

MRAC Hamateur Chatter

The Milwaukee Radio Amateurs Club

May 2017 Volume 25, Issue 5

100 Years, 1917—2017 The oldest Continuous Ham Radio Club in the United States

SECTION NEWSLETTER for May 2017

WISCONSIN: SM: Patrick Moretti KA1RB.

Are You Proud of Your Call Sign?

I know that I am proud of my call sign. I worked to earn that call sign, taking the test was not that hard, but it was an accomplishment and a reward all in one. I suspect everyone, or at least most everyone goes through the trepidations of taking "the test" and waiting to see if you made the grade or not. So - if we are proud of our call signs, why is it that some people don't take the time or make the effort to pronounce their own call in a way that can be understood?

We are supposed to be "communicators" and the first base of good communications is making sure that what we say is understood at least in substance if not in meaning or intent. Phonetics help and that is fine, but on a clear FM frequency (specially on repeaters), there should not be a need to routinely break your call sign down into its phonetic equivalent... I would much prefer to hear Amateurs use their calls correctly, making sure they are understood - i.e. slow down a bit, enunciate, show some pride in your own unique call sign! Label it "good operating procedure". Use phonetics for Nets when a Net Control asks for it.

I hear the comments already... "everyone mistakes my b for a d or an e... I have to use phonetics." Of course there are exceptions and there are actually quite a few letters with that "e" sound that can become confusing. Make that part of your conversation and compliment the other party on getting your call right! Note that with my French heritage, I have real problems distinguishing the letters G and J as pronounced in English - they are exactly backwards from the French pronunciation! ...go figure...

Recruiting is still the most important activity we can support - it is an important topic as new Hams are the lifeblood of this organization.

Our avocation is communicating over "the ether"... sharing that love of communications, our enthusiasm, our efforts to share and help are attractive to many people. The technology we use ranges from very basic to orbiting satellites. We tickle the fancy of Scientists, Physicists, Emergency Responders, Engineers, and Laymen in many different fields.

Each of these approach our hobby from a different perspective (note to those of us who consider Amateur Radio "not a hobby, but a service" - it can and should be both!) It is our task when we first meet a new potential ham to identify their perspective and sell our avocation from that perspective. As an example, an Astronomer might be interested in our following of the solar cycle or a tie-in to Radio Astronomy and their antennas, a Physicist might want to investigate radiation effects and propagation over time, an Engineer might be fascinated with design and building of better equipment... a First Responder would be interested in the speed and accuracy of various means of communications... there is room here for every possible "other" interest that can be tied in to Amateur Radio. Of course don't forget the Photographer and those folks who can document what we do.

Please go out of your way to explore the different perspectives out there and work to increase our numbers!

What is your Club doing to recruit new Hams and to get them to upgrade their license? See note on Field Day



MRAC Officers:

Terms Expiring in 2018

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

Terms Expiring in 2017

- Director – vacant
- Director – Vacant
- Director – Tom, W9TJP
- Director--Dale, AB9DW

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

(414) 332- 6 7 2 2

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www.w9rh.org

Mail correspondence to:

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Board of directors meeting called to order at 7:00 pm by Dave Shank, KA9WXN club president.

Director's present: Michael KC9CMT, Dan, N9ASA, Dave KA9WXN, Dave, KA9FUR, Dale, AB9DW, Tom W9TJP.

Absent: Al, KC9IJJ, one vacancy on the board.

Preliminary Discussion: The Treasurers report for February 2017 was presented by Michael, KC9CMT. The treasurers report was approved as read by KC9CMT, a motion to accept was made by Dan, N9ASA, seconded by Dale, AB9DW. The January balance ended with \$19,637.04 in Club accounts. The AT&T phone/DSL agreement was canceled as of March 31. Our communications will now be linked into a system of towers in the area.

Meeting Presentations: The April meeting will be our annual election, in addition to a presentation on a project to communicate with the ISS, which will include working on the system logistics needed to make this happen, plus a recap of the recent SwapFest. Further, Dave, KA9WXN will be asking the membership what meeting topics they would like to see presented in the future. May 2017 will be the annual club auction. June will be a field day rap up discussion, and more on the ISS project. The people from Milwaukee solar energy have said they would be willing to do another presentation to the club. Another good topic is lightning protection. The Ham Radio Outlet retailer is willing to have an out-of-trunk swapfest May 20th of 2017, 8-1 pm.

Field Day: Field day 2016, went well at the MATC facility. MATC has both port-a-potties and hand wash stations at the location. It's a good location, and we have received confirmation from MATC, that we will be able to use the facility again Saturday June 24th & Sunday June 25th, 2017. The board would like to have a working committee for the 2017 Makers Fair committee. The LEFROG group has been invited to share the MRAC/MAARS field site with us.

Special Project Committees & Committee reports:

Repeater Report: The club would like more than one repeater control operator. A club repeater control operator should be an extra class operator to have the kind of privileges that are necessary to operate field day to its fullest extent.

New Business: The Board will be having our meetings at the HRO classroom in 2017. Dave, KA9WXN is continuing discussions regarding events for the clubs' 2017 100th anniversary. Tom, W9TJP reports that Ham Radio Outlet is open from 10am-5:30pm, Monday through Saturday. Locations and dates are still being discussed as to the 100th anniversary Banquet. The banquet would have to be catered. Kermit Carlson will be the featured speaker at the banquet, tentative date October 21st, 2017. JOTA is the same day as the banquet.

We need to start planning special event stations for the entire year of 2017. Dave, KA9WXN will attempt to generate interest among the membership in forming a committee to handle planning. A club special event station will take place at The House of Harley Davidson during their annual bash on June 17th, 2017. MakersFaire 2017 will be a special event station from the State Fair Park. JOTA coordinator, KC9WW, Fred is helping the club to format an event at the Indian mounds, in Oconomowoc.

Swapfest Committee: The SwapFest was held on April 1st at the Elks Lodge across from HRO. The Boy scouts of America ran a food concession. The SwapFest was a success with the club selling out tables. The SwapFest is already being planned for **April 7th, 2018**. The Elks Lodge is still a definite possibilities, with other venues being looked at. A definite decision needs to be made by the end of September 2017, to facilitate the dissemination of informational fliers. A May out-of-trunk event for 2017, at HRO is a possibility, May 20th being the date talked about. The board has moved the SwapFest permanently to on or about April 1st, as a guard against losses due to inclement weather. Name: "Spring Fling" 2018 will be our 8th annual swapfest.

Special Projects: A special event station will be June 1st, at Greenfield House of Harley dealership. The special event will run during the dealerships hours of operations. The club needs someone to take over the FM simplex contest for February of 2018. The club really needs PR and recruitment, business cards have been printed and will be handed out at all club activities. The North Point lighthouse is the property of the Milwaukee Historical Society. The club would like to have a special event station setup there this summer. The lighthouse event in Port Washington is on August 19th. We should attempt not to conflict with this yearly sponsored event. Dave, KA9WXN will be meeting with the board of Discovery World museum during the last week of February. The board of directors has set a tentative date of October 21st, 2017 for the MRAC 100th anniversary banquet, to be catered for a crowd of 200. An August 19th lighthouse event is being worked on. A special event station at the lakefront is being worked on by Dave, KA9WXN. The club will be sending letters to former members asking if they would like to renew for 2017, our 100th anniversary year. This will allow our past members to take part in all the activities being planned. Dave, WB9BWP will be sending anniversary information to Gordon West for his weekly Ham Nation Broadcast. The board wants to compile a VIP list for the banquet and send out invitations.

A special event station at the War Memorial is being discussed. The club will use the club call of W9RH/100 for all our special events. The club would also like to have a membership drive for new members for 2017. There would be a special certificate for any new members of the club. The club needs to have some special QSL cards, or ridged certificates printed up for contacts during the calendar year of 2017. The club would like to query members about working on projects for the 100th anniversary. MakersFaire is on September 23-24th, 2017. JOTA 2017 will be another event the MRAC will be involved in. The club will be putting together a go kit for taking to various events.

Website update: Two new people have been added as administrators for the WordPress powered club website. Dan, N9ASA, & Dale, AB9DW.

Clubs throughout the country need to use the spectrum that they have been given. The 220mhz band is not used very often in the Milwaukee area. DMR is now becoming a item among Hams'. A Club calendar is a project that the Board of Directors' would like to pursue. Dave, KA9WXN has been working on this idea. A schedule of upcoming events should be printed in the chatter each month.

A motion was made to adjourn the meeting at 9:05 pm by Dan, N9ASA seconded by Michael, KC9CMT. Meeting adjourned at 9:07 pm.

April 11, 1965 — Palm Sunday Outbreak

Across the upper Midwestern United States, March of 1965 was cold, snowy and miserable. The month began with blizzard conditions across the region on March 2, bringing heavy snow and a biting 50mph wind. Another, more significant blizzard would follow on St. Patrick's Day, March 17. Several feet of snow buried the region, while 60mph winds whipped the landscape and blew the powdery snow into vast drifts tall enough to bury cars along the streets. In many locations, 1965 ranked among the top-20 coldest and snowiest Marches on record. A respite would not come until the first week of April, when a surge of warm air brought unseasonable warmth and temperatures into the low 70s. The warmth would not last long, however, as another arctic air mass settled over the region on the 8th with temperatures slipping back to the 30s and 40s.



St. Patrick's Day Blizzard. March 17, 1965.

By Palm Sunday weekend a weak low pressure system was edging toward the area, drawing in warm, humid air from the Gulf Coast and pulling a mass of cold and extremely dry air behind it. A 25-knot southerly low-level jet combined with stretches of clear skies and sunshine to rocket temperatures into the mid-70s across the warm sector. With widespread dewpoints in the 60s, residents throughout the region headed outside to enjoy the first beautiful spring day of the year. In some areas, the heat grew to become oppressive. In the words of retired police chief Warren Hale of Milan, Michigan; "The day was so warm and wonderful. The family and I decided go on a picnic in the Irish Hills, because it was too stifling in the house. The heat and humidity drove us crazy so we had to just get away from it all."

Unknown to all outside the meteorological community, a nearly unprecedented atmospheric setup was approaching from the west-southwest.

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For several days, the U.S. Weather Bureau had been tracking a large, complex storm system moving toward the middle of the country from the Pacific Northwest. Strong thunderstorms erupted across parts of the Ozarks on Saturday afternoon and evening, eventually producing several tornadoes in Missouri and Arkansas. The most intense tornado struck Conway, AR as a slender but violent F4, tearing a narrow, block-long path through a residential area and killing six people.



Dodge City, Kansas. By the time all observations had been taken, analyzed and prepared into charts, the larger picture had fully come into view. An exceptionally strong jet stream was digging into the heart of the Midwest, and rounding its base was an extraordinarily intense jet streak with a core of 135kt winds.

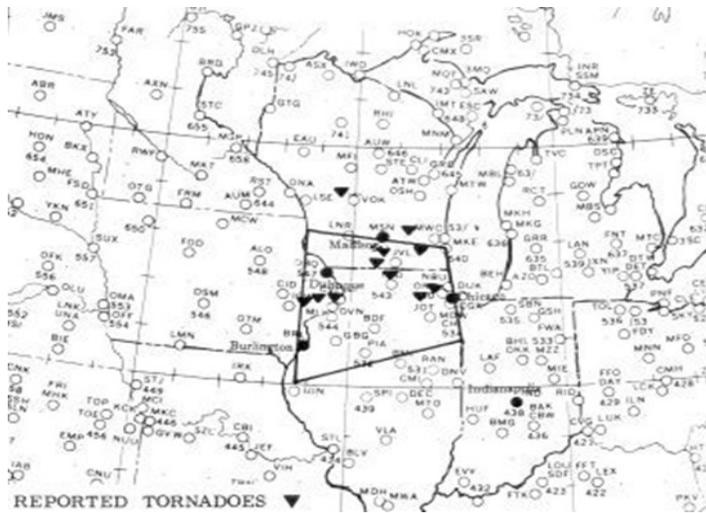
The low pressure system, rapidly deepening in response to the exceptional upper-level winds, drifted eastward toward central Iowa. Hand-analysis charts revealed a warm front surging northward through central Illinois, Indiana and Ohio, eventually pushing into southern portions of Michigan. Trailing behind the low, a cold front was draped south across the Ozarks and southwestward to Texas. By 10:45am CST, forecasters at the Severe Local Storms Center, a forerunner of today's Storm Prediction Center, began to suspect that conditions were setting up for rough weather. The intense jet streak, along with very intense, veering winds throughout the atmosphere, provided abundant rotational energy for any storms that managed to fire. Shortly before noon, a Severe Weather Forecast was issued mentioning the possibility of isolated tornadoes from northeast Missouri to central Illinois and north-central Indiana.



By the time the Severe Weather Forecast was issued, thunderclouds were already growing in the skies over the Iowa towns of Cedar Rapids and Waterloo. Strong, gusting winds were followed shortly by a spattering of rain and small hail. At 12:45pm CST, a funnel descended from the clouds and began snapping and debarking trees outside of Tipton, Iowa. The tornado ripped through more than two dozen farms, flattening many structures along its path and carrying large pieces of debris from one farm house more than a mile. The

When weather offices throughout the Southwest and Central Plains released their morning weather balloons on Sunday, the rawinsonde data that they received was disconcerting. Winds near the 500mb level, about 18,000ft., were extremely strong. Stations across a broad swath of the Midwest reported winds well in excess of 100kts. An absolute maximum of 159kts — 183mph — was detected over

tornado would later be rated F4, traveling 91 miles through three counties and killing one man as he ran for his storm cellar. Unaware of the destruction in Iowa, concern nevertheless began to rise at the Severe Local Storms Center. A second Severe Weather Forecast was issued at 1pm CST, mentioning the possibility of "one or two" tornadoes:



Severe Weather Forecast Number 68, issued at 1pm CST by the Severe Local Storms Center. The area of concern is outlined by a polygon.

SEVERE WEATHER FORECAST NUMBER 68

ISSUED 100 PM CST APRIL 11, 1965

EXTREME SOUTHERN WISCONSIN
EXTREME EASTERN IOWA
PORTIONS OF NORTHERN ILLINOIS

A FEW SEVERE THUNDERSTORMS WITH LARGE HAIL DAMAGING WINDS AND ONE OR TWO TORNADOES ARE EXPECTED FROM 1 PM UNTIL 6 PM CST THIS SUNDAY AFTERNOON AND EVENING IN AN AREA BOUNDED BY THE POINTS 40 MILES SOUTH OF BURLINGTON IOWA TO 50 MILES WST OF LONE ROCK WISCONSIN TO MILWAUKEE WISCONSIN TO 40 MILES SOUTH EAST OF CHICAGO ILLINOIS BACK TO THE POINT 40 MILES SOUTH OF BURLINGTON IOWA.
WOOD ... 1906Z

The next killer tornado touched down in Jefferson County, Wisconsin, just west of Jefferson. The F3 tornado caused damage to a number of farms before crossing U.S. Route 16 near Pipersville, where it ripped two cars from the roadway and tossed them several hundred feet, mangling the vehicles and killing three occupants. A further 28 people were injured along the tornado's half-mile wide, 24-mile path, including 12 in one home. Southeast of Watertown, the farm of Edwin Shroeder was demolished and a number of cows were killed. The tornado may have been at or near F4 intensity at this point, as evidenced by the fact that several buildings in the area were reportedly reduced to "piles of rubble."



Radar operators at the US Weather Bureau office in Chicago — one of just two offices in the affected area with access to the somewhat more modern WSR-57 radars — monitored their screens with nervous anticipation as several small, white blotches began to grow in size and number. Explosive thunderstorm development had begun across Iowa, Wisconsin and northwestern Illinois. Unknown to the operators at the time, multiple tornadoes were already in progress and causing extensive damage through largely rural areas of Iowa and Wisconsin. A large cone tornado touched down near Stockton, IL and moved rapidly to the northeast, cutting a swath of destruction through the northwest side of Monroe, WI. More than 100 structures were damaged or destroyed, including over a dozen trailers in a trailer court. Forty people were injured, many of them in mobile homes and vehicles. Trailers and barns were shredded by another tornado east of Evansville.

At 3:27pm, another violent tornado dropped from the sky in McHenry County, Illinois. The tornado's path began on the southwest side of the town of Crystal Lake, near a public golf course. The sky turned a sickly olive-green color as the vortex began to wrap up and extend earthward. Deputy Sheriff Glen Roberts noted the unsettling appearance in the skies to his west. "Everything seemed so strange and eerie, like the clouds were a spinning wheel coming at me," he would later recall. "I had seen newsreel footage of a killer tornado in Udall, Kansas when I was 16 and the way the clouds were moving made me feel really fearful that this storm was going to be similar."



Sheriff Roberts scrambled for his radio as the violent tempest began tearing across the south side of Crystal Lake, ravaging dozens of homes in a number of subdivisions and devastating the Lake Plaza Shopping Center, lofting large chunks of debris high into the

air. In Colby Holmes subdivision, three people were killed when a truck was thrown into the basement in which they were taking shelter under a heavy table. Just yards away, another woman was killed as she was unwittingly removing laundry from her clothesline. Her home was one of 45 that were completely swept away in high-end F4 fashion. The tornado continued on for another ten minutes, cresting a small hill before barreling into the small community of Island Lake. More than 150 homes were destroyed in all, and six people lay dead.

The outbreak, however, had scarcely begun. High in the atmosphere above the Wisconsin/Illinois border, the jet stream had split into a northern and southern branch. In the area surrounding the split, the already powerful atmospheric dynamics had become even more dangerous, providing additional lift to areas already undergoing explosive thunderstorm development. Supercells dotted the screens of the Weather Bureau's spotty network of aging WSR-1 and WSR-3 radars, many sporting the textbook hook echoes indicative of intense tornadic rotation. In northwestern Indiana, the mid-day sky had turned an odd, vaguely ochre hue. While concerning to

some who had heard news of the incoming bad weather, most continued about their day without a second thought. Unknown to observers at the time, the strange color had been produced by fine particles of topsoil, scoured from the Earth by the tornadoes to the west and carried aloft by the swift winds of the jet stream.

Finally beginning to realize the extent of the developing tornado threat, the Chicago weather office issued a "Tornado Forecast" at 4:35pm CST for an area 60 miles either side of a line from Detroit, Michigan to Lafayette, Indiana. Along with the tornado forecast came the warning that strong storms had begun developing over northwestern Indiana. Despite the limited technology and paucity of available information at the time, this tornado forecast would prove to be exceedingly prescient — nearly every significant tornado during the remainder of the outbreak would occur within the bounds of this forecast area.

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Officials and Weather Bureau personnel in the South Bend area sprang into action to prepare for the arrival of the storms. Additional personnel were called into the Weather Bureau office to assist in tracking the storms and issuing warnings. Emergency managers began preparations for the damage that was sure to follow. Indiana State Police, who had recently taken a cue from their brethren in the Great Plains and held three-hour "Severe Weather Surveillance" training programs, scrambled into position to track the incoming storms. They would not have to wait long. Just ten minutes after the tornado forecast was issued, at 5:32pm EST, another call from the Chicago office indicated that a rapidly intensifying thunderstorm had been spotted in northwestern Indiana. Less than 15 minutes later, the first of a violent wave of tornadoes touched down in Starke County, southwest of Hamlet, Indiana.



After crossing US Route 30 on a northeast heading, the slender funnel traversed nearby Koontz Lake as a violently rotating waterspout. Upon reaching the shore of the lake, the savage winds ripped through a cluster of cottages. At least a hundred cottages were damaged or destroyed and one man was thrown more than 600 feet to his death by the winds. As the tornado crossed US-31, Indiana State Trooper Robert Chandler took one of the most famous photographs from the

outbreak. Taken from just a few hundred yards away, the funnel appears a brilliant white due to the reflection of the bright sun against the dark, stormy background. Continuing northeast at speeds in excess of 60mph, the funnel appeared wide and gray as it barreled into the northern edge of the community of La Paz. Six homes were leveled and a church was destroyed in the small town as the tornado began to grow slightly.



At Lakeville, a local high school still under construction — the jewel of the community because of its beautiful new gymnasium and basketball court, a point of pride in basketball-crazed Indiana — was flattened to the ground. The tornado then engulfed the small town of Wyatt, damaging or destroying more than three-quarters of the structures in town. A large grain elevator was destroyed and several cars were thrown hundreds of yards from Bremen Rd. Fortunately, most residents had received advance warning of the tornado via television and radio — a luxury that would be all too rare in the following hours. The F4 tornado finally dissipated northeast of Wyatt, ultimately killing ten and injuring more than 80 along its 36-mile path. Around the same time, a slender but powerful tornado struck the community of Wanatah, in Laporte County, IN. The tornado caused significant damage to several farmsteads and was well-photographed as it exited the Wanatah area.

Just northeast of the La Paz tornado, a monster descended from the clouds southwest of Wakarusa in Elkhart County, IN. Leaving a narrow trail at first, the powerful funnel tore into Wakarusa and destroyed a number of homes, killing one small child. Soon after, the tornado would become a part of history. After snapping and uprooting trees in the countryside, the tornado approached U.S. Highway 33 between Dunlap and Goshen as a rapidly expanding, half-mile wide wedge. Paul Huffman, a reporter for the local *Elkhart Truth* newspaper, was on his way home from church with his wife Elizabeth when they noticed what appeared to be smoke billowing into the air. Pulling off the side of the highway to take a closer look, they noticed that the "smoke" was, instead, a massive tornado. Grabbing his camera, Mr. Huffman snapped a series of six photographs as the tornado approached his location. The fourth photo, sometimes known as "The Twins" would go on to become one of the most iconic weather photographs ever taken.





The fifth photo in the series clearly shows the multivortex structure of the massive wedge tornado. Large chunks of debris can be seen lofted around both sides of the tornado. The violently rotating multivortex tornado slammed into Midway Trailer Court just after 5:15pm EST. Two massive vortices swirled around a common center, obliterating trailers and throwing debris into the air. As Mr. Huffman braced himself against the strong inflow winds, a car — still airborne after being thrown by the tornado — crashed to the ground nearby.

It would later be determined that the automobile was airborne for at least a full three-quarters of a mile. Eighty of the 100 trailers at Midway were destroyed and ten people were killed. An airplane wing from Goshen Airport, where planes were tossed and ripped apart, was eventually found more than 35 miles away in Centerville, Michigan. The tornado continued on, demolishing much of the Jefferson Place subdivision and killing several people. Finally, the tornado struck Middlebury, sweeping away several homes and claiming another three victims. The tornado killed 14 in all, causing borderline-F5 damage at several points along its 22-mile path.



At approximately 5:40pm CST, just as the F4 that chewed through the Midway Trailer Court dissipated, a second violent multivortex tornado formed just south of the first. Beginning as an ephemeral, wispy waterspout over a small lake south of Goshen, the tornado intensified quickly as it crossed State Road 13 and destroyed a number of farms. The tornado thundered toward the Rainbow Lake area, completely demolishing a dozen homes and sweeping them away. Seventeen were killed in the area, where damage was so intense that an F5 rating may have been warranted. Onlookers described the

tornado as initially having the appearance of serpents writhing around a central point, eventually evolving and expanding into a massive, malevolent wedge with "octopus-like appendages" reaching out horizontally. The tornado continued on for another 20 miles, killing two while they sheltered in their home in Ontario. By the time the tornado ground to the end of its path around 6:00pm CST, the outbreak had reached a ferocious peak.

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Aerial view of the damage on the western shore of Lake Pleasant, IN.

In the northeast corner of Indiana, one of the most devastating events of the outbreak began to unfold. A slender gray funnel began causing damage about two miles west-southwest of Lake Pleasant. As it approached the lake, the tornado widened and rapidly intensified. Damage along the eastern shore of the lake was extreme, with several structures reduced to rubble piles. Trees in the area were almost completely debarked and denuded, with many snapped and twisted close to ground level. As the tornado crossed the Michigan border, first warning came from a deputy sheriff in southern Branch County. Witnessing the approach of the tornado, he scrambled to his car to radio in an alert. Moments later, the car was tossed off the road and rolled several times, causing serious injuries to the deputy.

Roaring across the landscape, the twister leveled much of the town of East Gilead before bearing down on Coldwater Lake, leaving a damage path more than a mile wide. On the lake's western shore, a number of cottages along Pearl Beach "exploded" and were swept from their foundations. Much of the debris was thrown into the lake, and more than a dozen vehicles were thrown from surrounding roads. Trees were mangled and stripped of their bark, and the grass was "torn out by the roots" in some areas. In the center of Coldwater Lake, the small peninsula of Iopawa Island was also devastated. Every home on the island was leveled, some of them swept away and dumped into the lake.



The giant twister slammed into the eastern shore of the lake with a fury, demolishing the large Davis Marine marina, throwing several boats from the water and killing the owner, Hank Davis. Homes along Crystal Beach were damaged or destroyed, and cars and tractors were thrown hundreds of yards. One news report, likely apocryphal, claimed that some vehicles driving along Lake Drive were snatched up by the tornado and thrown three to four miles across the countryside. Speeding to the northeast at 60mph, the tornado tore through dozens of farmsteads south of the hamlet of Quincy. The Busy Bee Farm, one of the most prominent dairy farms in lower Michigan, was completely obliterated and scattered for hundreds of yards. Near one demolished home, a large, heavy steel tank was torn away from its anchoring and thrown more than half a mile.

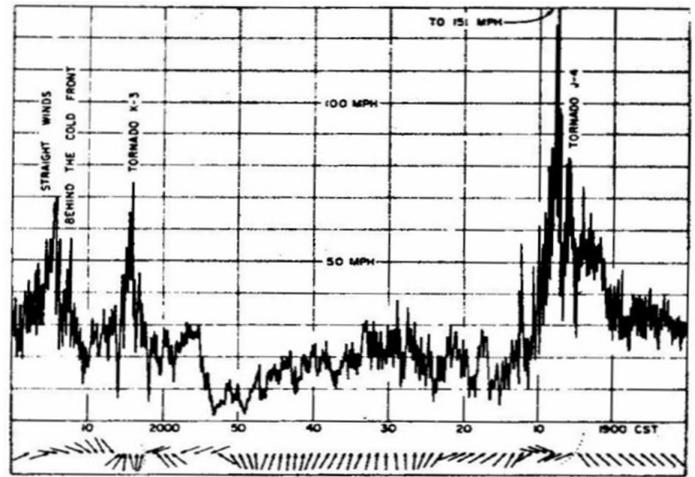


More than 300 head of livestock were killed in the Hillsdale area, some of them thrown great distances and badly mangled. An 80-year-old woman was blown 300 yards into Baw Beese Lake but survived by clinging to the debris of her home. Further northeast, the tornado devastated the community of Manitou Beach, sweeping away a number of homes and throwing them into nearby Devil's Lake and Round Lake. Six members of one family were killed in this area when the tornado obliterated their home. The local Baptist Church, where 50 people were attending evening services, was struck and destroyed. More than half of those inside were injured and trapped under the rubble for several hours, and three people died from their injuries. The church spire was thrown into the lake, where it was embedded nine feet into the lake bottom.



The twister continued its northeasterly course, causing severe damage near Onstead and Milan. On the northern edge of Tecumseh, the funnel skirted a tower at Mayers Airport. Despite being several miles from the core of the tornado, an anemometer affixed to the tower recorded

an extraordinary wind gust of 151 miles per hour. According to Dr. Theorode Fujita, who used this valuable data to estimate the wind velocity, direction and structure inside and around the tornado, the core flow of the tornado itself likely had wind speeds ranging from 180 to 240 miles per hour at the time the measurement was taken.



Wind trace from the anemometer near Tecumseh, Michigan. Peaks of 151 and 75 miles per hour can be seen with the passage of each tornado. This graph is read from right to left.

Approximately 35 minutes after the first tornado had touched down, a second tornado crashed to the earth and began to follow nearly the exact same path. The paths of the two tornadoes were so similar that, in most instances, it was impossible to tell the two apart. The second tornado swept through many of the same areas, flattening and sweeping away virtually anything that had been spared by the first tornado. Residents who had ventured outside to assess the damage were caught off-guard, as were volunteers who'd come to assist the many casualties. Drivers fled from their cars and dove into ditches along US-27. According to one witness, "bodies were dropping everywhere in fields." Several people were thrown more than a quarter of a mile, and cars were tossed hundreds of yards. Some bodies were thrown into swamps dotting the area.

By the time the second tornado was through, the two twisters had wrought a path of catastrophic damage ranging in width from one to more than three miles. At least 19 were killed in Branch County alone. A further 11 were killed in Hillsdale County. The two tornadoes ultimately claimed at least 44 lives along paths totaling 90 and 75 miles, respectively. More than 600 homes and dozens of businesses and other structures were destroyed along the damage path, many of them swept cleanly away. The second tornado also passed near the Mayers Airport, registering 75mph on the anemometer despite being even further away. Both tornadoes were later rated F4, though the first was likely the stronger of the two.

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In Indiana, the outbreak continued with undiminished ferocity. A funnel cloud dipped to the earth southwest of Lafayette, quickly growing into a violent stovepipe tornado. It cut a path nearly 22 miles long through central Indiana, causing extreme damage in and around the towns of Mulberry, Cambria and Moran. Despite leveling dozens of homes and sweeping several away, this massive tornado was one of few that did not cause any fatalities. Television and radio helped to warn some people in the path, and the tornado remained highly visible through much of its path.



About eight miles south of South Bend, yet another violent tornado began tearing up soil and vegetation. Traveling just north of the track left by the multivortex funnel that demolished the Midway Trailer Court, the tornado roared into the town of Dunlap, causing catastrophic damage to the subdivisions of Sunnyside and Kingston Heights. Many homes were swept clean from their foundations, the debris scattered and granulated by the winds. Vehicles were thrown and mangled, and in some areas grass was scoured from the ground. Twenty-six people were killed at Sunnyside alone, along with two at Kingston Heights. A further six lives were lost as the tornado leveled a truck stop and a well-built home at the intersection of Highways 15 and 20. This tornado would prove to be the deadliest of the outbreak, taking 36 lives in all. Originally rated F5, the twister was later downgraded to F4.



Devastation along CR-26 west of Dunlap.

Amid the flurry of activity, the beleaguered South Bend, Indiana office of the Weather Bureau became overwhelmed by the massive influx of tornado reports. Exasperated meteorologist Larry Burns issued an ominous, unprecedented blanket warning covering the office's entire jurisdiction:

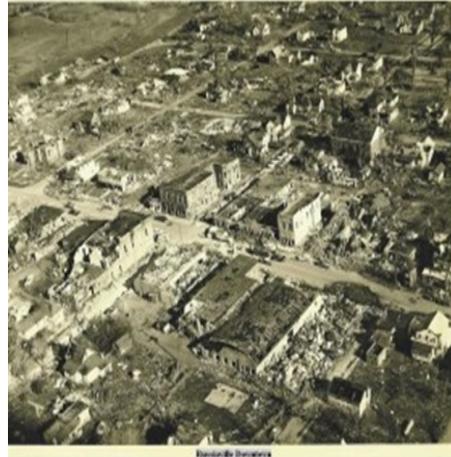
"Reports of tornadoes and funnel clouds have become so numerous that it is impossible to keep track of them. Warnings should therefore exist throughout the central and northern portion of Indiana. The problems have been intensified by telephones being out in many areas and it is impossible to notify many people."

By 6:25pm, between seven and nine violent tornadoes were simultaneously scouring the earth across Indiana and Michigan. A mile-wide tornado that began in Crawfordsville, IN obliterated more than 50 homes in and around Lebanon, killing six members of one family and another five nearby. The Lebanon Shopping Center was completely wrecked. Another four people were killed when the tornado ripped two vehicles off the road and threw each of them more than 100 yards. Ten more were killed in Sheridan, where the tornado demolished numerous homes, granulated debris and stripped trees bare.

One of the most damaging tornadoes of the outbreak began just west of the small community of Russiaville. As the tornado churned through the center of town, more than 90% of the buildings were damaged or destroyed. So complete was the destruction that one National Guardsman would later describe the scene at Russiaville as "like a city that has been bombed and burned." The funnel widened to nearly one mile as it engulfed the town of Alto. At least 100 homes were leveled as the tornado rampaged through Alto and into the south side of Kokomo. The well-built brick buildings of Maple Crest Apartments were damaged to varying degrees, with at least one leveled to its basement.



The Russiaville tornado reached its peak intensity near the community of Greentown. The tornado tore at the soil and left cycloidal scour marks across the fields to the west of town. These marks would come to serve an important role in the research of Dr. Fujita, who would later explain the source of their origin as narrow, particularly intense suction vortices within the main circulation of the tornado.



The tornado maintained its intensity while tearing through Greentown, where 80 buildings were razed and ten people were killed. The tornado struck with such violence that it scoured the grass from the backyards of many homes and completely debarked and denuded

many trees in the area. A number of fatalities occurred in cars which were lifted and tossed several hundred yards by the furious winds. Moving into the town of Marion, the tornado demolished dozens more homes and wiped out a small trailer court. A hospital and a shopping center were heavily damaged, and vehicles were again thrown from the road. In all, the tornado killed 25 people and injured at least 800 others across a 48-mile path of devastation.

Shortly afterward, another violent tornado began a path of destruction in northwest Toledo. For 33 year old Paul Smith, a foreman for the Norfolk & Western railroad, the approaching twister was preceded by spasmodic rain and pounding hail. Before leaving his home in the recently-built neighborhood of Fuller's Creek Addition, he hesitated a moment and turned back to reassure his fearful wife and children. Moments later, a nearby window shattered and sprayed shards

of glass through the room. Wind and rain lashed the siding and roof. The tornado thundered through Fuller's Creek with tremendous force, tearing many homes from their foundations and scattering the debris hundreds of yards away. Paul was thrown in the air, as if being "swept away in a vacuum." When he came to his senses, he found himself face-down in what remained of his neighbor's garage with multiple cuts and bruises. His wife was found dead several blocks from the site of their home.



This photo, taken by Jim Weyer, allegedly shows the Toledo tornado illuminated by an unexplained electrical phenomenon.

The damage path continued with nearly undiminished violence for 18 miles before moving on to Lake Erie, but the most intense damage was found in Fuller's Creek. A large DuPont paint factory was demolished, as were at least two other industrial buildings. More than 50 homes, some well-built, were swept cleanly from their foundations with possible F5 intensity. A bus was ripped from Interstate 75 and lofted through the air before being crushed upon landing, killing five occupants. The Toledo tornado took a total of 18 lives, 16 in Ohio and five at Fuller's Creek Additions. Nearly 250 more were injured. A photograph taken during the storm allegedly shows the tornado as two broadly spaced, glowing cylinders. While some have speculated that the photo shows the tornado glowing as a result of some static electrical phenomenon, the picture remains open to interpretation.

Just over an hour later, the last violent tornado of the outbreak began to fill the skies over Pittsfield, OH with bits of timber, furniture and vegetation. Virtually the entire town was destroyed, and six homes were damaged so badly that they reportedly "vanished into thin air." Those who emerged from the wreckage remarked that nothing in the town was left

standing, with the exception of a Civil War memorial statue. Seven of the town's 50 residents were killed, as were two motorists who were caught in the storm while passing through town. Twenty miles later, the town of Strongsville also bore the full fury of the tornado's winds. Fifty homes were irreparably damaged and as many as 20 were leveled completely. Witnesses again testified that several homes "literally vanished." A total of 18 were killed between the two communities. This tornado was rated F5 and later downgraded to F4, though the initial rating was likely correct.

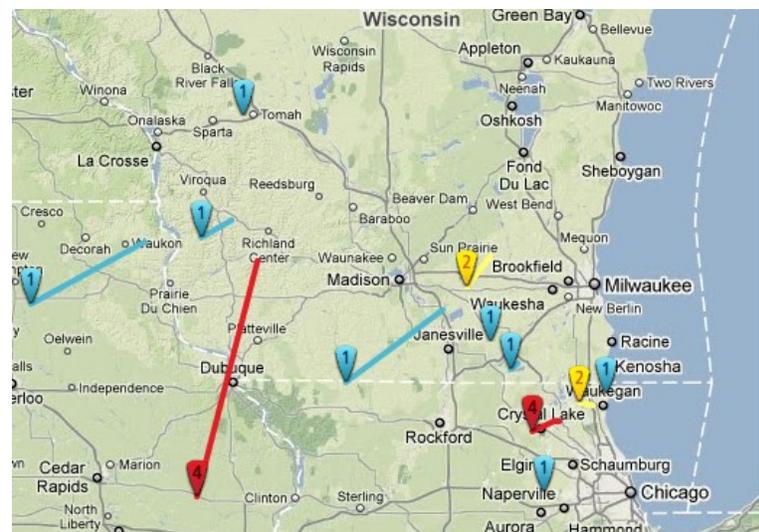
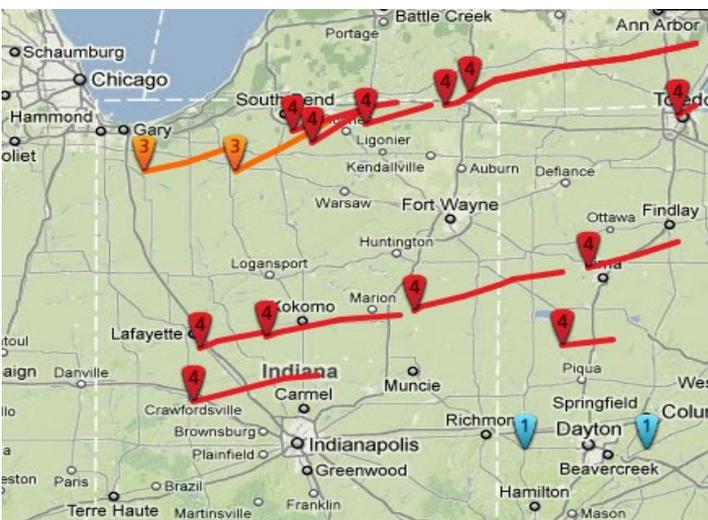
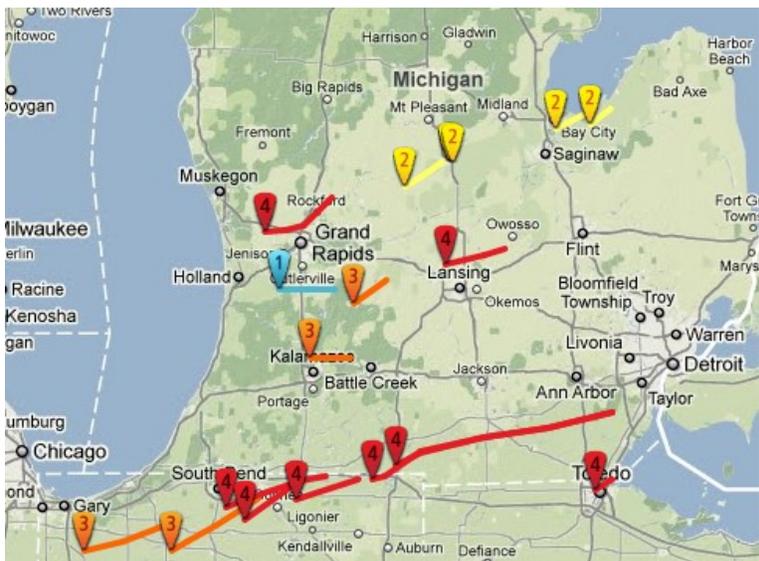
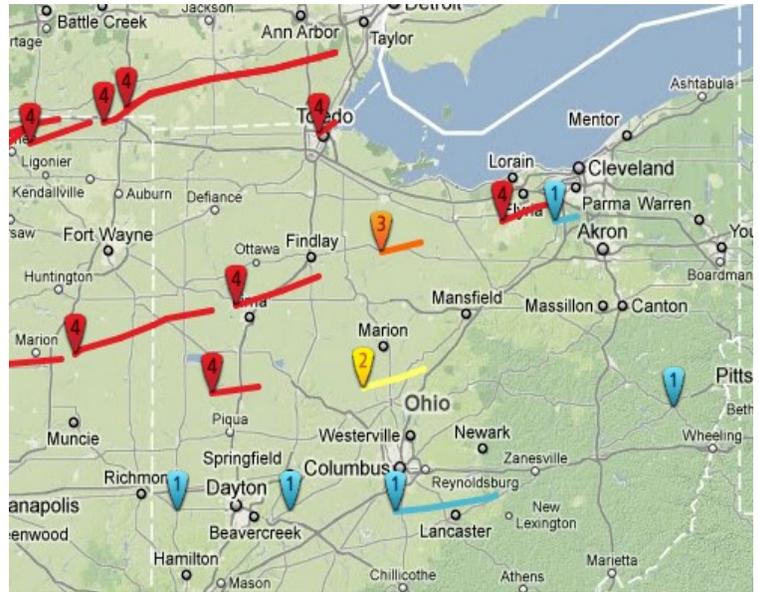


Aerial view of the destruction in a section of Strongsville.

• • •
Although there have been larger outbreaks in terms of raw numbers, the Palm Sunday Outbreak of 1965 still stands as one of the most intense in history. In the span of just 11 hours, 47 tornadoes killed 271 people. Twenty-one of those tornadoes took at least one life, and 38 were rated F2 or higher. Nineteen F4 tornadoes raked five states in the span of nine hours. Of those, as many as five produced damage that may have warranted an F5 rating. When normalized to adjust for inflation and other changes, the Palm Sunday Outbreak still ranks as the most destructive single tornado day ever recorded.

The outbreak also stands out for another, equally tragic reason. The extremely high death toll is owed in part to the twin failures of personnel and equipment. At the U.S. Weather Bureau office in Lansing, Michigan, a burnt circuit left the teletype machine out of commission. At the height of the event, warnings and bulletins from Fort Wayne and South Bend fell on deaf ears as the Lansing office was unable to receive them. In Muskegon, the WSR-3 radar was rendered useless by a failing vacuum tube. With no radar coverage, both Muskegon and Grand Rapids were left to rely on spotty communication that, in many cases, did not come until far too late. In Grand Rapids, further problems came in the form of human error. The staff was caught completely off-guard by the developing outbreak and was unable to issue timely warnings.

Further issues arose because officials in Michigan lacked a single agreed-upon radio frequency on which to communicate. Communication between fire, police, emergency management and other officials within a county became extremely difficult, and contact with personnel out of county or out of state was virtually nonexistent. Additionally, when Weather Bureau offices did manage to identify and comprehend the threat, they failed to pass the information along to offices downstream. The days and weeks that followed brought finger-pointing from all parties, but eventually led to a number of changes to facilitate faster, easier communication during future events.



Varactor diode specifications

- **overview of the key specifications for varactor diodes or varicap diodes, including Q, reverse voltage, capacitance range, etc.**

When choosing a varactor diode, the [varactor](#) specifications need to be carefully determined to assess whether it will meet the circuit requirements.

While there will be many [varactor diode](#) specifications that are the same as those applied to other types of diode, including signal diodes, etc, there are many other varactor specifications that are crucial to the performance of the varactor in any variable [capacitance](#) role.

Many of the different varactor parameters will be detailed in the varactor specification sheets that may be accessed in the manufacturers literature.

Capacitance range and capacitance ratio

The actual [capacitance](#) range which is obtained depends upon a number of factors. One is the area of the junction. Another is the width of the [depletion region](#) for a given voltage.

It is found that the thickness of the depletion region in the varactor diode is proportional to the [square](#) root of the reverse voltage across it. In addition to this, the capacitance of the varactor is inversely proportional to the depletion region thickness. From this it can be seen that the capacitance of the varactor diode is inversely proportional to the square root of the voltage across it.

Diodes typically operate with reverse bias ranging from around a couple of volts up to 20 volts and higher. Some may even operate up to as much as 60 volts, although at the top end of the range comparatively little change in capacitance is seen.

One of the key parameters for a varactor diode is the capacitance ratio. This is commonly expressed in the form C_x / C_y where x and y are two voltages towards the ends of the range over which the capacitance change can be measured. For a change between 2 and 20 volts an abrupt diode may exhibit a capacitance change ratio of 2.5 to 3, whereas a hyperabrupt diode may be twice this, e.g. 6.

However it is still necessary to consult the [curves](#) for the particular diode to ensure that it will give the required capacitance change over the voltages that will be applied. It is worth remembering that there will be a spread in capacitance values that are obtainable, and this must be included in any calculations for the final circuit.

Reverse breakdown

The reverse [breakdown voltage](#) of a varactor diode is of importance. The capacitance decreases with increasing reverse bias, although as voltages become higher the decrease in capacitance becomes smaller. However the minimum capacitance level will be determined by the maximum voltage that the device can withstand. It is also wise to choose a [varactor diode](#) that has a margin between the maximum voltage it is likely to expect, i.e. the rail voltage of the driver circuit, and the reverse breakdown voltage of the diode. By ensuring there is sufficient margin, the circuit is less likely to fail. It is also necessary to ensure that the minimum capacitance required is achieved within the rail voltage of the driver circuit, again with a good margin as there is always some variation between devices.

Diodes typically operate with reverse bias ranging from around a couple of volts up to 20 volts or possibly higher. Some may even operate up to as much as 60 volts, although at the top end of the range comparatively little change in

capacitance is seen. Also as the voltage on the diode increases, it is likely that specific supplies for the circuits driving the varactor diodes will be required.

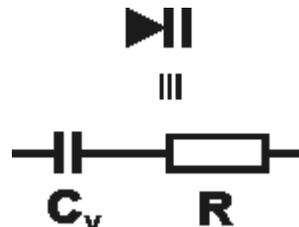
Maximum frequency of operation

There are a number of items that limit the frequency of operation of any varactor diode. The minimum capacitance of the diode is obviously one limiting factor. If large levels of capacitance are used in a resonant circuit, this will reduce the Q. A further factor is any parasitic responses, as well as stray capacitance and inductance that may be exhibited by the device package. This means that devices with low capacitance levels that may be more suitable for high frequencies will be placed in microwave type packages. These and other considerations need to be taken into account when choosing a varactor diode for a new design.

As a particular varactor diode type may be available in a number of packages, it is necessary to choose the variant with the package that is most suitable for the application in view.

Varactor Q

An important characteristic of any varactor diode is its Q. This is particularly important in a number of applications. For oscillators used in frequency synthesizers it affects the noise performance. High Q diodes enable a higher Q [tuned circuit](#) to be achieved, and in turn this reduces the [phase noise](#) produced by the circuit. For filters the Q is again very important. A high Q diode will enable the filter to give a sharper response, whereas a low Q diode will increase the losses.



Varactor diode equivalent circuit

The Q is dependent upon the [series resistance](#) that the varactor diode exhibits. This resistance arises from a number of causes: the resistance of the semiconductor in the areas outside the [depletion region](#), i.e. in the region where the charge is carried to the "capacitor plates".

- some resistance arising from the lead and package elements of the component some contribution from the die substrate

-

The Q or [quality factor](#) for the diode can be determined from the equation below:

$$Q = 1 / 2 \pi C_v R$$

Where:

C_v = the capacitance at the measured voltage

R = the [series resistance](#)

From this it can be seen that to maximize the Q it is necessary to minimize the series resistance. Varactor diode manufacturers typically use an epitaxial structure to minimize this resistance. When designing the circuit, the Q of the circuit can be maximized by minimizing the capacitance.

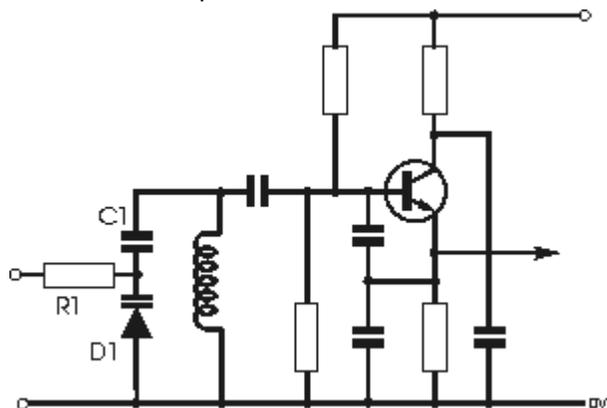
Varactor Circuits

- essentials of varactor diode circuits, detailing some circuits as well as the ways of using varactor diodes within electronic circuits.

There are many aspects to using [varactor](#) diodes in RF [elec-tronic](#) circuits. The configuration to the varactor circuits can affect their operation. In view of the fact that RF circuits are not always easy to optimize, it is necessary to ensure the varactor circuits utilize the best methods of driving varactor diodes as well as the most successful circuits.

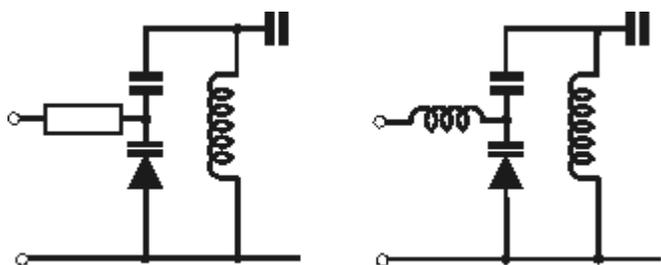
Driving varactor diodes

The [varactor diode](#) requires the reverse bias to be applied across the diode in a way that does not affect the operation of the [tuned circuit](#) of which it is part. Care must be taken to isolate the bias voltage from the tuning circuit so that the RF performance is not impaired.



Typical circuit using a varactor diode for tuning

Typically the cathode is earthed or run at the DC common potential. The other end can then have the bias potential applied. The bias circuitry needs to be isolated for RF signals from the [tuned circuit](#) to prevent any degradation of the performance. Either a resistor or an inductor can be used for this as the diodes operate under reverse bias and present a high DC resistance.



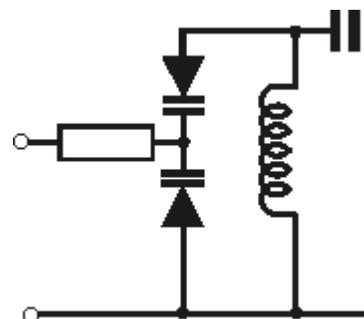
Resistor isolation

Inductor isolation

Applying varactor tuning voltage via resistor and inductor

[Inductors](#) can operate well under some situations as they provide a low resistance path for the bias. However they can introduce spurious inductance and under some circumstances they may cause spurious oscillations to occur when used in an oscillator. Resistors may also be used. The resistance must be high enough to isolate the bias circuitry from the tuned circuit without lowering the Q. They must also be low enough to control the bias on the diode against the effects of the RF passing through the diode. A value of 10 kohms is often a good starting point.

The varactor diodes may be driven in either a single or back to back configuration. The single varactor configuration has the advantage of simplicity. The back-to-back configuration overcomes the problem of the RF modulating the tuning voltage as the effect is cancelled out - as the RF voltage rises, the capacitance on one diode will increase and the other decrease. The back-to-back configuration also halves the capacitance of the single diode as the capacitances from the two diodes are placed in series with each other. It should also be remembered that the [series resistance](#) will be doubled and



Varactor back-to-back drive

When designing a circuit using varactor diodes, care must be taken to ensure that the diodes do not become forward biased. Sometimes, especially when using low levels of reverse bias, the signal in the RF section of the circuit may be sufficient over some sections of the cycle to overcome the bias and drive the diode into forward conduction. This leads to the generation of spurious signals and other nasty unwanted effects.

Early Radio: Military Communications

Mole City- A Perspective

By -Ron Leonard

Since Thanksgiving 1968 our whole AO of III Corp. had started seeing enemy activity on a slowly escalating scale. The doldrums of TET were over. Charlie seems to have his wounds licked and healed from the ass kicking he endured during the TET offensive. From his Cambodian sanctuaries another round of attacks are about to begin.

For weeks the tenseness in the air had been building and could be cut with a knife. Charlie had refused to commit large numbers of troops to the fight, just an ambush here and there mostly of platoon-sized action. This was aggravating the higher ups at Division and in Washington D.C. The body counts were slipping and something had to be done. With this in mind they developed a new strategy "The Patrol Base". The principal of the "Patrol Base" was to establish a very small Fire Support Base right under the VC and the NVA's nose. To this end, "Patrol Base Mole City" would be the first in a series of these bait and trap operations.

"Mole City" was located in an area that had been untouched by allied ground forces in over a year. The area straddled one of the busiest infiltration routes from Cambodia in all of III Corp. This route serviced the NVA with men, equipment, and supplies that would operate on the III Corp, Saigon, and War Zone C battlefields.

It was tiny, barely 100 yards across in any direction. Circular in nature and positioned but a couple of clicks from the Cambodian border it would prove to be the ultimate lure. It would have a defending force of 500 men made up of three companies of the 4/9th "Manchu's of the 25th Infantry Division. On the morning of 18 December 1968 the men of Manchu began the task of preparing this tiny oasis 91/2 miles south of Tay Ninh City into a fortified position nick named "Mole City". In a single day Company A. of the 25th Infantry Divisions 65th engineers transformed 186,000 pounds of building material hauled in by 27 sorties of CH-47 helicopters into a well fortified position. The engineers with the use of bulldozers constructed the perimeter berm, and the men of Manchu

would dig the bunkers spaced 20 yards apart linked together like a giant spider web with deep connecting trenches to act as fighting positions. The bunkers consisted of deep holes covered with PCP steel and a layer or two of sandbags on top to shield any direct hits from mortar, rocket, and RPG rounds. A prefabricated guard tower was flown in to cap off the construction effort. Needless to say there was a sense of urgency.

By nightfall of 22 December 1968 the concertina wire had been strung, the claymore mines set, personnel sensors were positioned in the tree lines, fields of fire established, listening posts had been dispatched to the northeast and southwest, and the artillery had set their coordinates on the tree lines. They were ready. These brave men had no idea what would soon be in store for them.

The Manchu's themselves had endured a hard month. A few days before Thanksgiving they had lost two-thirds of their experienced troopers in one all night firefight south of Trang Bang. The units were now made up of new replacements with no prior combat experience, virgins to combat, and a few seasoned veterans. It would prove to be for many their last night on this earth.

This sets the stage for the unraveling of events that will be forever etched on my brain. This battle would prove costly for the NVA/VC (North Vietnamese Army/Viet Cong). It was also very costly for the heroic men of Manchu and many more. They would still be paying for this battle 34 years later. In the "Diamondhead" scramble shack you could sense something big was up. No one was saying anything, but with the rumblings in the company area, the franticness of the maintenance crews in the hanger trying to get another fire team flyable. When our flare ship and our sister company Little Bear's counter mortar ship were put on three-minute standby at 6 P.M. you knew. We had all seen it before.

At 11P.M. in the "Little Bear" ready room the "Counter Mortar Crew", which was made up of the aircraft crewchief and gunner, the artillery "Forward Observer" (FO), the "Aircraft Commander (AC) CWO Mitch Wilhelm and the co-pilot (PP) WO Ed Rodgers had just settled down to go to sleep, when a messenger burst through the door stating in an urgent voice, "let's go you guys, you have a mission." The gunner and crewchief were already on their way to the aircraft to make it ready for take off along with AC CWO Mitch Wilhelm and the (FO). The (PP) WO Ed Rodgers was hurriedly writing down the mission coordinates, artillery information, and radio call signs of the ground commander.

As WO Ed Rodgers approached the aircraft the engine was already at 6600 RPM, the guns were mounted and the crew was on board and ready to go. In moments they were headed southwest towards a rendezvous with "Hell".

We in the Diamondhead "Scramble Shack" were doing our usual thing, some were watching the 11:30 TV program "Gun Smoke" and still trying to figure out if Matt Dillon flinches when he draws his gun in the opening scene of the program. Some of the crewmembers were playing cards, and the gunners were asleep, all of us waiting for the phone to ring. The signal the mission had started. It was a long restless night. At 0020 the phone rang. We all sprang into action and raced to the ships. The last pilot CWO Greg Bucy answered the telephone and got the radio frequencies of the ground commander and coordinates of the mission.

As I got to the ship I untied it's blade, gave the clear signal and the pilot hit the starter. You could hear the whining of the turbine as it started spinning. You could hear the Tic! Tic! Tic! Of the igniters searching for fuel and the Whoosh of its ignition. As the RPM's increased you could hear the methodical singing of the blades as they gained momentum searching

for 6600 RPM. The gunners and crewchiefs are mounting the guns, and getting into their protective chicken plates. CWO Bucy finally arrived with the mission information and gets in and buckles up in his seat. It is time to Rock and Roll.

"Cu Chi Tower, Cu Chi Tower this is Diamondhead Light Fire Team on "The Beach" (Our designated portion of the flight line) "Scramble", the Fire Team leader CWO Hayne Moore broadcasts. "We are enroute Hoc Mon". "Be advised Diamondhead of heavy arty in the area" breaks in the tower. "You are clear to the south. Contact Hoc Mon Arty for approach to the area". Moments later we hovered out of the protective revetment and head south down the runway, the heavily loaded gun ships, frantically clawing at the air for translational lift. Soon we were on the way into the cool night. The lights of Cu Chi slowly fading away as we steadily gain altitude up to 1500 feet and level off. It should be but a short flight of 15 minutes to Mole City.

As the gunships cut through the darkness, the rhythmic popping of the blades gave the night a feeling of tranquility. This tranquility would be shattered moments later. As we approached the Oriental River just south of Go Dau Ha, still three to five clicks south of our objective an NVA .51 caliber anti aircraft gun opened up on the lead gunship. We had positioned ourselves slightly behind and to the north of the lead ship, so we had a front row seat. As the tracers ascended towards the lead ship they appeared to curve towards them, like chains of orange Christmas tree lights. Over the radio came a transmission "Taking fire, taking fire". CWO Larry King my (AC) instinctively had WO Roy Thomas (PP) reach up and pull the navigation light circuit breaker and go blacked out. We immediately rolled in and attacked the NVA .51 cal below with several sets of rockets and the doorguns as the lead ship broke hard to the right to avoid the anti-aircraft fire from below they also killed the navigation lights and went blacked out. This one pass seemed to silence the .51 so both ships still blacked out head back to the river.

"Diamondhead 20, this is Diamondhead 10", CWO Hayne Moore broadcasts, "go Diamondhead 10" CWO Larry Little replies. "We are at 1500 feet and are going to go steady dim on the nav lights. Suggest you stay blacked out and below us", "Roger that Diamondhead 10".

In the distance you could already see the eerie glow of the parachute flares fired by Artillery howitzers somewhere in the Vietnamese night, and the occasional ricochet of a .51 cal tracer high into the night sky. I thought to myself, "damn not them 51's again. I hate those things." If you got hit in the chicken plate it wouldn't even slow it down. It would make a thumb size hole going in and take out the whole back of your chicken plate exiting. If you got hit in the hand it could just rip off your whole arm.

As we got closer CWO Hayne Moore was back on the radio contacting the ground commander. "Recast Uniform one four, this is Diamondhead 10 Light fire Team, please advise situation", our ETA is five minutes. "Roger Diamondhead 10. We are getting the shit kicked out of us. We are surrounded and I don't know how many there are but they are everywhere, and we are in danger of being over run. We have enemy in the wire and on the north/east sides they are in the open. We are taking recoilless rifle fire along with RPG and automatic weapons. Be advised we have two LP's (Listening Posts) out one to the southeast about 200 yards in the tree line, and one to the northeast about the same." "Roger Recast Uniform one four". As we neared station, we could make out the automatic weapons fire. It was ferocious, red tracers going out, white and green tracers going in towards the perimeter, and the occasional streak of an RPG seeking out a bunker and it's occupants.

The night was hazy with all the smoke and dust in the air from impacting ordinance of the friendly artillery and rockets and mortars from the NVA. The glow from the flares made it a surrealistic vision.

As we orbited the battlefield, the fire Team leader "CWO Hayne Moore" tried to quickly access the situation on the ground, and to formulate an impromptu plan of attack. The entire perimeter was under siege, and it was paramount to assist the hardest hit portions as soon as possible. It was decided to split the fire team Diamondhead 10 would work the north side of the perimeter, and Diamondhead 20 would work over to the west and south sides. As we started our first run, and we started down and punched off one set of rockets, here came the damn .51's. They looked like orange basketballs and they just whizzed by inches from their mark. I thought, "that was way to close". My gunner and I hosed the position the best we could with the M-60 machine guns leaning out the doors and made a mental note of the location. As we broke right we were over the open area to the north and there were so many NVA soldiers it looked like a bunch of ants attacking a picnic. I don't care where I shot the M-60 I couldn't miss. There were too many of them. As we circled around and made another pass we expended all of our rockets, mini-gun ammo and 2000 rounds of M-60 door gun ammo from each gun in the open area. The M-60's were so hot they glowed cherry red and had a translucency to them. You could see the bullets going down the barrel.

"Recast Uniform one four, this is Diamondhead 20. We are fully expended and headed to rearm, we will be back ASAP". "Roger Diamondhead 20, just make it fast". With that transmission made, we nursed all the speed we could get out of the old Huey. The blades flailing at the air to get all the speed it could muster from the old girl, the deafening whine of the engine, and the whop, whop, whop of the blades shattered the night as we hurriedly flew toward the re-arm point at Tay Ninh since it was closer than Cu Chi. Fuel could wait for later. "Tay Ninh Tower, Tay Ninh Tower this is Diamondhead 20. After a short pause Tay Ninh Tower replies, "Roger Diamondhead 20, go" "We need clearance to the Tay Ninh re-arm point direct, ETA five minutes". "Roger Diamondhead 20 you are clear direct". In the distance I could make out the lights of Tay Ninh City. Just to the north would be the base camp. The air was cool and soothing as it rushed by the open doors, my nerves were rattled and for the first time I noticed I was drenched in sweat. The combination of the heat of battle, fear, and adrenaline had caused it. I, for a few moments as the adrenaline subsided could recollect what had just happened. This was the most intense battle of MY war. To say I wasn't scared would be futile, and a lie. The tracers had come up so fast and so often at times I had been afraid to breathe for fear of inhaling one. I thought to myself, I don't know if we will get out of this one, this is bad. Then I thought about the grunts on the ground. I wouldn't trade with them for a million dollars. Whatever I had seen from above was ten fold worse down there in the trenches. Somehow the thought of their plight made my situation acceptable. It was our job to get the grunts out of this, to see them through. They were our grunts. They were our sole purpose of living. We could never let them down.

As we were inbound to the re-arm point I noticed the Little Bear Counter Mortar ship had just finished refueling, lifted off and hovered over to the headquarters pad near the Division commo bunker. The engine had remained at flight idle, the crew had stayed on board except for CWO Wilhelm the AC who had went inside.

As we landed and shed our helmets and protective equipment there was a sense of urgency to complete the re-arming as quickly as possible. The Manchu's needed us desperately and we knew it. The pilots and crewchiefs humped rockets and

loaded them into their launchers while the gunners re-armed the mini-guns and door guns. Moments later our wing ship appeared out of the south and landed next to us in the re-arm point. They too would go through the same ritual of re-arming as we did. Little did we know, that this ballet would be played out over and over for the next seven hours non-stop. The Little Bear counter Mortar ship also joined us, hovering over from the Division commo bunker.

CWO Hayne Moore and CWO Larry King the Diamondhead 10 and Diamondhead 20 AC's, along with CWO Mitch Wilhelm the Little Bear AC assembled near the lister bag of drinking water that was at the re-arm point to map out the best way to support the Manchu's, and develop a plan to protect the Little Bear ship on this upcoming mission.

The briefing in the commo bunker was for an emergency re-supply of ammunition, which was being loaded by the re-arm point personnel. If we didn't get it to the Manchu's quickly they would be out of ammo and over run, which would mean hundreds of deaths. There was no possibility of putting additional troops in before daylight, so CWO Wilhelm talked to his crew, and understanding the dilemma and danger involved they all volunteered to make the ammo resupply

After kicking several scenarios around they decided to stack the ammo in a pyramid in both doors. The re-supply would be a challenge, since "Mole City" was laden with obstacles. There was a tall radio antenna and an observation tower near the center of the compound where the drop zone was to be concerned with, not to mention they would be going into the center of a blazing fire fight which would make it prohibitive to land so they would just come to a hover and kick the ammo out the door. This plan also created a problem; they were two men short to off load the ammo. The gunner and crewchief needed to man the guns for self defense.

Two young troopers from the re-arm point were busily loading the last of the ammo, when CWO Wilhelm walked up to talk to them. He asked them if they would mind going along to kick out the boxes when we got where we were going. Neither one had been in a helicopter before nor did they know anything about them, or the mission. They jumped at the chance and replied, "sure man, this ought to be a trip". Little did they know, this would be a trip to last a lifetime. They boarded the "Little Bear" helicopter and took positions crouched down behind the ammo boxes. CWO Wilhelm shouted to them over the whine of the turbine engine, "Stay hunkered down behind those ammo boxes until I tell you to, then just kick out the boxes and we will be out of there". There were no headsets or helmets to give the two troopers where the pilot could talk to them directly in flight, so he would have to relay the instructions via the gunner and crewchief. The pilots were gathered around discussing tactics as us crewmembers just stood back and listened to the plan. They were discussing the best way to pull off this re-supply. It was going to be dangerous on the re-supply ship. Almost like a suicide mission. I'm glad I wasn't on that slick tonight, and I felt really sorry for those kids from the re-arm point. They didn't have a clue what was going on out there in Indian Country

"Look Mitch, Larry and I have been out there all night", Hayne Moore stated.. "The anti- aircraft fire has been very heavy, we have taken care of most of the .51's and now it is mostly small arms fire that seems to be slowing some. If we come in from the north and hang a hard right and head west I will turn on my landing lights to draw the fire away from you as best I can, and Larry will cover your ass. It ain't a great plan but it is all we have. The Arty is pounding the east and south so we can't go there. The west is really Indian Country so we don't want to start from there."

Everyone thought about it for a minute, and couldn't come up with a better idea, so the consensus was "Let's do it".

We all headed for our ships and began the ritual of getting the chicken boards, helmets and other gear squared away, checked the door guns one final time and climbed aboard. I glanced again at my watch and it was just after 2:20 A.M.

The Little Bear ship left first as we had a few little things to attend to, but moments later we slowly lifted off into the night sky heading back to the inferno of "Mole City".

In the distance we could see a single light of the battle, a glow in the southern sky. The closer we got the glow began to separate itself into many little lights. The flares dropped by the Spooky gunship overhead, the artillery flashes, the red almost laser like stream of tracers coming Down from the mini-guns of the Spooky gunship, and the tracers going up at the aircraft. Through our headsets on the radio we could hear the din of battle raging in the distance. This just heightened the adrenaline flow coursing through our veins.

Over the radio we could hear the Little Bear ship coordinating the re-supply with the ground commander, and arranging for a temporary halt to the artillery fire missions. Moments later we were there at 1500 feet above the raging battle and joined the Little Bear ship in a clockwise orbit above the battle.

"Little Bear, this is Diamondhead 20", "go Diamondhead 20 replied the Little Bear pilot". "Pull out of this orbit and make a big swing to the northeast, we will join up there. Presently we are at 1500 feet enroute to that location. When we get linked up kill your navigation lights and get down on the deck and make your approach north to south. When you get parallel to the center of the Drop Zone make a hard right and we will escort you in. I will turn on my landing lights to draw fire away from you, then we will be blacked out on the way in." "Roger that Diamondhead 20".

The three ships started their southerly approach towards Mole City. The Little Bear ship just barely skimming the tree tops flanked on one side by Diamondhead 10. Diamondhead 20 was at 1000 feet and turned on his landing light. That drew and immediate response and the torrent of anti-aircraft fire was horrendous. He quickly turned off the Landing light and blacked out his navigation lights as he descended to occupy the left flank of the Little Bear ship. The three ships in tandem made the right turn inbound to Mole City.

The gunships barely seventy-five feet on either side of the Little Bear ship blazing away with their rockets and door guns, the Little Bear ship withholding fire for fear of hitting one of their escorts. In the distance a flare was fired to mark the Drop Zone, with a little adjustment the re-supply ship was lined up on the Drop Zone. As they neared the outer perimeter, the gunships peeled off to the right and left leaving the re-supply ship unprotected and on her own. The intense small arms fire hammered the lone ship on her final hundred-yard journey. You could hear the ting-ting-splat of the enemy rounds piercing the thin skin of the aircraft.

On short final to the Drop Zone CWO Wilhelm was in command of the ship, but WO Don Rodgers had his hands and feet on the controls also in case CWO Wilhelm should become shot or killed. His job was to also monitor the gauges in case some vital component of the aircraft was hit with hostile fire. Within seconds the Little Bear ship was over the Drop Zone and had come to a hover just a few feet above the ground. Through the intercom CWO Wilhelm screamed to the crewchief and gunner to tell the two guys in the back to kick out the ammunition boxes, which they did frantically. It took but a few seconds, but with the murderous hail of enemy fire it seemed like a week.

As quickly as they had arrived, they were gone. As they crossed the perimeter wire through a hail of enemy small arms fire WO Rodgers broke in on the intercom "The engine oil pressure is dropping and the engine temperature is rising!"

It was decision time, either put it down immediately in Indian Country in the black of night and 10 miles from any friendly troops, or hope they can make it back to Tay Ninh, since it was the closest friendly installation. After discussing the dilemma quickly they voted to try and make Tay Ninh and put as much distance as possible on this little piece of "Hell". As the blades frantically beat the air into submission, and the whining of the engine reached a deafening roar the gauges continued to worsen. Soon the lights of Tay Ninh were in sight. Praying as they went, they soon crossed the perimeter wire and put it on the nearest landing pad that they found, which was the re-arm point. After shutting the engine down and thoroughly checking out the problem of the gauges, a round had severed the main oil engine line. They had been flying with no oil for a while. They all were relieved, and very lucky to have made it back in one piece. The ship was shot full of holes, but just that one lucky shot had hit anything vital.

Through their heroic deeds the Manchu's had the needed ammunition to withstand the NVA onslaught. Back at Mole City CWO Moore and CWO King had decided to keep the fire team split into two separate ships and fight individually as there were too many targets, and the Manchu's needed suppression on the entire perimeter. We would assume our previous position on the west and south with CWO Larry Kings Diamondhead 20 gunship. CWO Hayne Moore and the Diamondhead 10 gunship would again work the area to the north.

The Little Bear ship had been gone but seconds as we continued to expend our ordinance on the enemy below, after two passes we were totally expended and we to were in route to Tay Ninh to rearm and refuel. CWO Moore contacted the ground commander, and let him know our intentions. "Recast Uniform one four, this is Diamondhead 20. We are fully expended and headed to rearm, we will be back ASAP". "Roger Diamondhead 20, just hurry".

Several Minutes later looking over the pilot's shoulder through the windshield, the soft red glow of the gauges breaking up the darkness of the cockpit I could make out our lead ship. It's red and green navigation lights evident, along with the incessant blinking of the red rotating beacon. In the distance the discernable glow of Tay Ninh City was quickly approaching.

"Tay Ninh Tower Diamondhead 10", "go Diamondhead 10". "Request straight in to POL, need a little gas in this old beater". "You're clear at your discretion Diamondhead". Descending into the POL area we turned on our landing lights to locate the pumps. Having found them with a little effort, both old Huey's flared and settled slowly to the ground. The engines running at flight idle, the crewchiefs jumped out, removed the gas cap and started the refueling process. It would take but a few minutes. The heavy gunships could only take on 1000 pounds. If we put more fuel, and a full load of rockets and ammo they would never get off the ground with their underpowered engines.

When we had our 1000 pounds of JP-4 on board, we obtained clearance from the tower to hover the few yards over to the re-arm point to begin our re-arming ballet once again. This time we had some help. The local rearm point guys that had been loading the ammo in the Little Bear ship gave us a hand building the rockets, and helped us tote them, and place them in their launchers. We were exhausted, hot, and sweaty.

The lister bag was once again the center of attraction. We couldn't get enough water tonight to kill the thirst. We talked about the re-supply run as the rearm point guys finished loading the rockets, and what a crazy bunch of bastards they were. To pull that off in one of the biggest fire fights of the war.

Soon we were climbing back aboard and headed back to the war. There was silence in our souls as we had a chance to gather our inner most thoughts, and dwell on them for just a few moments, to have discussions with god and make silly promises, to see images of our family in our mind, and contemplate our fate to come.

In the distance we could see the familiar flares casting their eerie light on the landscape below. We could make out the navigation lights of an Air Force Forward Air Controller in his OV-10 Mohawk, and a Command and Control UH-1H slick that had one of the division upper level officers aboard to supervise the battle. They had arrived on station during our absence, and were orbiting counter clockwise high above the action below.

As we neared the battle the intensity of the ricocheting tracers became more distinct caroming high into the air. You could make out explosions around the perimeter of the tiny enclave. It was going to pick up right where we left off. I just gritted my teeth, checked the M-60 to make sure it was ready, and thought to myself, "You want me screw it come and get me you little bastards".

"Recast Uniform one four, this is Diamondhead 20, please advise situation", ETA two minutes. "Roger Diamondhead 20." "Charlie has broken through and taken over three bunkers on the north side and they are in the wire. I will mark our position with a strobe light. It will be the bunkers to the west of the light. Just start there and go anywhere you want. Get them suckers off our back".

"Diamondhead 20 this is Issue 15", "Roger Issue 15 go". I have a flight of two F-4's inbound now ETA 10 minutes. I suggest you stand off to the north when they drop these hot potatoes. They will be making their pass from west to east". CWO Larry King replied, "Roger that Issue 15, just call again when they're inbound"

We settled in on the west side and from 1500 feet began our run from the north punching off rockets in sets of two as we watched the tracers going in all directions below. The pungent odor of cordite was heavy in the Huey as we watched them impact in the wire, our M-60's finding their marks on the enemy caught in the open with nowhere to hide.

The roaring sound of the mini-guns cut through the night as their laser like trajectory-belched fire on the unsuspecting enemy below. It was like a replay of the previous trip the enemy tracers headed skyward searching for their tormentors our door guns again glowing cherry red and raining bullets on the NVA below. The NVA were everywhere but we had slowed the onslaught. At the end of the run we searched for altitude and again circled around to make another run. Once again the rockets found their marks in the groups of NVA. You could see them fall in groups some blown into body parts yet others were nailed to the ground and posts in the wire from the fleshettes.

We were under constant small arms fire, and The Manchu's were in a battle for their lives. The artillerymen with the Manchu's had lowered their 105's to chest high and were shooting beehive rounds point blank into the faces of the enemy. "Diamondhead 20 this is Issue 15, flight of two F-4's are on location and beginning their runs west to east". "Roger that Issue 15 CWO King replied". We immediately held off to the north. As the F-4's came by all you could hear was a hiss of

the fuselage cutting through the air, then the roar of their engines as they screamed by and dropped the napalm canisters which made a ball of fire that went 200 feet or more into the air and engulfed the landscape for several hundred yards into a fiery inferno. The NVA that were caught in the open would be fried to a crisp.

This was the scenario until 4:15 in the morning. Rearm, refuel return to the perimeter of Mole City. At 4:15 we spotted 50 to 60 NVA southwest of the friendlies trying to escape back toward Cambodia. We rolled in with the rockets and door guns and cut them to ribbons halting their impromptu retreat. After expending our rockets we orbited the area and let the door gunner shoot up what ammunition he had left into the fleeing throng of NVA. When the door gunner was expended on ammo, the C and C ships door gunners took over while we returned once again to Tay Ninh to rearm and refuel. At daybreak contact was lost and we flew around the pattern and inventoried the damage it was a sobering sight. The fleshettes had nailed NVA to the posts in the wire, to trees and anything else including the ground. Bodies were strewn everywhere, it seemed like hundreds of them scattered about with a multitude of weapons both personal and crew served. The napalm had fried many alive.

We remained on station until the wounded had been removed, and provided cover for the dustoffs. When it was all done, we had been in continuous action for 7 hours, and had played a decided role in the outcome of the battle for Patrol Base Mole City. It will be hard to ever forget.

The battle claimed 106 NVA lives that were counted and many more had been drug off the battlefield from the 272nd NVA regiment, and the 9th NVA Division. Bodies of dead NVA soldiers would continue to show up for days buried in shallow graves throughout the area. The Manchu's had been hit with the full force of a 1500 man NVA regiment. Out manned three to one they had fought with great courage and had won a monumental battle.

Operation Starlite

Official USMC After Action Report

On August 15 1965 the Marines received their first break. A deserter from the Vietcong 1st Regiment in-formed General Thi of a major build-up of enemy Marine Force units in the Van Tuong village complex, twelve miles southeast of Chu Lai along the coast. The VC goal was to achieve a great psychological victory by surprising the isolated marine base at Chu Lai in the first major engagement between American and enemy forces.

General Thi, informing none of his own subordinates, immediately relayed the information to General Walt. Marine intelligence had by this time received sufficient evidence on its own to corroborate the deserter's story. Colonel Edwin Simmons, newly arrived operations officer for III MAF, recommended a "spoiling attack" to prevent the anticipated VC strike against Chu Lal. The timing was fortuitous. The arrival of reinforcements at the Chu Lai base on August 14 enabled Walt to reassign two experienced combat battalions, 2d Battalion of the 4th Marines (or 2/4), and 3d Battalion, 3d Marines (3/3) to the command of Colonel Oscar F. Peatross, commander of the 7th Marines.

In addition, another marine battalion, afloat offshore, served as a reserve force that could be thrown into the battle when and where necessary. Finally, two U.S. Navy ships in the area, the U.S.S. Galveston and U.S.S. Cabildo, could provide offshore fire support. The operation, code-named Starlite,

would be a classic marine encounter, combining land and sea forces, including an amphibious landing and coordination with the navy. It would be a very different battle for the Vietcong, accustomed to fighting with their backs to the sea, knowing that against South Vietnamese forces the water could always be used as an avenue of escape.

Conducting an aerial reconnaissance of the operational area, which was about ten miles south of Chu Lai, Colonel Peatross found that the terrain was dominated by sandy flats, broken by numerous streams and an occasional wooded knoll. The scattered hamlets possessed paddy areas and dry crop fields. While airborne, Peatross selected the assault beach as well as three landing zones among the sand flats, about one mile inland from the coast.

Operation Starlite began inauspiciously at 10:00 A.M. on August 17, when Company M of the 3d Battalion, 3d Marines, took a short ride south of Chu Lai before marching four miles farther south and camping for the night just north of Van Tuong.

They met only light resistance and, since marine patrols in the area had been frequent, aroused no suspicion. Seven hours after Company M departed, the rest of the 3/3 and the command group embarked on three amphibious ships which, after a decoy maneuver, arrived in the area of the landing beach at five in the morning of August 18.

Fifteen minutes before the 6:30 A.M. H-hour, marine artillery and jets began to pound the three landing zones west of Van Tuong, LZ Red, LZ White, and LZ Blue (see map). Eighteen tons of bombs and napalm were dropped, adding to the firing of 155MM guns. At H-hour the troops of the 3/3 began their beach assault and pushed inland as planned.

At 6:45 A.M. Company G of the 2/4 landed at LZ Red, while Company E landed at LZ White and Company H landed at LZ Blue forty-five minutes later. The 3/3 approached Van Tuong from the south, while companies E, G, and H of 2/4 were to move in from the west. Company M blocked any retreat to the north by the VC, and the navy ships prevented an escape to the east via the South China Sea. Van Tuong and the Vietcong were surrounded. For the most part, the marines met little resistance as they closed in, but fierce fighting broke out near LZ Blue.

In the Vietnam War, intelligence was never precise and Company H had landed right in the middle of the Vietcong 60th Battalion and found itself surrounded. The VC let the first helicopters land without incident, then opened up on succeeding waves, a tactic they had used successfully against ARVN.

Three U.S. Army UH-1B helicopter gunships were called in to strafe the VC strong hold, a small knoll just east of LZ Blue called Hill 43. (Hill were given numerical distinctions according to the height in meters.) Meanwhile the infantry protected the LZ until the full company had landed. Company H commander, First Lieutenant Homer K. Jenkins, ordered an assault on the hill by one platoon, but it quickly stalled. Regrouping his men, and realizing that he had happened upon a heavy concentration of VC, Jenkins ordered in strikes against **Hill 43** and then assaulted it with all three of his platoons. Reinforced by close air support and the marines overran the enemy position, claiming six KIA at one machine-gun position alone. Hill 43 was taken.

Heavy fighting also took place in the village of An Cuong (2) approximately two miles northeast of Hill 43 when two platoons of Company I attempted to clear the village of enemy snipers. After an initial setback, the company's reserve

platoon was thrown into battle and the troops cleared the village. Company I's commander, Captain Bruce D. Webb, was among those killed in the early fire, and his company executive officer, First Lieutenant Richard M. Purnell, assumed command of the successful counter assault. Purnell counted over fifty enemy bodies when the fighting ended.

One (I) Company squad leader, Corporal Robert E. O'Malley, single-handedly killed eight Vietcong that day and became the first marine to win the Medal of Honor in Vietnam. (Later, a posthumous award was made to Captain Frank S. Reasoner, killed in action in July.)

The most dramatic fighting of the day was the result of another favorite VC tactic : ambushing a relief column. between 11:00 AM. and noon Major Andrew G. Comer sent a resupply column to aid beleaguered Company I. The column, which included three flame tanks, the only tactical fire support available, quickly lost its way. Suddenly, VC recoilless rifle fire and a barrage of mortar rounds rendered the tanks useless in providing fire support. Using only their small arms, the entrapped marines attempted to hold the advancing VC infantry.

The marine radio operator panicked and, according to Major Comer, "kept the microphone button depressed the entire time and pleaded for help. We were unable to quiet him sufficiently to gain essential information as to their location." Finally Comer organized a rescue mission, led by the already exhausted Company I and including the only available M48 tank.

By luck, one of the trapped flame tanks managed to break through the VC infantry and return to Comer's command post. The crew chief was able to lead the rescue mission to the location of the column. Approaching the besieged supply column, the relief force quickly drew heavy fire. Recoilless rifle fire knocked out the M48.

Within minutes five marines lay dead and seventeen wounded. Comer called for artillery fire and air support, and enemy fire soon sub-sided. As Comer put it, "It was obvious that the VC were deeply dug in, and emerged above ground when we presented them with an opportunity and withdrew whenever we retaliated or threatened them."

The heavy fighting of the first day proved to be the only major contact of the seven-day operation. For Companies H and L it had been an exhausting time. Together the two companies had sustained casualties amounting to over 100 of their original 350 men, including 29 dead, but in return they claimed 281 VC dead.

Aftermath of victory

On August 19, Starlite's second day, sporadic and isolated fire came from enemy soldiers covering their main force's retreat, but organized resistance had ended. The operation extended for five more days with the marines, now joined by ARVN troops, conducting village-by-village searches.

At its conclusion the marines could claim 573 confirmed enemy dead and 115 estimated, while suffering 46 deaths themselves and 204 wounded. The battle had been won by overwhelming American firepower.

Artillery support from Chu Lai had fired over three thousand rounds while the navy ships had supported the infantry with 1,562 rounds, sunk seven sampans apparently carrying fleeing VC, and pinned down one hundred enemy soldiers attempting to escape from the beach. Moreover, the marines had benefited from the close coordination of tactical air power, a coordination that ARVN never seemed to achieve.

General Walt later commented that air support was used "within 200 feet of our pinned down troops and was a very important factor in our winning the battle. I have never seen a finer example of close air support." The marines had won by doing what American troops do best coordinating their firepower on land, sea, and air. But most important, the marines had learned at least one valuable lesson from Starlite.

At General Thi's insistence no ARVN commander was even aware of the planned operation. At the last moment General Hoang Xuan Lam, whose men augmented the marines during the second day of operations, was informed of his role. Even American reporters did not arrive on the scene until the second day. As a result the VC were caught by total surprise. Future operations, similar in nature to Starlite, were much less successful. For political reasons the marines had to inform ARVN of future operational plans and thereby risk the likelihood of this knowledge somehow reaching the enemy.

The experience taught many minor lessons as well. The planned ration of two gallons of water per man each was insufficient in the heat of Vietnam. The M14 automatic rifle proved too heavy and bulky, especially for support troops who often crammed into small personnel carriers and the search began for a lighter, more maneuverable basic weapon.

Finally, for the marines the operation dramatized the complexity of fighting a war among civilians. Publicly the marines declared that only fortified enemy villages were destroyed, but the official "after-action" report stated: "Instances were noted where villages were severely damaged or destroyed by napalm or naval gunfire, where the military necessity of doing so was dubious."

Perhaps the most important outcome of Operation Starlite was its psychological lift. In the first major engagement between American troops and Main Force Vietcong soldiers the Americans had been victorious.

Had the American forces lost—a real possibility given their inexperience—the effects might have been severe indeed. The old tactics of the VC, which had worked so well against ARVN, failed to rout the marines.

So the enemy learned a lesson as well; it would be four months before they would again stand to fight against the Marines. On December 9th 1965, two Marine Battalions (3/3 and 2/7) would again fight for this same ground.



The Amateur Radio Newsline™ FAQ

About Us

Q: What is the Amateur Radio Newsline?

A: Amateur Radio Newsline™ is a free service to the amateur radio community. We produce a weekly audio news bulletin called a "QST" or "bulletin of interest to radio amateurs" that is delivered by a downloadable MP3 audio file from our website and over an automated dial-in telephone line. It's operations are primarily supported by voluntary donations from individual amateurs and amateur radio clubs. We are a 501 (c)(3), Federal tax-exempt corporation and most contributions made to us are tax deductible. (Please check with your tax advisor if you have any questions regarding such donations.)

Q: Whom are you associated with?

A: We are totally independent. Amateur Radio Newsline™ is not directly associated with the former Westlink Report Newsletter (no longer in production), the ARRL Letter, or any organization or amateur radio lobby group.

Q: Tell me about your newscast.

A: Amateur Radio Newsline™ produces a weekly newscast of interest to radio amateurs worldwide. The bulletins conform to all sections and codes as outlined under the United States FCC Part 97 Amateur Radio Service rules regarding the legal means of amateur radio operators issuing "QST's" or "Bulletins of Interest to All Amateurs." We differ only in format and follow a more traditional radio "spot news" format. Whenever possible, we attempt to bring you the voices of those in the news.

Q: Who are the people we hear in your newscast?

A: All participants in the production of the Amateur Radio Newsline™ bulletins are professionals or trainees in the news media who have volunteered their time and skills to help prepare each weekly bulletin.

Financial Matters

Q: How is Amateur Radio Newsline funded?

A: As noted above, Amateur Radio Newsline™ is a 501(C) (3) tax exempt corporation operating as a public service. It primarily survives on contributions made by listeners (and readers of the text version) such as you. Any shortfall has traditionally been paid out of pocket by our producer Bill Pasternak, WA6ITF.

Q: How big of a paid staff do you have?

A: Amateur Radio Newsline™ has no paid staff and all funds donated go directly to the defraying operating costs.

Production Format

Q: What is the "style" of your audio newscast?

A: Amateur Radio Newsline™ stories include the voices of the newsmakers themselves so that you can more easily understand the effect that the story will have on all radio amateurs. If you have ever heard the old CBS Network Radio News or NBC News on the Hour then you will be familiar with the format utilized by Amateur Radio Newsline™, with the exception that the information we provide is strictly directed to radio amateurs and communications hobbyists.

Distribution

Q: When do you transmit Amateur Radio Newsline on the air?

A: Amateur Radio Newsline™ does not directly sponsor any on-air operation. We have no transmitting facilities of our own on any band: HF or VHF / UHF. We are producer / distributors only.

Q: If you do not transmit your news bulletin, how can I hear it?

A: Amateur Radio Newsline™ is delivered primarily by MP3 Internet Audio at our <http://www.arnewline.org> website. Since some Amateur Radio Newsline™ bulletins contain a lead message to the issuing bulletin station called a "Closed Circuit Advisory" we recommend that bulletin stations pre-record the service and retransmit only that part which constitutes the text of the service itself. This is easily accomplished by either downloading the MP3 file at www.arnewline.org and recording Amateur Radio Newsline™ for delayed retransmission on your local repeater (or net frequency.) This also permits easy integration of Amateur Radio Newsline™ into an already established net or on-air amateur radio information service.

Newscast Release Schedule

Q: When do you update your newscast?

A: The website audio and text feed is usually update late Thursday or early Friday of each week – Eastern time (EST or EDT depending on time of year.)

Technical Stuff: What are your technical parameters?

A: The weekly Amateur Radio Newsline™ Amateur Radio bulletin is formatted and engineered primarily for distribution on VHF / UHF amateur repeaters and by FM simplex bulletin stations. Audio processing is specifically contoured for these delivery media, and was not meant for distribution using SSB.

Q: Do you have a shorter or longer version of your weekly bulletin to fit our particular needs?

A: No. We produce a "one size fits all" audio bulletin. You either use it as provided or not at all.

Legal Stuff

Q: Who can retransmit the ARNewsline audio?

A: In the United States, ARNewsline can be re-transmitted by any licensed radio amateur as long as his/her station operation conforms to Sections 97.111 and 97.113 regarding one-way transmissions. Our service may be retransmitted by commercial and non-commercial FCC licensed broadcast entities. It may also be retransmitted over the Internet as long as the actual audio file used is the one on our website.

Q: Can I excerpt an ARNewsline bulletin?

A: No, all bulletins must be retransmitted in their entirety with the exception of any "Closed Circuit Advisory" at the beginning or end of a given newscast. A "Closed Circuit Advisory" is a message to the bulletin station replaying the news bulletin and is not necessary to on-pass to the wider audience.

Q: I'm a skilled audio editor. Can't I shorten the newscast to fit our repeater (or net) Needs?

A: Because we are the copyright holders and we say you can't. It's a way of protecting all from frivolous litigation if in the process of re-editing a story, the meaning or intent of a story is changed and leads to litigation.

Q: Why can't I do that?

A: If you decide to violate this rule and get sued by some irate individual who believes you have exposed him/her to ridicule, do not come crying to us. You made the conscious decision to violate this important rule and we cannot (and will not) be involved in your legal defense or become a "party to" such litigation

Other Things Amateur Radio Newsline™ Does

Q: Tell me about the Young Ham of the Year Award that you sponsor.

A: Amateur Radio Newsline™ along with Yaesu USA, CQ Publishing and Heil Sound Ltd. is a co-sponsor of the Amateur .

Radio Newsline Young Ham of the Year Award program. The award was created in 1986 by ARNewsline™ founder Bill Pasternak, WA6ITF. Full information on this program is [here](#).

Q: What is your connection to the Roy Neal K6DUE Amateur Radio Mentoring Project?

A: Amateur Radio Newsline™ created and co-sponsors with the Quarter Century Wireless Association the Roy Neal K6DUE Amateur Radio Mentoring Project. This is a program designed to take newly licensed radio amateurs and place them one-on-one with veteran hams so that they may learn the traditions and operating skills that no classroom or home-study environment can teach.

Q: Do you supply speakers for radio clubs or conventions?

A: Yes. We do supply speakers and/or structured programs on a variety of topics including explaining who we are and how we produce our newscasts.

Q: How much do you charge to come to our club or convention?

A: Only expenses for travel, food, lodging and miscellaneous expenses. There are no honorarium fees

Contact Information

To contact Amateur Radio Newsline, please click on the "CONTACT" tab.

Thank-You

We hope that you and all amateur operators in your area will enjoy Amateur Radio Newsline™. Please let us know how we can serve you better. E-mail your suggestions to new-sline@arnewsline.org

Xenia Hamvention News

DAYTON HAMVENTION DX HOSPITALITY SUITE.

The Northern Ohio DX Association (along with Janeen Hire, W8ZET) will once again sponsor a Hospitality Suite (21st year) at this year's Dayton Hamvention. It will be in Suite 1011 on the 10th floor of the Crowne Plaza Hotel on Thursday, Friday and Saturday evenings (Look for signs!). All DXers/Contesters are welcome. Munchies and refreshments will be available. Come and meet the members and friends of NODXA.

DAY-XENIA 2017 CONTEST ACTIVITIES.

Tim Duffy, K3LR, has put together a short video on the Contest University and other contest related activities at Dayton-Xenia 2017. You can access the video on the World-Wide Radio Operators Foundation (WWROF) at the following URL link: <http://wwrof.org/.../k3lr-contest-university-2017-dayton-cont...>

WATCH HAM NATION AND CTU FROM DAYTON.

Tim Duffy, K3LR, reports: If you are not attending Dayton this coming week - here are a few interesting Dayton live events that you can watch on the Internet from anywhere. On Wednesday, May 17th at 9 PM EDT Ham Nation will be LIVE from the Crowne Plaza Contest Super Suite. Ham Nation is led by Bob Heil, K9EID, and along with Val Hotzfeld, NV9L this should be a very entertaining live show with guests from the Super Suite audience.

To watch Ham Nation LIVE - go to this link on Wednesday, May 17th at 9 PM EDT -- <https://twit.tv/live>

You can watch the recording of the "Ham Nation at the Crowne Plaza" show starting on Thursday morning (day after the live show) - go here: https://www.youtube.com/playlist?list=PLFKUe65yQy_vCT9kiubMkzZ6LQvESZn80

Thanks to Icom America, selected sessions of 2017 Dayton Contest University (CTU) will be shown LIVE on Thursday, May 18th starting at 8 AM EDT and lasting until 5 PM EDT. The CTU talks that will be shown LIVE are those in SALON ABCD or SALON B. You can see the CTU course times and topics (look for SALON ABCD or SALON B). See the PDF here: <https://www.contestuniversity.com/.../2017-CTU-Classes-rev-5...>

To watch the Icom LIVE feed from Contest University in Dayton go to <http://contestuniversity.com> and click on the CLICK HERE button under the home page photos - next Thursday morning at 8 AM EDT.

There will be CTU recordings (these LIVE sessions) posted on the CTU website by Icom a few weeks after CTU.

More details about Contest Super Suite and Contest University are here: <http://contestsupersuite.com> and <http://contestuniversity.com>

DAY-XENIA FLEA MARKET HOURS (General Public/Note The Change). From the Hamvention schedule, there is an interesting change from previous years -- This year the flea market is scheduled to open to the general public at 9:00 AM, rather than the 8:00 AM opening that has been in practice for many years.

OPDX
(southgate)



Next Regular Meeting

The next meeting will be on **Thursday, May 25, 2017**, 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. **May is Auction Night !**

Meeting Schedule:

June 29th, 7 pm.

Please do not call the church for information!

Club Nets

Please check in to our nets on Friday evenings.

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

Visit our website at: www.w9rh.org

Or phone (414)-459-9741

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

Tick Removal

A nurse discovered a safe, easy way to remove ticks where they automatically withdraw themselves when you follow her simple instructions. Read this one as it could save you from some major problems.

Tick Removal:

Spring is here and the ticks will soon be showing their heads. Here is a good way to get them off you, your children, or your pets. Give it a try.

Please forward to anyone with children, hunters or dogs; or anyone who even steps outside in summer!

A School Nurse has written the info below--good enough to share--and it really works!

"I had a pediatrician tell me what she believes is the best way to remove a tick. This is great because it works in those places where it's sometimes difficult to get to with tweezers: between toes, in the middle of a head full of dark hair, etc."

"Apply a glob of liquid soap to a cotton ball. Cover the tick with the soap-soaked cotton ball and swab it for a few seconds (15-20); the tick will come out on its own and be stuck to the cotton ball when you lift it away. This technique has worked every time I've used it (and that was frequently), and it's much less traumatic for the patient and easier for me.."

Unless someone is allergic to soap, I can't see that this would be damaging in any way. I even had my doctor's wife call me for advice because she had one stuck to her back and she couldn't reach it with tweezers. She used this method and immediately called me back to say, "It worked!"

Pass this on.....everyone needs this helpful hint.

VE Testing:

April 29th, 9:30am— 11:30am

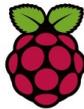
No testing: June, August or December

ALL testing takes place at: Ham Radio Outlet 5720 W. Good Hope Rd. Milwaukee, WI 53223

Area Swapfests

June 4th, [Starved Rock Radio Club Hamfest and Hobby Show](#) Location: Princeton, IL
Type: ARRL Hamfest **Sponsor:** Starved Rock

June 18th, [Six Meter Club of Chicago 60th Annual Hamfest](#) Location: Wheaton, IL **Type:** ARRL Hamfest **Sponsor:** Six Meter Club of Chicago, Antique Radio Club of Chicago and Midwest Classic Radio Net Hamboree **Website:** <http://www.K9ONA.com>



MRAC Working Committees 100th Anniversary:

- Dave—KA9WXN

Net Committee:

- Open

Field Day

Dave—KA9WXN, Al—KC9IJJ

FM Simplex Contest

- Joe - N9UX
- Jeff - K9VS

Raffle

- Tom - N9UFJ

Newsletter Editor

- Michael-KC9CMT

Newsletter Proofreader

- Pancho- KA9OFA

Webmaster

- Dave, KA9WXN
- Dale, AB9DW

Refreshments

- Open



Welcome

Membership Information

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

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

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

Address correspondence to:

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



Email may be sent to: w9rh@arri.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)

Chatter Deadline

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

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

or by Post to:

Michael B. Harris

807 Nicholson RD

South Milwaukee, WI 53172-1447

Milwaukee Area Nets

Mon.8:00 PM 3.994 Tech Net

Mon.8:00 PM 146.865- ARRL Newsline

Mon.8:00 PM 146.445+ Emergency Net

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

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

Mon. 8:45 PM 147.165- ARRL Audio News

Mon. 8:00 PM 442.875+ WIARC net also on EchoLink 576754

Mon. 8:30 PM 146.820 Waukesha ARES Net —

on the 1st, 3rd, and 5th Monday of each month.

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

Saturday Night Yaesu Fusion Net 7:00 P.M., W9RH Repeater, C4FM digital mode, using "DN", digital narrow mode

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

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

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

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

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

Wed. 8:00 PM 28.365Mhz 10/10 International Net

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

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.

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

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

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

Thur. 8:00 PM 443.800+ Tech Net

Thur. 9:00 PM 146.910+ Computer Net

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

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

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

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

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

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

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

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

Sun 8:00 PM 146.910+ Information Net

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

Sun 9:00 PM 146.910+ Swap Net

Minnesota/Wisconsin Yaesu System Fusion, Wires-X Technical Net.
Monday Evenings 7:30 P.M. Local Time.

Sponsored By

BARS -Bakken Amateur Radio Society.

**Where: On the MRAC repeater,
145.390MHz, Offset -600KHz, PL Tone encode of 127.3.**

The Net is carried via a RF Node Link to Wires-X Room (21493) .

The net is held in the Digital Narrow (DN) mode.



**Memorial
Day**
*Never Forget
Ever Honor*