HAMATEUR CHATTER

The Milwaukee Radio Amateurs Club

September 2012, Volume 20, Issue 9

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

Presidents' Letter

At the June meeting, I mentioned that I reluctantly accepted the President position. I am also currently the president of MAARS and the Chairman of the Wisconsin Association of Repeaters and a board member in the West Allis Radio Club. Most of my friends think I'm crazy for taking on another position.

The only reason I decided to take on this added responsibility, was because of our current board and the clubs' rich history. Over the last year we have had 10 new members and done several events and activities. I can see we as a club are making progress and didn't want to see that stop. I contribute the progress to our current board and Dave WB9BWP.

Since I am involved with all these other groups, I see a common theme with all of them. Most radio organizations are having problems finding people to fill the offices in their club. Most clubs' are all complaining about lack of membership. I contribute part of the problem with most clubs' is promotion. The only local organization that does a good job of promotion is the Milwaukee Repeater Club.

That is mainly because of Warren K9IZV and his responders. If you have a 2 meter radio and ever listen to the 91 repeater you know what I mean. If you want to attract new membership, you need to promote the club. So now you need to decide what about your club to promote.

People join clubs for many different reasons. Mainly it is for the social aspects of sharing an interest in ham radio. Others join because of the elmering and education that a club brings to its membership.

Or it is supporting a common project or infrastructure. I would like to focus our energy on the social and educational areas. MRAC has had a history of being an educational organization. What is missing with today's radio clubs is elmering. You can hear the lack of good information being shared everyday on the air. There is no reason why we cannot be a club known for it's elmering.

We need the help of every member to make this successful. All I'm asking is that we all promote the club meetings and share ideas. If you have an idea for a program or club activity, please bring it forward. I want to devote time at each meeting to talk about operating and take questions about problems people might be having. I'm looking forward to this year and see what we can accomplish.

Dave KA9WXN

MRAC Officers:

Terms Expiring in 2014

- President – Dave, KA9WXN
- V-President– Dan, N9ASA
- Secretary – Mike, KC9CMT
- Treasurer – Joe, N9UX
- Director – Mark, AB9CD

Terms Expiring in 2013

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

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

(414) 332- 6 7 2 2

Visit our website at:

www.w9rh.org

Mail correspondence to:

M. R. A. C.

P.O. Box 240545

Milwaukee, WI 53223

Board of Directors' Meeting Minutes

Board of directors meeting called to order at 7:06 pm by Dave Shank, KA9WXN club president.

Director's present: Mark, AB9CD, Dan N9ASA, Michael KC9CMT, Dave KA9WXN, Hal, KA9OZN, Joe, N9UX.

Absent: Al KC9IJJ.

Preliminary discussions:

The minutes from the June meeting were accepted as published in the July HamChatter by a unanimous voice vote 6-0. Joe made an inventory of the equipment of K9LCQ (sk) for later disposition by someone in the club management at a upcoming swapfest yet to be determined.
The club Treasurer holds a significant amount for this time of year, $18,565 in the club accounts. Two people renewed in the month of August, their names will be added to the club roster by the club secretary.

One of the keys for the Brown Deer Post Office Box will be transferred to the new club president, Dave, KA9WXN. A new banking certificate of deposit was negotiated by Joe N9UX. The account access names have been updated at the bank that the club uses. Joe gave his report and it was accepted by a voice vote of 6-0.

Upcoming meeting programs: September, West Mountain Radio, October Open. November Open. The suggestion was made by Michael KC9CMT to have a program about how a oscilloscope works. The idea was discussed by the Board. A presentation on this will be worked on for the October Meeting. The suggestion was made by Joe, N9UX to have a presentation on the Arduino Pic platform. A live demonstration on how to make the Arduino work. The D-Star presentation can be redone to discuss any changes that have been made. Also, Yaesu now has a emerging Digital radio protocol that we could give a class on.

Field Day in 2013 will fall on June 22-23. The interclub hamfest will fall on February 16th, 2013. Flyer's will be put together this week and printed up before the MRC91 Swapfest in November.

The board needs to decide on what to do with the equipment stored at the Pioneer Village site.
We should move any and all equipment into another club storage site if we will not be going their anytime in the future. Greenfield is a good spot for us as a club due to it location within the city. Pioneer Village (PV) is 30-40 mile from Milwaukee, which the membership has though to far to go during past discussions. The equipment at the PV site could be brought down with two pickup truck loads, even though this will require some antenna breakdown time. Another storage site has not been found yet, even though Joe, N9UX has offered to store antenna's in his garage. Dave, KA9WXN stated that he had storage space at one of his work sites.

No information has been received by the Church that we use for our meetings. Mark, AB9CD will check back with his contact at the church. Funds will be allocated for Pioneer Village again in 2012 to keep our storage area and for good will within their organization. The club may do the PV free weekend that is usually prior to the ARRL field day. This would make the PV people happy. Action item for Mark, AB9CD, call Pioneer Village and discuss our situation with them and offer to do their free weekend in 2013.

Hamfest, same location, date February 16th, 2013. Flyers need to be made very soon. Michael, KC9CMT will handle the flyers, printing prices are still to be investigated. Flyers should contain a provision saying no guns or other weapons. Site is owned by MATC which is a school zone. Need new email site for correspondence related to swapfest, swapfest@w9rh.org. This address can be tagged on to the club domain. Email related to the swapfest will be routed to both Dave, KA9WXN and Michael, KC9CMT. Check the address on the flyer someone complained about some mistake in the directions last year. We plan to print 500 or more flyers. Swapfest flyers will be sent out during January 2013 to many area clubs in Northern Illinois and Southern Wisconsin. Tickets to other swapfests can be used as door prizes. Complimentary ticket will be printed during the normal ticket print run. Swapfest prizes will be solicited by the board from various sources, including swapfest attendees.

Swapfest date needs to be submitted to CQ & QST magazines for publication.

The club wants to institute a cutoff date to receive table reservations. The first week of February will be the cutoff date. Food will be the same as last year, coffee, donuts, & soda. A donation can will be left out as last year. A free items table will be allocated again next year. Parking will be worked on in the coming months. Dave, KA9WXN will work on this. New signage will be obtained for 2013. A new map of the swapfest location will done by Dave, KA9WXN.

PR & club recruitment: Do we want to have a table at any upcoming swapfests to promote the club. We will have a table at the MRC91 swapfest, and possibly the Waukesha SWARC swapfest in January.

The club will have a table at the SEWFARS hamfest to promote the club on October 14th. We will also be a AES Superfest in 2013, in the back with the other clubs this time. The club needs to form special interest committees, on various subjects.

Meeting dates for the year will now be printed in the chatter each month. Anniversary club station contact certificates should be done by the October meeting. Joe, N9UX will bring some of the QSL cards from the special event station to the October meeting for viewing.

A motion was made to adjourn the meeting at 8:48 pm by Mark, AB9CD, seconded by Michael KC9CMT. Meeting adjourned at 8:55 pm.

Severe Weather Preparedness

WHAT IS A COLD AIR FUNNEL?

From: **METEOROLOGIST JEFF HABY**

A cold air funnel is a high based weak circulation that occurs in a cool air mass. By high based it is meant it develops well above the earth's surface. Since it is high based and weak they rarely impact the earth's surface although they can look threatening. Unlike typical tornadoes, cold air funnels develop in a shallow cool air mass and often behind a cold frontal passage. The mixing of cool and windy conditions in the lower troposphere with air in the middle troposphere flowing in a different direction may spark the rotation that spins up the funnel. If the air is moist enough and rises enough the condensation funnel will be visible. The image below gives an idea to what these cold air funnels look like.

Cold core funnels defined, by: JOHN SAUDER

As a weathercaster in the Canadian prairies I have seen everything from paralyzing snowstorms to F2 or F3 tornadoes. Each summer and into early fall, I notice an increasing number of viewers calling in to report funnel cloud sightings on days where atmospheric conditions would not really support a supercell environment. Were these viewer reports accurate or were the viewers really seeing a non-supercell funnel cloud? The answer to that question lies in the study of the cold core funnel.

A cold core funnel is a vertically tilted rotating column of air under a rapidly growing convective cloud, but the atmospheric conditions are different than those conditions that produce typical funnel clouds or tornadoes. A cold core environment exists when low pressure is vertically stacked from the surface to 500 mb and is bounded by an area with a 700 mb temperature equal to or colder than +1C.

A funnel that forms in this environment is high based, meaning it develops well above the earth's surface. This means cold core funnels rarely touch the ground (become tornadoes) but they can still look threatening, especially to the untrained eye. But these funnels occasionally do touch down to become weak tornadoes. Tornadoes associated with cold core events are typically F0 to F1 in intensity, but can still cause property damage and injuries.

In the summer of 2002, there were 13 cold core events in Manitoba producing 7 reported funnel clouds and 1 tornado. Roughly half of the cold core events studied in the Canadian prairies in 2002 happened over sparsely populated areas, so it is likely that many of the funnels produced by these events went unreported.

Cold core formation

A typical tornado forms in a warm air mass that is part of an energetic synoptic environment, while a cold core funnel forms in a cool air mass that is part of a quiet, benign synoptic environment. Cold core funnels usually form behind a cold front where there is enough instability and moisture to support towering cumulus clouds, but not much precipitation. When my weather office phone rings in late summer or early fall with an excited viewer on the other end shouting, "There's a tornado coming out the bottom of a cloud," I explain that it is just a funnel cloud if it's not contacting the ground, and offer an abbreviated version of the following conditions. Cool and windy conditions probably exist in lower levels of the atmosphere mixing with air in the middle troposphere that is flowing in a different direction. This produces vertical speed shear and results in a rotation (vortex) on a horizontal axis. If that horizontal vortex comes in contact with an updraft under a convective cloud, the vortex is tilted upward, and rotation is now on a vertical axis. If there is enough moisture in the air, a condensation funnel will be visible. The initial circulation isn't associated with a severe thunderstorm mesocyclone or a rear-flank downdraft; it develops from the surface up to the cloud base along a mesoscale convergence boundary.

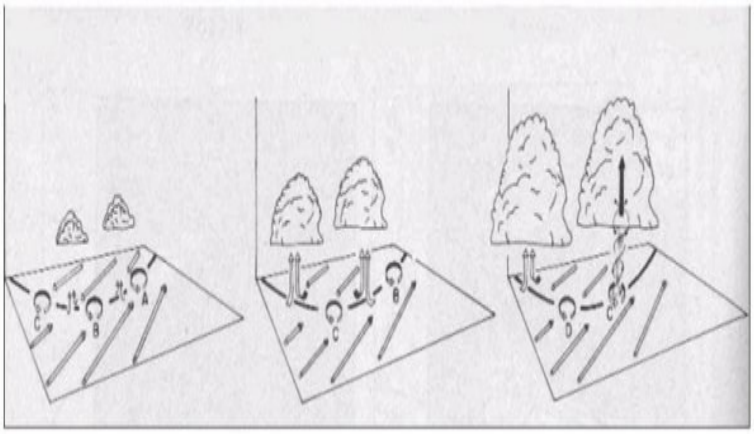

Figure #2. Formation of a cold core funnel

The black line is the convergence boundary. Low level vortices are labeled A, B, and C. (Wakimoto and Wilson 1989)

Severe Weather Preparedness

The initial stage of formation shows the horizontal shear across the convergence boundary resulting in the vortices labeled A, B and C. As cumulus clouds quickly develop along the convergence boundary, vortex 'C' has become entangled with an updraft under a towering cumulus cloud. This develops into a funnel under the influence of vortex stretching.

It is typical for a cold core event to form due to weak dynamic forcing. Wall clouds are rarely observed near a cold core funnel. In most cases, the funnel will produce itself from a rapidly growing convective cloud that has a well defined cloud base, indicative of a strong updraft. The fact that a pronounced cloud lowering is absent suggests a mesocyclone is missing. The lack of a mesocyclone is the difference between the formation of the cold core funnel and the formation of a supercell tornado.

Forecasting

The difficulty in forecasting cold core funnels lies in the fact that they form in a non-energetic synoptic environment. Therefore, it's easier for meteorologists to anticipate a tornado formed by a supercell rather than one formed in a cold core environment. Also, these cold core events happen on a small scale (mesoscale) and are typically rather short lived. Synoptic scale model data doesn't offer much assistance to a forecaster in the prediction of these events. The resolution of numerical models and GRIB data is limited when it comes to forecasting the low level dynamics that result in cold core funnels. It's up to the forecaster to look at and interpret data on the synoptic scale and use experience to find clues that lead to the formation of such events. A forecaster will also find difficulty in recognizing the small low level circulations associated with cold core events on Doppler radar. The velocity signatures are very small and usually blend in with background noise. Reflectivity's are also usually very small (0-30 dBz) which makes cold core funnel or cold core tornado detection using radar almost impossible. This difficulty in forecasting such events results in short , if any, warning times for the public and, as mentioned earlier, these cold core funnels do occasionally touch down and cause damage and injuries. The table below outlines the best fields to use when assessing cold core funnels **or tornadoes.**

Table #1. Meteorological Fields used in cold core funnel forecasting

- Surface - within 100 km of isobaric troughs.
  - dew point temperature Td >= 8C
- 850 mb - within 100 km of main troughs.
  - absolute vorticity >= 13 x 10^-5 s^-1
  - vertical velocity of >= 2 microbars/sec.
- 700 mb - temperature <= +1C
- Lifted Index - LI <= 0
- CAPE - >= 250 m^2/s^2

As forecasters, we can do a better job detecting these events by defining areas where cold core events may happen. This won't really tell us which cloud could produce a funnel or tornado but may lead to earlier warnings to the public regarding the potential of a cold core funnel. Cold core funnels commonly occur where there is an enhanced updraft and low level vorticity so extra attention should be paid to cells that are associated with high reflectivity's on radar. High reflectivity's are usually linked to a strong updraft and vorticity. If a forecaster can find areas with evidence of a strong updraft and vorticity, earlier detection of cold core funnels may be possible.

What makes late season cold core funnels slightly unique to southern Manitoba is the number of lakes in the region, including two very large lakes just north and northwest of Winnipeg. These lakes are still fairly warm in late summer and early fall which creates a strong thermal gradient between the lower and mid levels. This low level thermal support is an important ingredient in the recipe for late season cold core funnel clouds.

Getting the Most from your Batteries

A common difficulty with portable equipment is the gradual decline in battery performance after the first year of service. Although fully charged, the battery eventually regresses to a point where the available energy is less than half of its original capacity, resulting in unexpected downtime.

Downtime almost always occurs at critical moments. This is especially true in the public safety sector where portable equipment runs as part of a fleet operation and the battery is charged in a pool setting, often with minimal care and attention. Under normal conditions, the battery will hold enough power to last the day. During heavy activities and longer than expected duties, a marginal battery cannot provide the extra power needed and the equipment fails.

Rechargeable batteries are known to cause more concern, grief and frustration than any other part of a portable device. Given its relatively short life span, the battery is the most expensive and least reliable component of a portable device. In many ways, a rechargeable battery exhibits human-like characteristics: it needs good nutrition, it prefers moderate room temperature and, in the case of the nickel-based system, requires regular exercise to prevent the phenomenon called 'memory'. Each battery seems to develop a unique personality of its own.

Memory: myth or fact?

The word 'memory' was originally derived from 'cyclic memory', meaning that a NiCd battery can remember how much discharge was required on previous discharges. Improvements in battery technology have virtually eliminated this phenomenon. Tests performed at a Black & Decker lab, for example, showed that the effects of cyclic memory on the modern NiCd were so small that they could only be detected with sensitive instruments. After the same battery was discharged for different lengths of time, the cyclic memory phenomenon could no longer be noticed.

The problem with the nickel-based battery is not the cyclic memory but the effects of crystalline formation. There are other factors involved that cause degeneration of a battery. For clarity and simplicity, we use the word 'memory' to address capacity loss on nickel-based batteries that are reversible.

The active cadmium material of a NiCd battery is present in finely divided crystals. In a good cell, these crystals remain small, obtaining maximum surface area. When the memory phenomenon occurs, the crystals grow and drastically reduce the surface area. The result is a voltage depression, which leads to a loss of capacity. In advanced stages, the sharp edges of the crystals may grow through the separator, causing high self-discharge or an electrical short.

Another form of memory that occurs on some NiCd cells is the formation of an inter-metallic compound of nickel and cadmium, which ties up some of the needed cadmium and creates extra resistance in the cell. Reconditioning by deep discharge helps to break up this compound and reverses the capacity loss.

The memory phenomenon can be explained in layman's terms as expressed by Duracell: "The voltage drop occurs because only a portion of the active materials in the cells is discharged and recharged during shallow or partial discharging. The active materials that have not been cycled change in physical characteristics and increase in resistance. Subsequent full discharge/charge cycling will restore the active materials to their original state."

When NiMH was first introduced there was much publicity about its memory-free status. Today, it is known that this chemistry also suffers from memory but to a lesser extent than the NiCd. The positive nickel plate, a metal that is shared by both chemistries, is responsible for the crystalline formation.

New NiCd cell.
The anode is in fresh condition (capacity of 8.1Ah). Hexagonal cadmium hydroxide crystals are about 1 micron in cross section, exposing large surface area to the liquid electrolyte for maximum performance.

Cell with crystalline formation.
Crystals have grown to an enormous 50 to 100 microns in cross section, concealing large portions of the active material from the electrolyte (capacity of 6.5Ah). Jagged edges and sharp corners may pierce the separator, which can lead to increased self-discharge or electrical short.

Restored cell.
After pulsed charge, the crystals are reduced to 3 to 5 microns, an almost 100% restoration (capacity of 8.0A). Exercise or recondition are needed if the pulse charge alone is not effective.

Figure 10-1: Crystalline formation on NiCd cell. Illustration courtesy of the US Army Electronics Command in Fort Monmouth, NJ, USA.

In addition to the crystal-forming activity on the positive plate, the NiCd also develops crystals on the negative cadmium plate. Because both plates are affected by crystalline formation, the NiCd requires more frequent discharge cycles than the NiMH. This is a non-scientific explanation of why the NiCd is more prone to memory than the NiMH.

The stages of crystalline formation of a NiCd battery are illustrated in Figure 10-1. The enlargements show the negative cadmium plate in normal crystal structure of a new cell, crystalline formation after use (or abuse) and restoration.

Lithium and lead-based batteries are not affected by memory, but these chemistries have their own peculiarities. Current inhibiting pacifier layers affect both batteries — plate oxidation on the lithium and sulfation and corrosion on the lead acid systems. These degenerative effects are non-correctible on the lithium-based system and only partially reversible on the lead acid.

How to Restore and Prolong Nickel-based Batteries

The effects of crystalline formation are most pronounced if a nickel-based battery is left in the charger for days, or if repeatedly recharged without a periodic full discharge. Since most applications do not use up all energy before recharge, a periodic discharge to 1V/cell (known as exercise) is essential to prevent the buildup of crystalline formation on the cell plates. This maintenance is most critical for the NiCd battery. All NiCd batteries in regular use and on standby mode (sitting in a charger for operational readiness) should be exercised once per month. Between these monthly exercise cycles, no further service is needed. The battery can be used with any desired user pattern without the concern of memory.
The NiMH battery is affected by memory also, but to a lesser degree. No scientific research is available that compares NiMH with NiCd in terms of memory degradation. Neither is information on hand that suggests the optimal amount of maintenance required to obtain maximum battery life. Applying a full discharge once every three months appears right. Because of the NiMH battery's shorter cycle life, over-exercising is not recommended.

A hand towel must be cleaned periodically. However, if it were washed after each use, its fabric would wear out very quickly. In the same way, it is neither necessary nor advisable to discharge a rechargeable battery before each charge — excessive cycling puts extra strain on the battery.

Exercise and Recondition — Research has shown that if no exercise is applied to a NiCd for three months or more, the crystals ingrain themselves, making them more difficult to break up. In such a case, exercise is no longer effective in restoring a battery and reconditioning is required. Recondition is a slow, deep discharge that removes the remaining battery energy by draining the cells to a voltage threshold below 1V/cell.

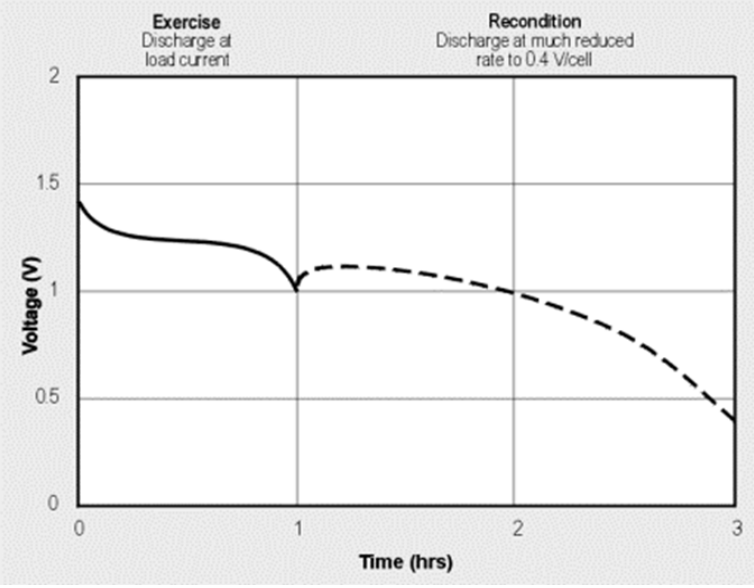

Figure 10-2: Exercising and reconditioning batteries on a Cadex battery analyzer.

This illustration shows the battery voltage during a normal discharge to 1V, followed by the secondary discharge (recondition). Recondition consists of a discharge to 1V/cell at a 1C load current, followed by a secondary discharge to 0.4V at a much reduced current. NiCd batteries affected by memory often restore themselves to full service.
Tests performed by the US Army have shown that a NiCd cell needs to be discharged to at least 0.6V to effectively break up the more resistant crystalline formation. During recondition, the current must be kept low to prevent cell reversal. Figure 10-2 illustrates the battery voltage during normal discharge to 1V/cell followed by the secondary discharge (recondition).

Figure 10-3 illustrates the effects of exercise and recondition. Four batteries afflicted with various degrees of memory are serviced. The batteries are first fully charged, then discharged to 1V/cell. The resulting capacities are plotted on a scale of 0 to 120 percent in the first column. Additional discharge/charge cycles are applied and the battery capacities are plotted in the subsequent columns. The solid black line represents exercise, (discharge to 1V/cell) and the dotted line recondition (secondary discharge at reduced current to 0.4V/cell). On this test, the exercise and recondition cycles are applied manually at the discretion of the research technician.

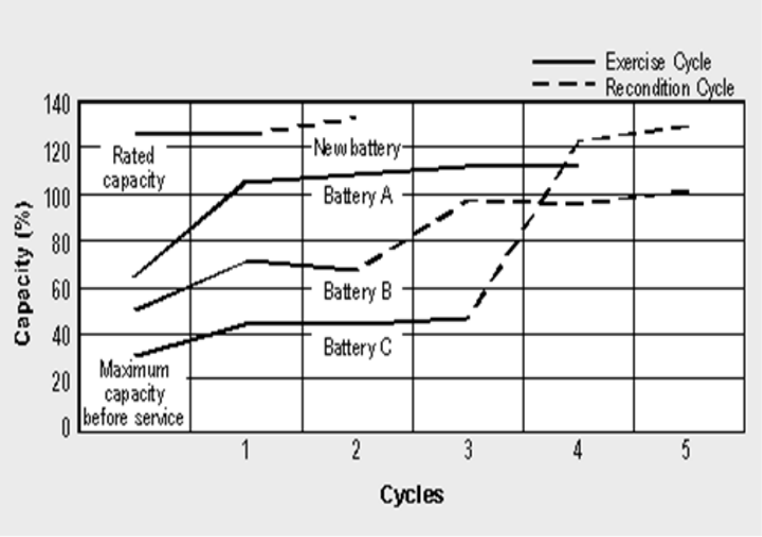

Figure 10-3: Effects of exercise and recondition.

Battery A improved capacity on exercise alone; batteries B and C required recondition. A new battery with excellent readings improved further with recondition.

Battery A responded well to exercise alone and no recondition was required. This result is typical of a battery that has been in service for only a few months or has received periodic exercise cycles.

Batteries B and C, on the other hand, required recondition (dotted line) to restore their performance. Without the recondition function, these two batteries would need to be replaced.

The Experimenters Bench

After service, the restored batteries were returned to full use. When examined after six months of field use, no noticeable degradation in the restored performance was visible. The regained capacity was permanent with no evidence of falling back to the previous state. Obviously, the batteries would need to be serviced on a regular basis to maintain the performance.

Applying the recondition cycle on a new battery (top line on chart) resulted in a slight capacity increase. This capacity gain is not fully understood, other than to assume that the battery improved by additional formatting. Another explanation is the presence of early memory. Since new batteries are stored with some charge, the self-discharge that occurs during storage contributes to a certain amount of crystalline formation. Exercising and reconditioning reverse this effect. This is why the manufacturers recommend storing rechargeable batteries at about 40 percent charge.

The importance of exercising and reconditioning NiCd batteries is emphasized further by a study carried out by GTE Government Systems in Virginia, USA, for the US Navy. To determine the percentage of batteries needing replacement within the first year of use, one group of batteries received charge only, another group was exercised and a third group received recondition. The batteries studied were used for two-way radios on the aircraft carriers USS Eisenhower with 1500 batteries and USS George Washington with 600 batteries, and the destroyer USS Ponce with 500 batteries.
With charge only (charge-and-use), the annual percentage of battery failure on the USS Eisenhower was 45 percent (see Figure 10-4). When applying exercise, the failure rate was reduced to 15 percent. By far the best results were achieved with recondition. The failure rate dropped to 5 percent. Identical results were attained from the USS George Washington and the USS Ponce.

The annual percentage of NiCd batteries requiring replacement when used without any maintenance decreases with exercise and recondition. These statistics were drawn from batteries used by the US Navy on the USS Eisenhower, USS George Washington and USS Ponce.

The GTE Government System report concluded that a battery analyzer featuring exercise and recondition functions costing $2,500US would pay for itself in less than one month on battery savings alone. The report did not address the benefits of increased system reliability, an issue that is of equal if not greater importance, especially when the safety of human lives is at stake.

Another study involving NiCd batteries for defense applications was performed by the Dutch Army. This involved battery packs that had been in service for 2 to 3 years during the Balkan War. The Dutch Army was aware that the batteries were used under the worst possible conditions. Rather than a good daily workout, the packs were used for patrol duties lasting 2 to 3 hours per day. The rest of the time the batteries remained in the chargers for operational readiness.

After the war, the batteries were sent to the Dutch Military Headquarters and were tested with Cadex *7000 Series* battery analyzers. The test technician found that the capacity of some packs had dropped to as low as 30 percent.

With the recondition function, 90 percent of the batteries restored themselves to full field use. The Dutch Army set the target capacity threshold for field acceptability to 80 percent. This setting is the pass/fail acceptance level for their batteries.

Based on the successful reconditioning results, the Dutch Army now assigns the battery maintenance duty to individual battalions. The program calls for a service once every two months. Under this regime, the Army reports reduced battery failure and prolonged service life. The performance of each battery is known at any time and any under-performing battery is removed before it causes a problem.

NiCd batteries remain the preferred chemistry for mobile communications, both in civil and defense applications. The main reason for its continued use is dependable and enduring service under difficult conditions. Other chemistries have been tested and found problematic in long-term use.
During the later part of the 1990s, the US Army switched from mainly non-rechargeable to the NiMH battery. The choice of chemistry was based on the benefit of higher energy densities as compared to NiCd. The army soon discovered that the NiMH did not live up to the expected cycle life. Their reasoning, however, is that the 100 cycles attained from a NiMH pack is still more economical than using a non-rechargeable equivalent. The army's focus is now on the Li-ion Polymer, a system that is more predictable than NiMH and requires little or no maintenance. The aging issue will likely cause some logistic concerns, especially if long-term storage is required.

Simple Guidelines
Do not leave a nickel-based battery in a charger for more than a day after full charge is reached.

- Apply a monthly full discharge cycle. Running the battery down in the equipment may do this also.
- Do not discharge the battery before each recharge. This would put undue stress on the battery.
- Avoid elevated temperature. A charger should only raise the battery temperature for a short time at full charge, and then the battery should cool off.

Use quality chargers to charge batteries.

The Effect of Zapping

To maximize battery performance, remote control (RC) racing enthusiasts have experimented with all imaginable methods available. One technique that seems to work is zapping the cells with a very high pulse current. Zapping is said to increase the cell voltage slightly, generating more power.

Typically, the racecar motor draws 30A, delivered by a 7.2V battery. This calculates to over 200W of power. The battery must endure a race lasting about four minutes.

According to experts, zapping works best with NiCd cells. NiMH cells have been tried but they have shown inconsistent results.

Companies specializing in zapping NiCd for RC racing use a very high quality Japanese NiCd cell. The cells are normally sub-C in size and are handpicked at the factory for the application. Specially labeled, the cells are delivered in a discharged state.
When measuring the cell in empty state-of-charge (SoC), the voltage typically reads between 1.11 to 1.12V. If the voltage drops lower than 1.06V, the cell is considered suspect and zapping does not seem to enhance the performance as well as on the others.
The zapping is done with a 47,000mF capacitor that is charged to 90V. Best results are achieved if the battery is cycled twice after treatment, then is zapped again. After the battery has been in service for a while, zapping no longer seems to improve the cell's performance. Neither does zapping regenerate a cell that has become weak.
The voltage increase on a properly zapped battery is between 20 and 40mV. This improvement is measured under a load of 30A. According to experts, the voltage gain is permanent but there is a small drop with usage and age.
There are no apparent side effects in zapping, however, the battery manufacturers remain silent about this treatment. No scientific explanations are available why the method of zapping improves battery performance. There is little information available regarding the longevity of the cells after they have been zapped.

How to Restore and Prolong Sealed Lead Acid Batteries
The sealed version of the lead acid battery is designed with a low over-voltage potential to prevent water depletion. Consequently, the SLA and VRLA systems never get fully charged and some sulfation will develop over time.
Finding the ideal charge voltage limit for the sealed lead acid system is critical. Any voltage level is a compromise. A high voltage limit produces good battery performance, but shortens the service life due to grid corrosion on the positive plate. The corrosion is permanent and cannot be reversed. A low voltage preserves the electrolyte and allows charging under a wide temperature range, but is subject

to sulfation on the negative plate. (In keeping with portability, this book focuses on portable SLA batteries. Due to similarities between the SLA and VRLA systems, references to the VRLA are made where applicable).

Once the SLA battery has lost capacity due to sulfation, regaining its performance is often difficult and time consuming. The metabolism of the SLA battery is slow and cannot be hurried.
A subtle indication on whether an SLA battery can be recovered is reflected in the behavior of its discharge voltage. A fully charged SLA battery that starts its discharge with a high voltage and tapers off gradually can be reactivated more successfully than one on which the voltage drops rapidly when the load is applied.

Reasonably good results in regaining lost capacity are achieved by applying a charge on top of a charge. This is done by fully charging an SLA battery, then removing it for a 24 to 48 hour rest period and applying a charge again. This is repeated several times, then the capacity of the battery is checked with a full discharge. The SLA is able to accept some overcharge, however, too long an overcharge could harm the battery due to corrosion and loss of electrolyte.

The effect of sulfation of the plastic SLA can be reversed by applying an over-voltage charge of up to 2.50V/cell for one to two hours. During that time, the battery must be kept cool and careful observation is necessary. Extreme caution is required not to raise the cell pressure to venting point. Most plastic SLA batteries vent at 34 kPa (5 psi). Cell venting causes the membrane on some SLA to rupture permanently. Not only do the escaping gases deplete the electrolyte, they are also highly flammable!
The VRLA uses a cell self-regulating venting system that opens and closes the cells based on cell pressure. Changes in atmospheric pressure contribute to cell venting. Proper ventilation of the battery room is essential to prevent the accumulation of hydrogen gas.
Cylindrical SLA — The cylindrical SLA (made by Hawker) resembles an enlarged D sized cell. After long storage, the Hawker cell can be reactivated relatively easily. If affected by sulfation, the cell voltage under charge may initially raise up to 5V, absorbing only a small amount of current. Within about two hours, the small charging current converts the large sulfate crystals back into active material. The internal cell resistance decreases and the charge voltage eventually returns to normal. At a voltage between 2.10V and 2.40V, the cell is able to accept a normal charge. To prevent damage, caution must be exercised to limit the charge current.
The Hawker cells are known to regain full performance with the described voltage method, leaving few adverse effects. This, however, does not give credence to store this cell at a very low voltage. It is always best to follow the manufacturer's recommended specifications.
Improving the capacity of an older SLA by cycling is mostly unsuccessful. Such a battery may simply be worn out. Cycling would just wear down the battery further. Unlike nickel-based batteries, the lead acid battery is not affected by memory.
SLA batteries are commonly rated at a 20-hour discharge. Even at such a slow rate, a capacity of 100 percent is difficult to obtain. For practical reasons, most battery analyzers use a 5-hour discharge when servicing SLA batteries. This typically produces 80 to 90 percent of the rated capacity. SLA batteries are normally overrated and manufacturers are aware of this.
Caution: When charging an SLA with over-voltage, current limiting must be applied to protect the battery. Always set the current limit to the lowest practical setting and observe the battery voltage and temperature during charge. Prevent cell venting.

Important: In case of rupture, leaking electrolyte or any other cause of exposure to the electrolyte, flush with water immediately. If eye exposure occurs, flush with water for 15 minutes and consult a physician immediately.

Simple Guidelines

- Always keep the SLA charged. Never store below 2.10V/cell.
- Avoid repeated deep discharges. Charge more often.
- If repeated deep discharges cannot be avoided, use a larger battery to ease the strain.

Prevent sulfation and grid corrosion by choosing the correct

How to Prolong Lithium-based Batteries

Today's battery research is heavily focused on lithium chemistries, so much so that one could assume that all future batteries will be lithium systems. Lithium-based batteries offer many advantages over nickel and lead-based systems. Although maintenance free, no external service is known that can restore the battery's performance once degraded.

In many respects, Li-ion provides a superior service to other chemistries, but its performance is limited to a defined lifespan. The Li-ion battery has a time clock that starts ticking as soon as the battery leaves the factory. The electrolyte slowly 'eats up' the positive plate and the electrolyte decays. This chemical change causes the internal resistance to increase. In time, the cell resistance raises to a point where the battery can no longer deliver the energy, although it may still be retained in the battery. Equipment requiring high current bursts is affected most by the increase of internal resistance. Battery wear-down on lithium-based batteries is caused by two activities: actual usage or cycling, and aging.

The wear-down effects by usage and aging apply to all batteries but this is more pronounced on lithium-based systems. The Li-ion batteries prefer a shallow discharge. Partial discharges produce less wear than a full discharge and the capacity loss per cycle is reduced. A periodic full discharge is not required because the lithium-based battery has no memory. A full cycle constitutes a discharge to 3V/cell. When specifying the number of cycles a lithium-based battery can endure, manufacturers commonly use an 80 percent depth of discharge. This method resembles a reasonably accurate field simulation. It also achieves a higher cycle count than doing full discharges.

In addition to cycling, the battery ages even if not used. The amount of permanent capacity loss the battery suffers during storage is governed by the SoC and temperature. For best results, keep the battery cool. In addition, store the battery at a 40 percent charge level. Never fully charge or discharge the battery before storage. The 40 percent charge assures a stable condition even if self-discharge robs some of the battery's energy. Most battery manufacturers store Li-ion batteries at 15°C (59°F) and at 40 percent charge.

Simple Guidelines

- Charge the Li-ion often, except before a long storage. Avoid repeated deep discharges.

- Keep the Li-ion battery cool. Prevent storage in a hot car. Never freeze a battery.

- If your laptop is capable of running without a battery and fixed power is used most of the time, remove the battery and store it in a cool place.

- Avoid purchasing spare Li-ion batteries for later use. Observe manufacturing date when purchasing. Do not buy old stock, even if sold at clearance prices.

Battery Recovery Rate

The battery recovery rate by applying controlled discharge/charge cycles varies with chemistry type, cycle count, maintenance practices and age of the battery. The best results are achieved with NiCd. Typically 50 to 70 percent of discarded NiCd batteries can be restored when using the exercise and recondition methods of a Cadex battery analyzer or equivalent device.

Not all batteries respond equally well to exercise and recondition services. An older battery may show low and inconsistent capacity readings with each cycle. Another will get worse when additional cycles are applied. An analogy can be made to a very old man for whom exercise is harmful. Such conditions indicate instabilities caused by aging, suggesting that this pack should be replaced. In fact, some users of the Cadex analyzers use the recondition cycle as the acid test. If the battery gets worse, there is strong evidence that this battery would not perform well in the field. Applying the acid test exposes the weak packs, which can no longer hide behind their stronger peers.

Some older NiCd batteries recover to near original capacity when serviced. Caution should be applied when 'rehiring' these old-timers because they may exhibit high self-discharge. If in doubt, a self-discharge test should be carried out.

The recovery rate of the NiMH is about 40 percent. This lower yield is, in part, due to the NiMH's reduced cycle count as compared to the NiCd. Some batteries may be afflicted by heat damage that occurs during incorrect charging. This deficiency cannot be corrected. Permanent loss of battery capacity is also caused by prolonged storage at elevated temperatures.

The recovery rate for lead acid batteries is a low 15 percent. Unlike nickel-based batteries, the restoration of the SLA is not based on reversing crystalline formation, but rather by reactivating the chemical process. The reasons for low capacity readings are prolonged storage at low terminal voltage, and poor charging methods. The battery also fails due to age and high cycle count.

Lithium-based batteries have a defined age limit. Once the anticipated cycles have been delivered, no method exists to improve the battery. The main reason for failure is high internal resistance caused by oxidation. Operating the battery at elevated temperatures will momentarily reduce this condition. When the temperature normalizes, the condition of high internal resistance returns.

The speed of oxidation depends on the storage temperature and the battery's charge state. Keeping the battery in a cool place can prolong its life. The Li-ion battery should be stored at 40 percent rather than full-charge state.

An increasing number of modern batteries fall prey to the cut-off problem induced by a deep discharge. This is especially evident on Li-ion batteries for mobile phones. If discharged below 2.5V/cell, the internal protection circuit often opens. Many chargers cannot apply a recharge and the battery appears to be dead.

Some battery analyzers feature a boost, or wake-up function, to activate the protection circuit and enable a recharge if discharged too low. If the cell voltage has fallen too low (1.5V/cell and lower) and has remained in that state for a few days, a recharge should not be attempted because of safety concerns on the cell(s).

It is often asked whether a restored battery will work as good as a new one. The breakdown of the crystalline formation can be considered a full restoration. However, the crystalline formation will re-occur with time if the battery is denied the required maintenance.

When the defective component of a machine is replaced, only the replaced part is new; the rest of the machine remains in the same condition. If the separator of a nickel-based battery is damaged by excess heat or is marred by uncontrolled crystalline formation, that part of the battery will not improve. Other methods, which claim to restore and prolong rechargeable batteries, have produced disappointing results. One method is attaching a strong magnet on the side of the battery; another is exposing the battery to ultrasound vibrations. No scientific evidence exists that such methods will improve battery performance, or restore an ailing battery.

The 'Green Light' Lies

When charging a battery, the ready light will eventually illuminate, indicating that the battery is fully charged. The user assumes that the battery has reached its full potential and the battery is taken in confidence.

In no way does the 'green light' guarantee sufficient battery capacity or assure good state-of-health (SoH). Similar to a toaster that pops up the bread when brown (or black), the charger fills the battery with energy and 'pops' it to ready when full (or warm).

The rechargeable battery is a corrosive device that gradually loses its ability to hold a charge. Many users in an organization are unaware that their fleet batteries barely last a day with no reserve energy to spare. In fact, weak batteries can hide comfortably because little demand is placed on them in a routine day. The situation changes when full performance is required during an emergency. Total collapse of portable systems is common and such breakdowns are frequently related to poor battery performance. Figure 11-1 shows five batteries in various states of degradation.

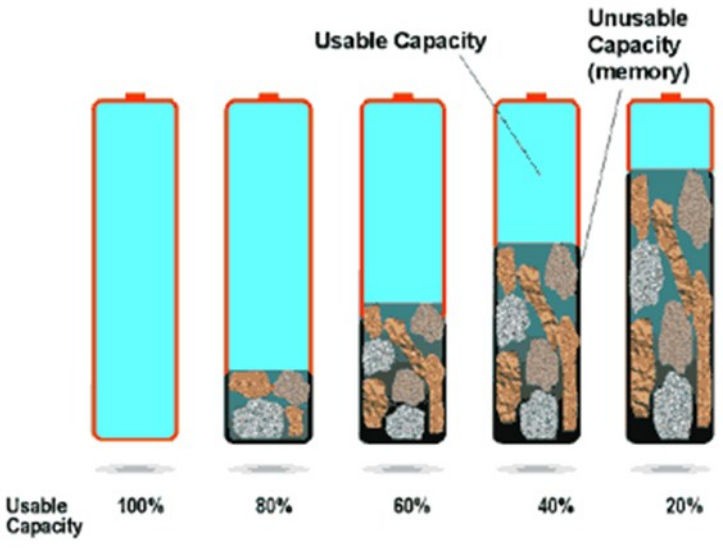

Figure 11-1: Progressive loss of charge acceptance.

The rechargeable battery is a corrosive device that gradually loses its ability to hold charge as part of natural aging, incorrect use and/or lack of maintenance. The unusable part of the battery that creeps in is referred to as 'rock content'. Carrying larger packs or switching to higher energy-dense chemistries does not assure better reliability if the weak batteries are not 'weeded' out at the appropriate time. Likewise, the benefit of using ultra-advanced battery systems offers little advantage if packs are allowed to remain in the fleet once their performance has dropped below an acceptable performance level.

Figure 11-2 illustrates four batteries with different ratings and SoH conditions. Batteries B, C and D show reduced performance because of memory problems and other deficiencies. The worst pack is Battery D. Because of its low charge acceptance, this battery might switch to ready after only 14 minutes of charge (assumed time). Ironically, this battery is a likely candidate to be picked when a fresh battery is required in a hurry. Unfortunately, it will last only for a brief moment. Battery A, on the other hand, has the highest capacity and takes the longest to charge. Because the ready light is not yet lit, this battery is least likely picked.

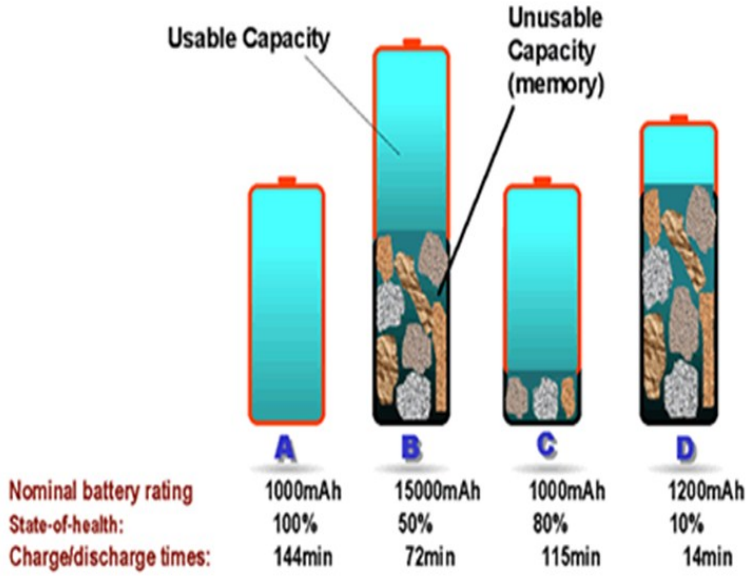

Figure 11-2: Comparison of charge and discharge times. This illustration shows typical charge and discharge times for batteries with different ratings and SoH conditions. Carrying larger batteries or switching to high energy-dense chemistries does not necessarily assure longer runtime if deadwood is allowed to remain in the battery fleet.

The weak batteries are charged quicker and remain on 'ready' longer than the strong ones. The bad batteries tend to gravitate to the top. They become a target for the unsuspecting user. In an emergency situation that demands quick charge action, the batteries that show ready may simply be those that are deadwood.

A weak battery can be compared to a fuel tank with an indentation. Refueling this tank is quicker than a normal tank because it holds less fuel. Similar to the 'green light' on a charger, the fuel gauge in the vehicle will show full when filled to the brim, but the distance traveled before refueling will be short.

The Evolving Battery

The Li-ion battery has not yet matured. Chemical compositions change as often as once every six months. According to Moli Energy, a large manufacturer of Li-ion batteries, the chemical composition of Li-based batteries changes every six months. New chemicals are discovered that provide better load characteristics, higher capacities and longer storage life. Although beneficial to consumers, these improvements wreak havoc with battery testing equipment that base quick test algorithms on fixed parameters. Why do these changes in battery composition affect the results of a quick tester?

The early Li-ion batteries, notably the coke-based variety, exhibited a gradual drop of voltage during discharge. With newer graphite-based Li-ion batteries, flatter voltage signatures are achieved. Such batteries provide a more stable voltage during most of the discharge cycle. The rapid voltage drop only occurs towards the end of discharge.

A 'hardwired' tester looks for an anticipated voltage drop and estimates the SoH according to fixed references. If the voltage-drop changes due to improved battery technology, erroneous readings will result.

Diverse metals used in the positive electrode also alter the open terminal voltage. Manganese, also referred to as spinel, has a slightly higher terminal voltage compared to the more traditional cobalt. In addition, spinel ages differently from cobalt. Although both cobalt and spinel systems belong to the Li-ion family, differences in readings can be expected when the batteries are quick tested side-by-side.

The Li-ion polymer has a dissimilar composition to the Li-ion and responds in a different way when tested. Instruments capable of checking Li-ion batteries may not provide reliable readings when quick testing Li-ion polymer batteries.

The Cadex Quicktest™ Method

A battery quick text must be capable of adapting to new chemical combinations as introduced from time to time. Cadex solves this by using a self-learning fuzzy logic algorithm. Used to measure analog variances in an assortment of applications, fuzzy logic is known to the industry as a universal approximator. Along with unique learning capabilities, this system can adapt to new trends. Similar to a student adapting to the complexity of a curriculum, the system learns with each battery tested. The more batteries that are serviced, the higher the accuracy becomes.

Cadex *Quicktest*™ is built on the new Cadex *7000 Series* battery analyzer platform. This system features interchangeable battery adapters that contain the battery configuration codes (C-codes). When installed, the adapter sets the analyzer to the correct battery parameters (chemistry, voltage rating, etc.).

To enable quick testing, the battery adapters must also contain the matrix settings for the serviced battery. While matrices for the most common batteries are included when acquiring the adapter, the user is asked to enter the information on those adapters that have not yet been prepared for quick testing. This can be done in the field by 'scanning' the working battery.

The *'Learn'* program of the Cadex *7000 Series* battery analyzer performs this task by applying charge-discharge-charge activities on the test battery. Similar to downloading a program into a PC, the information derived from the battery sets the matrices and prepares the Cadex *Quicktest*™ function. The *'Learn'* program completes its cycle within approximately four hours. One learning cycle is the minimal requirement to enable the Cadex *Quicktest*™ function.

With only one battery learned or scanned, the confidence level is 'marginal'. Running additional batteries through the learning program will fill the matrix registers and the confidence level will increase to 'good' or 'excellent'. Like a bridge that needs several pillars for proper support, the most accurate quick test results are achieved by scanning individual batteries that have SoH readings of around 100, 80 and 60 percent. The confidence level attained for a given battery adapter is indicated on the LCD panel of the analyzer.

The Cadex *Quicktest*™ can be performed with charge levels between 20 and 90 percent. Within this range, different charge levels do not affect the readings. If the battery is insufficiently charged, or has too high a charge, a message appears and the analyzer automatically applies the appropriate charge or discharge to bring the battery within testing range. Charging or discharging a battery immediately prior to taking the reading does not affect the Cadex *Quicktest*™ results.

The reader may ask whether the Cadex *Quicktest*™ system can also learn incorrectly. No — once the learning cycles have been completed for a given battery, the matrix settings are firm and resilient. Testing bad batteries will not affect the setting.

Spoilage is only possible if a number of bad batteries are purposely put through the *'Learn'* program in an attempt to alter the existing matrix. Such would be the case when scanning a batch of batteries that have not been properly formatted, have been in prolonged storage, or are of poor quality. To protect the existing matrix from spoilage when adding learning cycles, the system checks each new vector reading for its integrity before accepting the information as a valid reference. Learned readings obtained from defective batteries are rejected.

If a battery adapter has lost its integrity as part of 'bad learning', the matrix setting can be erased and re-taught. As an alternative, Cadex will make recommended matrices available on the Internet. Users may also want to exchange learned matrix information with each other. Copying battery adapters by inserting a recognized adapter into the analyzer will achieve this. Another method is 'Webcasting' the matrices over the Internet.

Early Radio: Military Communications

The Crash Of The Great Strawberry

By-Bob Seger

Date Line Nui Ba Den-Sometime in 1968

There was one striking feature of our area of operations that stood out above all others. It actually stuck out from all of the other terrain features and was known as Nui Ba Den. Nui Ba Den was a rock mountain sticking out of the middle of nowhere close to the Cambodian border. The mountain rose majestically to a height of 3225 feet. Nui Ba Den commanded the view of our entire area of operations. Nui Ba Den translated into English as the Black Virgin Mountain. On a clear day it could be seen from just about anywhere in the division's area of operation. On top of the mountain was a company of soldiers and a signal detachment for communication purposes.

Nui Ba Den was a freak of nature rising up out in the middle of nowhere and where some of the strangest battles of Vietnam were fought. It stood in stark contrast to the rest of the surrounding area. It was a perfect observation post so the Army established a Special Forces camp on top. Later when the 25th Infantry Division arrived in Vietnam, they assumed responsibility for it and also established a communication system on top.

Nui Ba Den was easily the most significant feature of the area of operation for the 25th Infantry Division. It was not that tall as mountains go, but it was a solitary feature and was surrounded by flat plain. Its beauty could easily make one forget a war was ongoing. I saw numerous sunsets with the sun setting behind the mountain while flying in my helicopter. At times like those, I forgot the war for a few seconds. It was a strange and beautiful sight at the same time. Beauty was seen in the midst of the horrors of war.

There are some other memories of the mountain that I have that are memorable in other ways. Resupply missions to the signal troops on top of Nui Ba Den got to be very dangerous because of the unpredictable landing conditions.

. There was only a small area in which to land on top of the mountain. The chopper pad was very small and required a precision landing. Additionally, the winds would whip around the mountain and suddenly instead of having a head wind, a pilot could be facing a severe cross wind, tail wind, or sudden down draft. This caused many difficulties when the crew was confronted with a landing on top of the mountain.

Since the mountain height was well above our usual cruising altitude, helicopter crews had to climb to altitude before they could attempt to land. Most Hueys approached the mountain top chopper pad at almost eye level. The pilots rarely faced this type of landing and never practiced this type of approach. Except for landing at a big base camp, most landings were performed while circling directly over the landing area. A spiraling while descending approach was the preferred and safest approach. If a pilot made a long straight in approach, the helicopter would get shot at while flying slow and low to the ground.

The landing to the mountain posed another problem as the helicopter was usually overloaded with supplies. A heavily loaded chopper can lose lift just like an airplane and can stall out and fall out of the sky. Helicopters require lift to stay airborne and in rare occasions, can lose actually lift. This is no problem at altitude, as the helicopter just drops its nose and can continue flying. However, if the helicopter is close to the ground, the helicopter will fall to the ground. This happened on a number of occasions to helicopters flying into Nui Ba Den.

Due to windy conditions, helicopters always approached slowly and cautiously. On one such approach the resupply chopper deliberately made its approach to the summit. Just short of the chopper pad, it started to lose altitude as it lost lift. The pilot tried in vain to restore power and control. Very slowly, the helicopter fell out of the sky, and started going down the side of the mountain. It crashed into nothing but huge boulders. Anyone who has been on the mountain knows that once you are below the summit, boulders are everywhere, big ones and little ones. Just before it hit the rocks, the soldiers on top took cover behind some rocks and bunkers and waited until the rotor blades stopped turning. Rotor blades hitting rocks will send shrapnel careening everywhere. After the crash, several of the soldiers ran down and extracted the crew. There was no fire and all survived. I heard later that the troops on the top watching said it looked as if they were watching a slow-motion chopper crash. A helicopter that looses its lift, initially falls slowly out of the sky. Some of the crew in the chopper were slightly injured, but none were hurt seriously.

The following day, another attempt was made to resupply the soldiers on top of the Black Virgin Mountain and to take out the crashed helicopter crew. I am sure a larger crowd was watching this time. As the helicopter got within a few feet of the top, it also started losing altitude and someone on the mountain top probably yelled, "there goes another one". The pilot increased power and collective but to no avail. The chopper ran out of power. The chopper went down and again the soldiers on top took cover behind the rocks and bunkers.

Early Radio: Military Communications

The rotor blades hit and made a god-awful sound as parts of the rotor blades were slung over the heads of those on top of the mountain. The once intact helicopter tumbled down the mountainside and was ripped apart. Again, soldiers ran down and pulled out the pilots and crew. There was no fire, just a wrecked chopper with a few minor injuries and some bruised egos belonging to the pilots. They had been warned by radio and by the crew of the previous crashed chopper how difficult it was to land.

Resupply and rescue was necessary, so the following day another helicopter was scheduled to make the resupply run. By now these pilots are wary, and as the make their approach they can not miss observing the two crashed Hueys lying just short of the peak of the mountain. As the third helicopter approaches, the crowd at the top was getting larger as they were expecting another show. Sure enough, they get it. Like the two previous helicopters, down this one goes, just like the others. Same results: no fire, lots of bumps and bruises and, of course, the pilot's bruised egos. The crew all scrambled to safety with assistance from the "Mountain Men". By now they are getting proficient at rescuing helicopter crews. Now, the daily helicopter landing was an exciting event for the troops on top and a death defying maneuver for the pilots and crew.

Three lucky crews are on top and three unlucky helicopters lay strewn on the side of the mountain. Word spreads regarding the danger of the landing situation and reaches the division commander. Pilots insist the Huey is not stable enough in the unpredictable and windy conditions and is not capable of the mission. Helicopter pilots strongly recommend resupply by a Chinook. The commanding general is unconvinced of the danger and believes the helicopter pilots are exaggerating the dangers. Since the division commander knows more than the lowly helicopter pilots, he decides to fly to the top of the mountain to demonstrate that it can be done in safety.

The division commander's helicopter is unlike all the other helicopters in our division. His helicopter resembles his clean uniform, crisply starched, with spit shined boots. Of course the General does not do those things himself, as he has an army of minions for manual labor. It is the same with his helicopter. It looks a bit different from our Hueys, as it very clean and shiny because of it being washed and waxed all the time. It has painted on its nose, the Electric Strawberry patch representing the division's emblem. There is no mistaking the general's helicopter. Every other helicopter assigned to the 25th Infantry Division is a combat veteran and looks as if they have seen an abundance of combat. The general's helicopter looks just like it just rolled off the assembly line. Another mission is scheduled and the commanding general will be aboard this time to prove his point. The General is not that supremely confident of the tactical situation, as two Cobras are schedule to fly in support of him. We take off from Cu Chi, the general's helicopter and two Cobras, all in support of the General's ego.

This time, everybody is at the top watching the general's helicopter attempt to land. They have been informed the General is on the helicopter. Will it be Mountainside 4 and Helicopter 0, or will it be Mountainside 3-1.

Vegas bookies would not want to handle these odds, as the Black Virgin Mountain was no longer a virgin. Her mountainside had been bloodied and she is a combat veteran. She is littered with the remains of three helicopters. The crashed helicopters had parts scattered all of the mountainside. I had no pressure on this mission, as I was along for the ride and enjoying my simple part of the operation.

However, the pilot in command of the general's chopper had tremendous pressure thrust upon him. Tension was high and the stress had to be unbelievable. As the troops on top were watching the spectacle of the Commanding General of the 25th Infantry Division approach for a landing, the pilot had to be apprehensive beyond any description. Scared shitless was more like it, for three good reasons. First he had an enthralled audience well schooled in ducking flying rotor blades. Secondly, three prior crews, equally qualified, all failed in their attempts to land. Thirdly, the other crews did not have added pressure of having the Commanding General of the 25th Infantry Division onboard. Everybody on top was aware of the three prior crashes on consecutive days and how dangerous and difficult it will be to land. The pilot of the general's helicopter certainly comprehends this but the General does not appreciate it. As I circle overhead the mountain, I watch the approaching general's chopper, I am watching this circus and can plainly see all the troops on the mountain top that have a front row seat.

The general's pilot has to be sweating bullets as he knows the three previous choppers are scattered in many pieces on the mountainside. Additionally, he knows that crashing the general's chopper with him on board, cannot be good for your career advancement. So guess what, there goes a flying career and the general's helicopter, along with the General in it. Down the mountainside goes the beautiful, simonized Huey dropping into the rocks and boulders on the side of the mountain. The pilot has misjudged his descent and starts to lose power and altitude. The pilot is attempting to add full power as the rotor blades clawed the air, trying to pull away from the mountainside with little success. The RPM's were bleeding off and the rotor blades were not providing sufficient lift. Soon the pilot loses power, altitude and ideas at the same time. Slowly down the mountainside plunges the once proud Huey belonging to the General. The troops on top are treated to another spectacle. The mountain has won again, as the General and his helicopter are going down. I imagine by this time, the drill was well orchestrated, as the troops on top take cover for the fourth time and avoid rotor blades smashing against the rocks and boulders. As soon as the crashing noises subside, the "Mountain Men" scramble down the mountainside to rescue the hapless General and the crew.

I had previously instructed my wingman to stay at least 500 feet below me, as I did not want to have to watch out for him also. Additionally, he knows I will keep the general's chopper in sight, while he looks out for any enemy activity. I do not hear any "Mayday" radio call from the general's helicopter, as it happened so quickly and the crew were struggling to control the helicopter.

Early Radio: Military Communications

. I plainly could see the general's helicopter lose lift and then slide down the mountain. The rotor blades were moving slower and slower. It is a good thing I had my wingman below me, as I was transfixed watching the general's helicopter. The general's helicopter rolled over slightly and the rotor blades hit the side of the mountain coming to an abrupt stop. Long before the helicopter stopped falling down the mountainside, I excitedly screamed in my radio to division headquarters, "the General's down, the General's down". Quickly, I calmed down and regained proper radio procedures and requested some assistance from Cu Chi. It was one thing to leave lowly helicopter crews stranded overnight on the mountain top, but I assumed the General would not be spending the night there and an effort would me made to immediately extract the General.

I was in contact with division headquarters as they were closely monitoring his flight. They wanted to know his condition and I replied I did not know, and informed them the general's helicopter did not explode on impact nor was there a fire. I told them I could see individuals exiting the crashed chopper and soldiers scrambling down to rescue the occupants. All survived the crash, except for the beautiful helicopter. I presume the general's pilot, was no longer the general's pilot. I learned later the General got out of the chopper, stumbling and tripping and falling, as he was desperately trying to get away from the chopper, as highly combustible jet fuel was spewing everywhere. Helicopters use the same type of fuel as jet fighters and is extremely flammable.

I radioed the top of the mountain and requested to know the General's condition. I was not exactly specific enough, as I only wanted to learn if the General survived the crash. I was advised that when the General got to the top, the General was absolutely exhausted from the climb and out of breath. With that small bit of information, I knew he was alive. It was a harrowing experience for him. I was told the General needed assistance climbing to the safety of the mountain top. As he lay on the top of the mountain exhausted and out of breath, I wondered if the General now agreed with the expertise of the helicopter pilots regarding the unsuitability of landing Hueys on top of the mountain.

When I first entered the Army, I learned there were two ways to do things in the Army; the Right way and the Army way. Well I was wrong, as now, there was the General's way. The General, like so many high ranking officers, was a man accustomed to giving an order but not aware of the practicality of carrying it out. The destruction of his once proud helicopter proved that.

Since the mountain was a signal station with the best radios available, I can assure you the Commanding General of the 25th Infantry Division would be in radio contact with Cu Chi requesting assistance. Very quickly another helicopter was dispatched to pick up the General. It did not take long getting there and it was not a Huey. It was a Chinook, a twin rotor helicopter capable of carrying about 45 fully equipped troops. It was a much heavier helicopter and considerably more stable in the high winds conditions surrounding the mountain. The Chinook rescued the General and helicopter crews and flew them back to Cu Chi.

After that, by order of the Commanding General of the 25th Infantry Division, only Chinooks were permitted to resupply Nui Ba Den. That was great news for those soldiers who eventually would be flying off that mountain by helicopter. They knew they would now be able to safely fly off the mountain. The General did not know how lucky he was. American forces owned the top and bottom of the Black Virgin Mountain, however, the VC controlled everything in between. He could have been captured and all due to his willingness to prove a point. Sometimes, there is a God. This was the same general that kept me aloft one long night for no apparent reason, while flying a flare ship for over five hours without once dropping a flare. The General had me counseled (the polite military term for a severe ass chewing) the following day because I had the audacity to question a mission he ordered, but that is another story. Stupidity and foolishness I learned, were not limited solely to Privates or Lieutenants.

ARRL Newsline

Emergency Preparedness: Get Set for the 2012 Simulated Emergency Test

Are you ready to respond to a local communications emergency? How about within your area, state or beyond? The ARRL Simulated Emergency Test (SET) -- an exercise that enables you and your local, District and Section leaders to test equipment, modes, operating skills and emergency deployment plans to see if everything is in place and ready for an actual emergency event -- is October 6-7. The SET is one of the premier events of the year that invites the Amateur Radio Emergency Service, the National Traffic System, the Radio Amateur Civil Emergency Service, SKYWARN, members of the ARRL Field Organization and other groups to work in concert together to practice and prepare.

ARRL Newsline

Are you ready to respond to a local communications emergency? How about within your area, state or beyond? The ARRL Simulated Emergency Test (**SET**) -- an exercise that enables you and your local, District and Section leaders to test equipment, modes, operating skills and emergency deployment plans to see if everything is in place and ready for an actual emergency event -- is **October 6-7, 2012**. The SET is one of the premier events of the year that invites the Amateur Radio Emergency Service (**ARES**), the National Traffic System (**NTS**), the Radio Amateur Civil Emergency Service (**RACES**), **SKYWARN**, members of the ARRL Field Organization and other groups to work in concert together to practice and prepare.

ARRL Field Organization Leaders at the Section and local levels -- along with many other volunteers who are active in public service and disaster preparedness communications -- are developing emergency-like scenarios in consultation with a variety of agencies for that rely on radio amateurs to provide service during emergencies. Make this the year that you decide to create a personal plan and to be ready and help if and when you're needed. Taking part in an SET is one step toward doing just that.

The wider community is also encouraged to be involved in the SET by way of working relationships and agreements with community and public service agencies, giving everyone a chance to test and improve these cooperative agreements. The ARRL maintains national agreements and/or *Memoranda of Understandings* with several organizations, including the American Red Cross (**ARC**), the National Weather Service (**NWS**), the Federal Emergency Management Agency (**FEMA**), the **Salvation Army**, **Civil Air Patrol**, the Association of Public Safety Communications Officials-International (**APCO**) and others. More information on these and other national served agencies and partners may be found **here**.

National Preparedness Month

ARRL is a **National Preparedness Month Coalition Member**. Held each September, National Preparedness Month (**NPM**) is a nationwide effort to encourage Americans to take simple steps to prepare for emergencies in their homes, businesses and schools. The US Department of Homeland Security is working with a wide variety of organizations -- including the ARRL -- to highlight the importance of emergency preparedness and promote individual involvement through events and activities across the nation. We encourage you to consider this year's Simulated Emergency Test and all preparations for it as a demonstration of Amateur Radio's readiness and as an active participant in National Preparedness Month.

Next Regular Meeting

The next meeting will be on Thursday, September 27th 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 25nd, 2012

November 29th, 2012

January 31st, 2013

February 28th, 2013

SwapFest: February 16th, 2013

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) 332-MRAC or 332 - 6722

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:

October 27th, 2012—AES 9:30 am to 11:30 am.

November 24th, 2012—AES 9:30 am to 11:30 am.

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

Area Swapfests

Sept. 29th, Ozaukee Radio Club's Fall Electronics, Computer & Hobby Swapfest Location: Cedarburg, WI
Type: ARRL Hamfest Sponsor: Ozaukee Radio Club
Website: http://ozaukeeradioclub.org

Oct. 14th SEWFARS Swapfest Location: Hubertus, WI
ARRL Hamfest, Sponsor: Southeastern Wisconsin FM Amateur Repeater Society
Website: http://www.sewfars.com

MRAC Working Committees

95th Anniversary:

- Dave—KA9WXN

Net Committee:

- Open

Field Day

Dave—KA9WXN, Al—KC9IJJ

FM Simplex Contest

- Joe – N9UX
- Jeff – K9VS

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)

An ARRL Affiliated Club

The HamChatter is a monthly publication of the Milwaukee Radio Amateurs' Club.
Serving Amateur Radio for Southeastern Wisconsin & 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- 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

24h radar-indicated circulations* and tornadoes associated with Tropical Storm Debby
Sunday, June 24, 2012