



PCARA Update



Volume 8, Issue 6

Peekskill / Cortlandt Amateur Radio Association Inc.

June 2007

Drills and bugs

PCARA participated in a MCI (Mass Casualty Incident) Drill on May 5, 2007 at the Buchanan-Verplanck School, which was organized by the Town of Cortlandt and the Cortlandt Community Volunteer Ambulance Corps. The scenario was one of a multi-vehicle accident involving a busload of senior citizens out on a day trip, followed by an explosion and fire at a theatre full of young people attending a concert.

Representing PCARA were Joe, WA2MCR, Malcolm, NM9J, Bob, N2CBH, and myself. Also present was Rob Kantor, N2TSE Public Service Director of WECA. I arrived at the school at 08:00 hrs with my "handy-dandy radio station in a toolbox." There were already a lot of people getting made up for their roles as victims. A bit before 10:00 hrs Bob, N2CBH drove over to the Buchanan Public Works Garage just down the street from the school, to provide supplemental communication services at the scene of a motor vehicle accident involving a busload of senior citizens. Shortly after the accident scene was under control, Bob was released and returned to the school. About this point Joe, WA2MCR headed over to Cortlandt Town Hall on Heady Street to set up the radios at the EOC. We successfully established communications between the incident scene and the town EOC.

Chirping fire alarm enunciators and flashing strobes announced the start of the second phase of the drill. Within a couple of minutes I could hear the alarm being dispatched by 60-Control on the scanner. A few minutes later, enough fire hardware began to roll in to make you think you were at a Fourth of July parade! I turned my attention to the radio for just a moment, and when I turned back, half a dozen NYS Trooper cruisers had arrived. It was all very impressive and very professional. As the scene was evaluated by the first responders and more alarms were called in, more and more apparatus responded from towns all around the area. I even saw some old friends from PCVAC.

Bob, N2CBH, Rob, N2TSE and myself were at the scene maintaining communication with Joe, WA2MCR and Malcolm, NM9J at the EOC. As the drill progressed and unfolded, entropy and chaos naturally increased. We were getting requests from the EOC for status



Greg KB2CQE outside Buchanan-Verplanck Elementary School, ready for the May 5 drill.

updates. At one point the EOC requested that Incident Command phone the EOC, and provided telephone numbers to call. A while later the EOC called us and said that they had not yet heard from the Incident Commander on the phone. We relayed this to the IC, who informed us that he was unable to obtain cellphone service from the incident scene, and was unable to contact the EOC. So for the remainder of the drill (you guessed it), all communications between the EOC and IC was by **amateur radio**.

Bitten by the bug!

This year Field Day 2007 will be held on the weekend of June 23-24, 2007. To sign-up and to find out where Field Day will be held this year (yes we're still trying to figure it out), come to the June meeting at Hudson Valley Hospital Center.

I look forward to seeing each of you at the June 3rd meeting, at 3:00 p.m. at HVHC.

- 73 de Greg, KB2CQE

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Adventures in DXing

- N2KZ

Sneaky Den!

It was quite a day in May. The PCARA fox hunt commenced at 3 p.m. at the Beach Shopping Center in Peekskill. Ray, W2CH and Marylyn, KC2NKK took attendance. Their car was equipped with a new four-antenna Ramsey radio direction finding unit we all admired. Will, KC2FYY and his brother Jason, KC2KIX were also well equipped with serious direction finding gear including a tape-measure Yagi. My daughter Sarah and I just barely made it, rolling in at about 2:58 p.m! Sarah had my trusty Radio Shack scanner to listen for the broadcasts using a mag-mount whip on our car's roof. My Icom IC-T7H HT was ready, attached to my three-element Yagi left over from my days at ABC Wide World of Sports. A Radio Shack TV attenuator became my RF gain control thanks to a handful of adapters. After a brief conversation with our fellow hunters we were ready to go!

One of the fox twins, Malcolm, NM9J began to transmit at the stroke of 3 p.m. A huge signal reached us on 146.565 MHz FM simplex. All of us found immediate bearings to the northwest. As soon as the fox's transmission was over, we zoomed out of the Beach Shopping Center parking lot in pursuit. We didn't hear the voice of second fox, Joe, WA2MCR until much later in the hunt.

This was Sarah's first fox hunt and she did a terrific job listening for clues and navigating with our map. Our strategy was to think like the foxes and try to guess where they would hide logically. Our first try was the elementary school at the end of Horton Drive. We saw no fox but received a tremendous signal still to the northwest. Since Malcolm mentioned water and wood as clues, we journeyed around to the other side of the Bear Mountain Parkway and snooped around Oakwood and Ridgewood Drives situated near a reservoir. We were chasing our red tails!

It was approaching 3:30 pm. We wandered back onto the Bear Mountain Parkway and quickly off again onto Highland Avenue making a right onto Dogwood Road. Sarah and I circled Radio Terrace, the former studio site of WLNA, and came back down the hill heading for The Reef restaurant. Now the fox was really weak and our bearing seemed to be east! Sarah and I quickly tried running down to a little park at the base of Main Street in Peekskill near the Metro-North tracks. We saw an Amtrak train roll right by us, but no fox. Our bearing was now due north!

We rushed back to the area near Sprout Brook Park for further investigation. Every nook and cranny of

the long park was searched. Sarah and I even poked into the woods at one point. The N2KZ-mobile was even seen cruising Continental Village for a short period of time. We reverted back to Sprout Brook Park. With a strong signal on the foxes' harmonic frequency, 439.695 MHz, we were convinced the fox was hidden in the parking lot. Sarah held our scanner as we peeked inside every single car! Nothing found, we waited for the last transmission entertained that Malcolm and Joe had done such a good job.

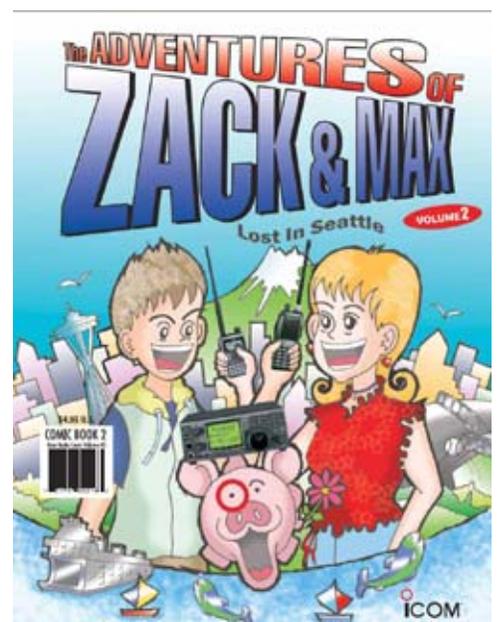
The announced location was at the end of nearby Doris Lee Drive. Will and his brother Jason were the only party to find the fox. Sarah and I arrived after the hunt's end to congratulate the foxes. A grand time was had by all! We convened to Applebee's restaurant in Cortlandt Manor, along Route 6, to swap stories and award the certificates. Malcolm and Joe had been foxy indeed!



Karl and Sarah with their Foxhunt certificate.

Young Learning

As a post script to our adventure, Sarah became curious about amateur radio licenses and tests. We investigated the Technician license question pool together. One thing became quickly obvious. The advanced vocabulary used can be a major handicap to young people seeking a license. Sarah did very well with practice questions on QRZ.com after I explained some of the bigger words. I found a nifty free resource at the icomamerica.com site. Icom has authored five comic books just for kids learning the



basics of ham radio. They are drawn in *Anime* style and make great teaching aids! Take a look at The Adventures of Zack and Max at: http://www.icomamerica.com/amateur/comic_book/default.asp. Artistic students can download the coloring book versions! Adorable Max is the trademark pig seen in many of Icom's print ads. This dynamic duo is joined by Madison Bailey, a young lady ham always ready to go with her HT in hand. Young and old will enjoy reading about their adventures and learning about the best hobby there is!

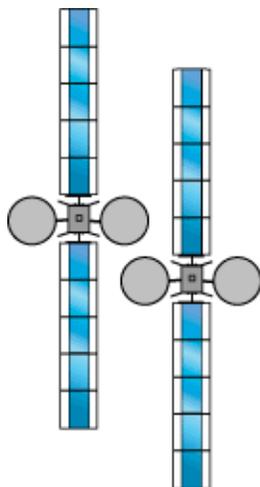
XM Eclipse

A full-day partial eclipse of XM satellite radio darkened North America on Monday, May 21 and Tuesday, May 22. This was an unnatural event! Starting at about noon on Monday, two-thirds of XM's distribution network went off the air leaving millions of satellite receivers mute with "No Signal" on their displays. XM's geosynchronous satellite favoring America's east coast, and their entire nationwide network of terrestrial repeaters, allegedly went off the air due to problems with a software upload.

The greatest impact of the outage was felt in large cities and urban areas dependent on land-based repeaters to provide coverage where XM's satellite signals can not penetrate. For example, XM was, for all intents, completely off the air in New York City. My trip home from work proved interesting. Using the advanced diagnostics on my Rody 2 receiver, I could see that XM had increased the output of their remaining satellite favoring the west coast. It also proved how dependent my mobile reception was on the east coast bird! I endured an hour of near silence! Reception at home was bearable. I could intercept the western bird without much trouble. By the way, XM is offering a two-day refund to those who apply. At \$12.95 per month, that's an enormous 87 cents!

Here is the scoop as reported on fan site XM411.com: After XM launched their XM-3 satellite to cover the east coast, they moved XM-1 to be very close to XM-2 (and the then forthcoming XM-4) on the west coast. On Monday, May 21, the XM-3 satellite suffered an unexpected in-orbit computer glitch.

In order to fix this issue, XM had to perform a software upgrade on the XM-3 satellite, which required the bird to be re-oriented to be corrected. That process also reportedly required the



Boeing 702 satellites as used by XM Radio are designed for an end-of-life power of > 15 kW.

satellite to stop broadcasting. The off-line secondary system came online and superceded the primary system, and for some unknown reason it tried to re-install the patch to XM-3. Subsequently, for some unknown reason, the patch caused XM-3 to give itself a blue screen of death halting all computer control of its operations.

To recover, they needed to hard re-boot the satellite, re-aim it towards the western satellites, recalibrate and resync it, hope it performs whichever I/O tests it needs to pass, and then re-aim it to the east coast, while at the same time debugging the ground system that threw everything into chaos to begin with. When re-orientation and debugging was completed, XM re-established connectivity with its ground source and XM-3 went back on the air.

XM switches between their primary and secondary systems fairly often as a continuity test, with little or no consequence to the broadcast satellite or terrestrial signal. This time, obviously, it either wasn't planned or it was done by accident without both systems operating as independent mirrors of each other. However, not moving XM-1 back to the eastern slot appears to have been a mistake. Having a hot spare available (even at 75% power level) potentially could have minimized the impact of this outage. One xm411.com correspondent posted that he wasn't able to detect XM-3 beacon on Monday afternoon. "That suggests they had lost control of the bird and it had probably dropped down into some sort of minimal operation safe mode. I'm not sure 24+ hours spent bringing XM-3 back up from a cold start makes sense. The first notice from XM indicated they expected a faster recovery. You can imagine how careful their engineers were after making the horrendous blunder that triggered this event."

All was well by lunch time Tuesday afternoon. The XM-3 east coast signal was slowly brought back up to full power. The west coast bird was adjusted for nominal power and the terrestrial repeater network came back to life. Now we can return to listening to 20 on 20, George Noory and the broads on Broadminded! XM satellite radio has returned!

See You On Six!

My boundless enthusiasm for six meters continues. A five day wildfire of reception occurred May 5th through 10th. Strong openings to the St. Louis area, Northern Florida and places as far away as Oklahoma provided great

STATION	DAY	MO	YR	UTC	FREQ	REPORT	MODE	WAVE
N2KZ	6/5	07	2331	5000	599	CW	300	

PSE QSL TRX 73 Sam Kay McElroy

fun. Ray, W2CH and Marylyn, KC2NKU both worked Costa Rica! Not bad for the beginning of the season. A reminder: The ARRL VHF QSO party begins 2 pm June 9 through 11pm June 11. The Six Meter International Radio Klub (SMIRK) holds their QSO party 8pm June 16 to 8 pm June 17. Both events should bring great activity to “The Magic Band.”

I have been gaining experience operating on six meters. CW operations seem to center around 50.100 MHz and SSB uses 50.125 MHz as a calling frequency. In reality, SSB operators are active from 50.100 to as high as 50.200 or beyond. CW can be found from 50.085 to 50.105 or so. Always scan 50.000 to 50.300 in its entirety every

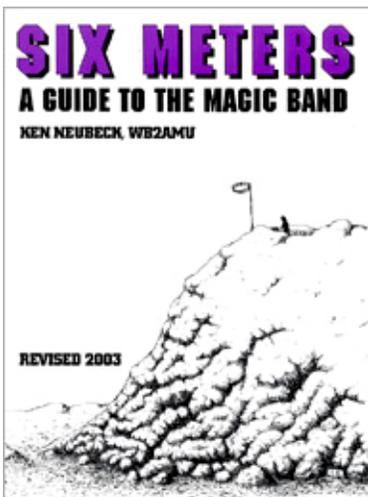
once in awhile! I made a couple of great CW contacts on 50.131 a few nights ago. Make sure you do two things: Do a lot of scanning and careful listening. Call every once in awhile! Someone may hear you!

When six meters is not open, you can still read about it! I was lucky to work an authority on The Magic Band, Ken, WB2AMU.

Ken is the author of “Six Meters: A Guide To The Magic Band” offered by WorldRadio books (www.wr6wr.com.) It is a comprehensive collection of knowledge and yore about my favorite summertime band.

Read all about it at: www.eham.net/reviews/detail/2591. It is a must for all who dream about double-hop E-skip.

- Until next month, happy trails de N2KZ “The Old Goat.”



Jason KC2FIX and Will KC2FYY made up one of the foxhunting teams. Photo by W2CH.

direction while in motion. But how well would it work in practice?

Playing the foxes this time around were Malcolm NM9J and Joe WA2MCR. This was a result of their tracking PCARA's previous fox Karl, N2KZ all the way back to the Beach Shopping Center in October 2006. The fox's first transmission at 3:00 p.m. was received with good strength at the Beach, with a general direction of northwest. As soon as the 5 minute transmission was completed, all three teams set out. Incidentally, that first transmission employed full power from a Radio Shack HTX242 mobile transceiver.

It turned out that Ray W2CH's first bearing with a conventional antenna was 100% accurate and went straight through the fox's location... but this did not become evident until much later. What did become clear was that Ray's Doppler antennas did not have sufficiently strong magnets to stay on the car roof at normal driving speeds. Even with assistance from strong adhesive tape, the Doppler antennas came adrift on the Bear Mountain Parkway, and Ray had to revert to his directional antenna for the rest of the hunt.

Foxes in the park

On May 20, three teams checked in at the Beach Shopping Center for PCARA's latest Foxhunt. They included Wires KC2FYY with his brother Jason (Cables) KC2FIX; Karl N2KZ with junior op Sarah, and Ray W2CH with Marylyn KC2NKU.

Ray was trying out a “secret weapon” — a Ramsey Electronics DDF1 Doppler Direction Finder. Ramsey Electronics suggests that instead of swinging a directional antenna around to find a hidden station, the Doppler unit's display gives a direct bearing to the location of the transmitter. Four roof-mounted quarter-wave antennas allow continuous monitoring of the fox's



Four telescopic antennas mounted on Marylyn's car roof for the Ramsey DDF1 Doppler Direction Finder. Photo by W2CH.

Later, Ray mentioned that other reviewers had commented on the weak, stick-on magnet strips employed for the Ramsey Doppler antennas – they are only effective if the vehicle is stopped or traveling very slowly. And the ground plane effect from the roof may be weakened by the limited contact area.



Ramsey DDF1 Doppler Direction Finder pictured above Ray's map with his initial extra-accurate bearing from the Beach Shopping Center.

At various times, our intrepid hunters visited the same locations – perhaps because they had been previously discussed as possible Field Day sites. There was the old WLNA/WHUD studio and transmitter site at the top of Radio Terrace. And there were several car parks along Sprout Brook Road, including the Town of Cortlandt's Sprout Brook Park. Signals were very strong, but there was no sign of the fox. Some hunters went further along Route 9 to Annsville Circle and PCARA's holiday stomping ground "At the Reef" – but no foxes were on the menu there.

During the transmissions, several clues were given. A lot of material came from the Town of Cortlandt's web site (<http://www.townofcortlandt.com/Cit-e-Access/webpage.cfm?TID=20&TPID=4813>).

It was pretty clear that the foxes were in a park... and on the east side of the park was a gravel mine that had operated until the early 1970s. The land in question had been purchased in 2000 by the Scenic Hudson Land Trust, the Town of Cortlandt and Westchester County. The park had previous visitors, including a mystery "moose" who used to preside over the "rock cut". The name of the park and the road that leads to the foxes' street both began with "H". And the park has a number of trails, one of which is the Annsville Creek Trail.

After all this information had been provided, it should have been clear that the foxes were located at the Hudson Highlands Gateway Park, which has **two** entrances. The main entrance and trailhead is in Sprout Brook Road – but that one was a little too obvious! The

foxes were actually located at the "Universally Accessible Entrance" and trailhead at the end of Doris Lee Drive, off Highland Avenue. There is a gravel area for car parking, adjacent to the information booth that describes the trails and the park. The entrance is covered by heavy foliage and cannot be seen until after the bend in Doris Lee Drive.



First to discover the foxes' lair were Wires KC2FYY and Cables KC2FIX at 4:20 p.m. Congratulations Will and Jason! Will has taken part in many a PCARA foxhunt, and this was his best result to date.



Wires, KC2FYY on the run to find the foxes first.

The second team to find the fox was Karl N2KZ and Sarah. They were unaware of the recent park developments in the Town of Cortlandt, and had been hunting along Sprout Brook Road for strong signals – on both 2 meters and on the 440 MHz harmonic.



Joe WA2MCR pictured at the foxes den with Karl N2KZ and daughter Sarah, the second team to find the fox.

Enough clues and details were revealed for them to find the foxes just after 4:30 p.m.

All the hunters made their way to Applebees in Cortlandt Town Center for a comparison of experiences, presentation of certificates and a cooling off at the outside restaurant tables.



Wires, KC2FYY picks up the first place certificate from Joe WA2MCR and Malcolm, NM9J. (Taken by W2CH)

Will and Jason – here's hoping that you are available for the next PCARA foxhunt! It will be your turn to hide, and I'm sure you will provide us all with a fresh challenge.

- NM9J

Cortlandt Drill

On Saturday May 5 2007, disaster struck Cortlandt twice in rapid succession and hundreds of casualties were scattered around the area.

In practice, the Town of Cortlandt and Cortlandt Community Volunteer Ambulance Corps had organized a full scale exercise to test emergency responders. Peekskill/Cortlandt Amateur Radio Association had been invited to participate by Jeff Tkacs, the Town Of Cortlandt's Homeland Safety Coordinator.

Early on the Saturday morning, PCARA members turned up for their briefing at Buchanan-Verplanck Elementary School on Westchester Avenue. Between interviews, Jeff Tkacs explained that our role was to provide an alternative means of communication to Cortlandt's Emergency Operations Center located at Town Hall, in Heady Street, with a situation report every 15 minutes. The first responders all had their own radio communications, and PCARA's vehicles were parked alongside area ambulances and Westchester County's Emergency Communication trucks. Despite the presence of these high-powered agencies, amateur radio would still have a role to play.



Bob N2CBH and Greg KB2CQE prepare Greg's 'go-kit' radio.

As the first incident in the exercise, a bus from the local senior center had supposedly been involved in a three-vehicle accident and Bob, N2CBH was dispatched to the Buchanan town garage parking lot where he was able to contact the local incident commander.

Meanwhile, back at Buchanan-Verplanck Elementary School, a large number of youngsters had been carefully made up with "moulage" to simulate all sorts of injuries, including – in one case – a guitar pick buried in the forehead. The scenario was a rock concert at the "Town of Cortlandt Concert Hall", where an explosion had just occurred. Suddenly the school entrance where Joe, WA2MCR and Greg KB2CQE had been parked was full of NY State Police vehicles with their lights a-flashing. The police cars were rapidly followed by numerous fire engines and ambulances from Buchanan and the surrounding communities.

As the action began at the school, Joe WA2MCR and Malcolm NM9J set off for Cortlandt Town Hall to



Multiple State Police vehicles arrive at Buchanan-Verplanck Elementary School with red lights flashing.

provide back-up communications to the EOC. Meanwhile, Greg KB2CQE and WECA's Public Service director Robert N2TSE had contacted the Incident Commander at Buchanan-Verplanck school. Signal strength into PCARA's 2 meter repeater on 146.67 was just strong enough for N2TSE to relay information via his handi-talkie from the middle of the scene. However, this situation was not ideal and when Bob, N2CBH returned from the first incident, a decision was made to lift Greg's "go kit" field radio out of the back of Greg's car and carry it directly to the Incident Commander's location. Connected to a portable antenna, signals were then excellent on all three PCARA repeaters.

At Cortlandt Town Hall, Joe WA2MCR popped the original ceiling tile that conceals the antenna cables installed by PCARA back in 2004. (See *PCARA Update*, Oct 2004). In a few minutes Joe's Icom IC-7000 transceiver and switch-mode power supply were connected, just outside the door to the Supervisor's office. Situation reports were soon flowing between the incidents and the EOC.



Joe, WA2MCR operates in Cortlandt Town Hall outside the Supervisor's office. Note the antenna cables leading up to the open ceiling tile.

One problem appeared when Jeff Tkacs, located at the Town Hall, asked a town employee at the Buchanan-Verplanck school to contact the EOC by cell phone. The cell phone was not working, so a decision was made to use the amateur radio link for more critical traffic. (Later we checked with Jeff Tkacs to see whether the cell phone failure was part of the drill scenario. It wasn't – the cell phone really had failed.)

Several messages were passed between the EOC and Buchanan-Verplanck school, including a further part of the drill scenario in which a second "explosive device" was located and secured. In a last message, the EOC learned from KB2CQE that the buildings were

clear of all "victims", who were being transferred to local hospitals.

As a final part of the exercise, Jeff Tkacs organized a "press conference" at Cortlandt Town Hall where Town of Cortlandt Supervisor Linda Puglisi answered questions from various 'newshounds', including a pair of TV reporters who looked suspiciously like PCARA members.

What did we learn from the drill? The good news was that PCARA's three repeaters covered the area nicely. The "go kit" field radio built by Greg, KB2CQE turned out to be just the ticket. Combining a 144/440 MHz FM radio with power supply, battery and charger in a single container makes an adaptable solution to many problems. (Thanks to SATERN's Jeff, N2HPO for the field radio inspiration.) And Joe's IC-7000 makes a good radio for use at Town Hall where VHF/UHF and HF antennas are pre-installed.

Lessons learned – it's more useful to have a true dual-band transceiver than a one-band-at-a-time radio when monitoring multiple frequencies. Incident commanders tend to speak too quickly when handed a microphone. And any single system – including cell phones – can fail just when you need it. Best to have a back-up!

- NM9J

BARA Hamfest



PCARA table at the BARA Hamfest on May 26. L to R: Marilyn KC2NKU, Alan, NM9J, Joe, WA2MCR. Pic - W2CH.

PCARA Officers

President:

Greg Appleyard, KB2CQE kb2cq at arrl.net

Vice President:

Joe Calabrese, WA2MCR; wa2mcr at arrl.net

Essential₂ Field Day

Here's another episode in the occasional series where we look at chemical products that are indispensable to amateur radio. The American Chemistry Council's "Essential₂" campaign aims to explain how the chemistry industry is "essential₂" our lives.

One thing we cannot work without on Field Day is electrical energy. And unless you are operating Class A-battery or Class B-battery, the chances are high that a portable electric generator plays a part in the proceedings, probably powered by **gasoline**.

If you have a generator for Field Day or other 'emergencies', a lawn mower or a leaf blower, then spring can be the time for swear words. The reason – small gasoline engines left unused for months on end can be very reluctant to start!

Large standby generators usually have a test schedule. Once a week, they are started and the electrical output is checked. But our own small gasoline engines rarely get this amount of attention. Once the season is over, they are put away, often with gas still in the tank. And that's where the problems begin.

Gasoline contains a mixture of **hydrocarbons**... these are compounds that contain only carbon and hydrogen. The hydrocarbon molecules in gasoline contain 3-12 carbon atoms – examples include n-octane, iso-octane, benzene and toluene. These and other hydrocarbons are the major constituent of gasoline – when their vapors are mixed with air and ignited by a spark, the hydrocarbons burn explosively, forming carbon dioxide (CO₂) and water vapor (H₂O).

Gasoline that emerges from the oil refinery has an additive package mixed in by the oil company before it is sold. The package will contain (depending on season) octane-enhancing additives, antioxidants, metal deactivators, deposit modifiers, surfactants, freezing point depressants, corrosion inhibitors and dyes.

These days, gasoline also contains "oxygenates" – compounds that contain oxygen in addition to the carbon and hydrogen of the hydrocarbons. Methyl tertiary-butyl ether (MTBE) has been the most popular oxygenate in recent years, until the discovery that leaking gasoline was contaminating groundwater with MTBE and rendering wells useless. Oxygenates are added to gasoline to improve antiknock properties (octane rating) at a time when the proportion of aromatic hydrocarbons such as benzene is being reduced. Oxygenates may also reduce the tendency of vehicle emissions to form objectionable pollution in the form of smog. The Mobil gas station where I fill up currently sells gasoline with 10% ethanol as the oxygenate in place of MTBE.

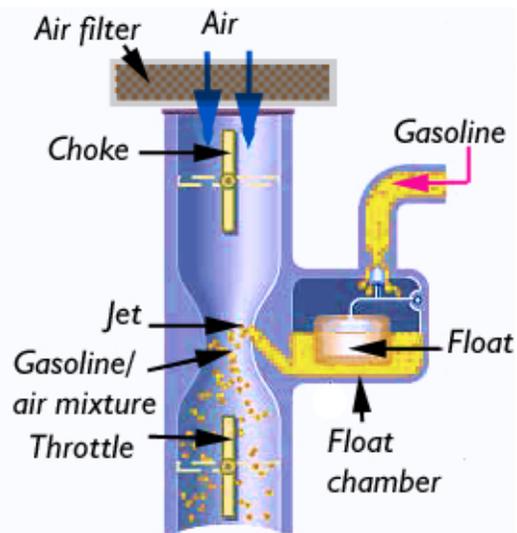
Let us suppose that it is Field Day, or mowing day and time to start the gasoline engine for the first time in months. We open the fuel valve, turn on the ignition

circuit, pull on the starter and... nothing happens. Repeat until skinned knuckles and sore arms say "enough!"

What could have gone wrong? First, remember that the small engines in portable generators and yard equipment still have a **carburetor** to vaporize the gasoline. Reduced pressure in the cylinder sucks air through the carburetor, pulling gasoline droplets out of a narrow jet. The result is a mixture of air and evaporating gasoline droplets, that is then drawn into the cylinder. (This suction method is in contrast to modern vehicles with computer-controlled "fuel injection" systems, where gasoline is forced through an adjustable nozzle under positive pressure from a pump.)

That tiny jet in the carburetor is a potential trouble spot. It could become blocked by tiny grains of dirt – so we definitely need a fuel filter. And if you leave regular gasoline standing in the carburetor for months on end, the lighter components evaporate and gummy deposits will occur, clogging the jet.

Where does that gum (or shellac or varnish) come from? **Unsaturated hydrocarbons** in the gasoline are the cause. Unsaturated hydrocarbons contain



Still used in small gasoline engines, the **carburetor** provides an explosive mixture of gasoline and air.



A blocked carburetor (arrowed) on this particular Honda engine helped inspire the article.

double or triple bonds between the carbon atoms. These unsaturated compounds can become oxidized with time, forming gum. Oxidation can also produce peroxides that increase knocking and attack plastic and rubber components in the fuel system. These reactions can be catalyzed by traces of metals such as copper... which might be found in the fuel line components.

The gum formation speeds up as the temperature rises. Some of the gums are soluble in gasoline, but they will eventually come out of solution as the remaining gasoline evaporates. The oil company's additive package includes **antioxidants** to slow down the gum formation... but their effect is limited to the normal vehicle fuel life of one or two months.

What to do? One piece of advice is to wait until the last use of a small engine for the season, then empty the fuel tank and run the engine until the carburetor is dry. No gasoline – no gum formation. However, it is difficult to clean out all the fine jets, and there is still a chance that water will collect in the fuel system and cause corrosion.

A more convenient suggestion – especially for engines that are only run occasionally, according to the vagaries of weather or sunspots – is to employ a **fuel stabilizer**. This usually takes the form of a concentrated source of antioxidants added to the gasoline. A shot of stabilizer is added to the full fuel tank, mixed with the fuel, then the engine is run long enough for the mixture to be drawn through the fuel system into the carburetor.

One of the best-known fuel stabilizers is “STAB-II” manufactured by Gold Eagle Company of Chicago. According to the company's own publicity:

“STA-BIL, America's top selling fuel stabilizer, is a blend of scientific additives that prevents fuel from deteriorating. Stored fuel goes bad in as little as 60 days causing gum and varnish deposits to build up in engines. This build-up results in starting problems, poor performance and reduced engine life. STA-BIL stops the formation of gum and varnish when added to fresh fuel. Plus it contains a water remover to prevent corrosion and a fuel injector cleaner to restore power. This is especially important to boaters because water can easily get into the fuel and cause corrosion in the fuel system.”

STA-BIL's publicity goes on to say...



STA-BIL fuel stabilizer.

“In addition to boats, it is also frequently used for off-season storage of collector cars, sports cars, motorhomes, motorcycles, ATV's, Snowmobiles, jet skis, outdoor power equipment (for example lawn mowers, leaf blowers, weed eaters), tractors and snowmobiles. STA-BIL keeps fuel fresh for 12 months. Using STA-BIL prevents the need to drain the fuel. Plus draining the fuel is bad because 1) It's impossible to get all the fuel out of the engine where it can go stale and gum up internal parts. 2) The fuel tank should be stored 95% full to prevent condensation from getting in the tank. 3) Gaskets and Seals can dry out and crack leading to leaks when the system is refilled.”

But what is in STAB-II that does such a good job? The Material Safety Data Sheet (MSDS) says the composition is 95% petroleum distillates plus 5% of an “additive mixture”, or “Proprietary or trade secret ingredient(s)”.

We can take a *guess* at likely candidates for those “proprietary ingredients” by examining the gasoline additives sold to oil companies. The first **antioxidant** component is probably a “hindered phenol” such as BHT – butylated hydroxytoluene (2,6-di-*tert*-butyl-4-methylphenol, also known by the ICI trade name Topanol O), or it might be 2,6-di-*tert*-butylphenol, known by the Albemarle trade name Ethanox 4701. (The “hindered phenol” description refers to the bulky *tert*-butyl groups that surround the phenolic –OH group on the aromatic benzene ring). The second **antioxidant** component is likely to be N,N'-di-*sec*-butyl-*p*-phenylene diamine, Albemarle trade name Ethanox 4720. The third component is likely to be a **metal chelator** to complex the copper, such as N,N'-disalicylidene propylenediamine, also known as Albemarle 4705.

We know that another additive in the fuel stabilizer is a compound to mop up any water in the gasoline. Condensed water from the fuel tank can separate, sink to the bottom of the tank and block filters. Water can also corrode the zinc die castings used in carburetors and fuel pumps. The water-absorbing additive might be ethanol or methanol. (The presence of a water absorbing compound explains why these fuel stabilizers are sold in carefully sealed packages, with a limited shelf life after they have been opened. However, there is little point in adding water absorbing compounds to modern gasoline, when it already contains 10% ethanol.)

Now we know how to keep our small gasoline engines running reliably, we can conserve more of that expensive gas at over \$3.30 per gallon. Just remember that no additive will stabilize fuel for more than about 12-24 months. (Let me mention that the company I work for used to manufacture cracking catalysts for the petroleum refining industry, until that business was acquired by Albemarle a few years ago.) - NM9J

Peekskill / Cortlandt Amateur Radio Association

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Newsletter contributions are always very welcome!

Archive: <http://home.computer.net/~pcara/newslett.htm>

PCARA Information

PCARA is a **Non-Profit Community Service Organization**. PCARA meetings take place the first Sunday of each month* at 3:00 p.m. in Dining Room B of the Hudson Valley Hospital Center, Route 202, Cortlandt Manor, NY 10567. Drive round behind the main hospital building and enter from the rear (look for the oxygen tanks). Talk-in is available on the 146.67 repeater. *Apart from holidays.

PCARA Repeaters

W2NYW: 146.67 MHz -0.6, PL 156.7Hz

KB2CQE: 449.925MHz -5.0, PL 179.9Hz

(IRLP node: **4214**)

N2CBH: 448.725MHz -5.0, PL 107.2Hz

PCARA Calendar

Sun June 3: Monthly meeting, 3:00 p.m. Hudson Valley Hospital Center.

Sat-Sun June 23-24: ARRL Field Day.

Hamfests

Sun Jun 3: LIMARC Outdoor Hamfest, Briarcliffe College 1055 Stewart Ave, Bethpage, NY. 9:00 a.m.

Sun Jun 10: Hall of Science ARC Hamfest, New York Hall of Science, 47-01 111th St, Flushing Meadows Corona Park, Queens, NY. 9:00 a.m.

Sun Jul 8: Sussex County ARC Hamfest, Sussex Co Fairgrounds, Plains Rd. off Rt. 206, Augusta NJ.

VE Test Sessions (*No more code tests!*)

Jun 3: Yonkers ARC, Yonkers PD, 1st Precinct, E Grassy Sprain Rd, 8:30 a.m. Contact D. Calabrese, (914) 667-0587.

Jun 9: Split Rock ARA, Hopatcong HS, Hopatcong, NJ. 7:00 p.m. Contact Sid Markowitz, (973) 663-0518.

Jun 14: WECA, Westchester Co Fire Trg Cntr, 4 Dana Rd, Valhall NY. 7:00 p.m. Contact: Stanley Rothman, 914 831-3258.

Jun 18: Columbia Univ ARC, 612 W 115th St, Columbia Univ-Morningside Hgts, Watson Labs, 6th floor, New York, NY. 6:30 PM. Contact: Alan Crosswell, (212) 854-3754.



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