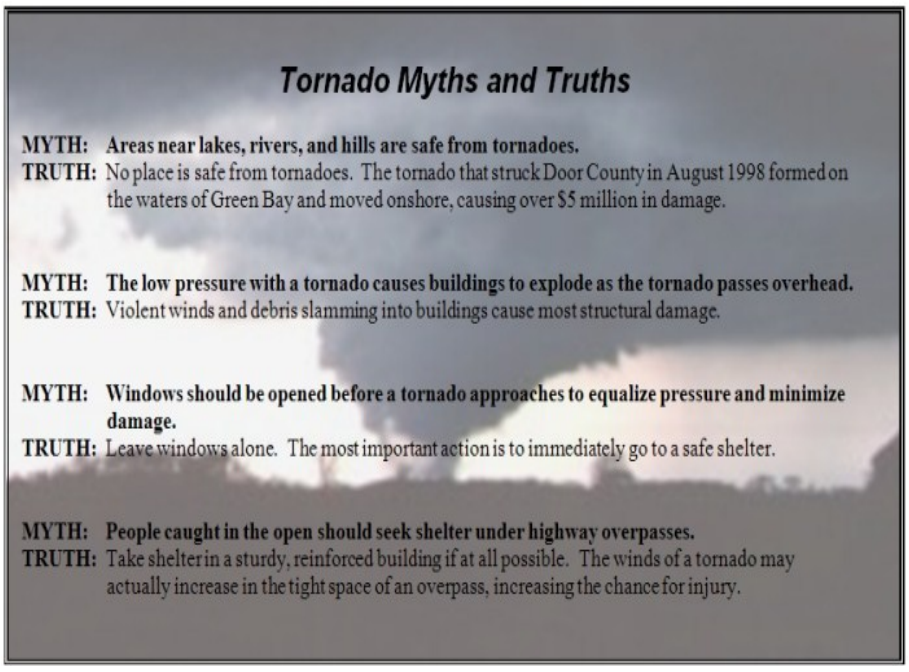
**MRAC, Box 240545, Milwaukee, WI 53223**

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)



## Milwaukee Area Nets

**Mon.8:00 PM 3.994 Tech Net**

**Mon.8:00 PM 146.865- ARES Walworth ARRL News Line**

**Mon.8:00 PM 146.445 Emergency Net**

**Mon.8:00 PM 146.865- ARES Net Walworth**

**Mon.8:45 PM 147.165- ARRL Audio News**

**Mon. 9:15 PM 444.125+ Waukesha ARES Net**

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

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

**Tue. 7:00 PM 145.130 MAARS Trivia Net**

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

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

**Wed. 9:00 PM 145.130 MAARS IRLP SwapNet d FM-38 Repeaters (IRLP 9624)**

**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 Net SSB**

**Fri. 9:00 PM 145.390 W9RH 2 Mtr. FM 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 146.91 Information Net**

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

**Sun 9:00 PM 146.91 Swap Net**

**2 meter 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.**