Watt's What

Volume 9, Issue 5

September 2015

Calvert Amateur Radio Association, Inc.

ALL MEETINGS ARE OPEN TO THE PUBLIC…YOU DO NOT HAVE TO BE A MEMBER OR EVEN A LICENSED AMATEUR RADIO OPERATOR TO ATTEND.
150 Main Street (First level—County Services Building)
Prince Frederick, MD 20678

Meetings held every first Thursday of each month

Next CARA meeting — October 1, 2015

CARA CLUB DATES and UPCOMING EVENTS FOR 2015

September 15, 2015 — *ARC Meeting, 7:30 p.m., Mount Hope Community Center, Pushaw Station Road, Sunderland, MD*

September 19, 2015 — *CARA Club Breakfast, 9:00 a.m., Traders Seafood-Steak-Ale Restaurant, 8132 Bayside Rd, Chesapeake Beach, MD 20732*

October 1, 2015 — *CARA Club Meeting, 7:30 p.m., 150 Main Street, Prince Frederick, MD (1st level County Services Building)*

October 13, 2015 — *ARC Meeting, 7:30 p.m., 150 Main Street, Prince Frederick, MD (1st level County Services Building)*

October 17, 2015 — *CARA Club Breakfast, 9:00 a.m., Traders Seafood-Steak-Ale Restaurant, 8132 Bayside Rd, Chesapeake Beach, MD 20732*

November 5, 2015 — *CARA Club Meeting, 7:30 p.m., 150 Main Street, Prince Frederick, MD (1st level County Services Building)*

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September 25-26, 2015 — *Countdown to W4DXCC/Ham Radio Bootcamp, Pigeon Forge, TN. For further info go to W4DXCC.com. Send inquiries via email to info@W4DXCC.com.*

October 3, 2015 — *Delmarva Amateur Radio and Electronics Expo, Sussex Technical High School, 17099 County Seat Hwy (Rte 9),Georgetown, Delaware 19947. For info call 302-628-3060 or 302-629-4949. Gates open at 6 a.m.; Expo begins at 7:30 a.m.*

October 4, 2015 — *CARAfest, Howard County Fairgrounds, 2210 Fairgrounds Rd, West Friendship, MD 21794. For info go to www.carafest.org*

October 24, 2015 — *St. Mary's Ham Fest/Southern MD Tailgate Fest, Hollywood Volunteer Fire Department, 24801 Three Notch Road, Hollywood, MD 20653. Contact Ken McNeely, KB3YPY, at (301) 862-4105 or email ken.mcneely@yahoo.com or go to http://www.k3hki.org/tailgatefest/.*

October 25, 2015 — *Mason-Dixon Hamfest, Sportsman Hall Skating Rink, 15500 Hanover Pike, Upperco, MD 21794. For info go to www.qis.net/~k3pzn.*

(See next page for list of AARC/CARA public service events.)

Calvert Amateur Radio Association, Inc.

Calvert County, MD

Club Officers

President	Bob Sheskin	
N3PPH	president@k3cal.org	
Vice-Pres.	Eric Christensen	
WG3K	vicepresident@k3cal.org	
Secretary	Ron Byzet	
WA4PRR	secretary@k3cal.org	
Treasurer	Dick Ratcliffe	
W3RBR	treasurer@k3cal.org	
Director	Dave Hardy	
KB3RAN	director@k3cal.org	

AARC/CARA Public Service Events Remaining in 2015

Les Silva, KH6CUJ, contributed the information for this schedule.

Sunday, September 27, 2015 — *Run for the Lighthouse Half Marathon & 5k, Quiet Waters Park, Annapolis, MD — contact Les Silva, KH6CUJ.*

Sunday, October 4, 2015, 8 a.m. — *Metric Marathon, Southern High School, 4400 Solomons Island Road, Harwood, MD — contact Ron Boller, N3WOF.*

Sunday, October 11, 2015, 2 p.m. — *PRAD (Patuxent River Appreciation Days) Parade, Solomons Island, MD — contact Dave Weaver, W3PQS.*

***Sunday, October 11, 2015, 8 a.m. —** *CFC Bike Ride 20, 40, and 60 miles, Herrington Harbor South, North Beach, MD — contact Les Silva, KH6CUJ.*

Saturday, November 14, 2015, 8 a.m. — *Rosaryville Veterans Day 50k, Rosaryville State Park, Rosaryville, MD — contact Paul Bowling, W4ATN.*

Sunday, November 22, 2015, 8 a.m. — *Cold Turkey 10k, Arundel High School, 1001 Annapolis Road, Gambrills, MD — contact Mike Montrose, KA2JAI.*

The CFC Bike Ride is a Calvert Amateur Radio Club event that the AARC supplements with operators. (See the following page for detailed information on this event.)

Thanks to Les, KH6CUJ; Bob, N3PPH; and Steve, N3IPN for working the Annapolis 10 Mile Run on Sunday, August 30, 2015. This event originated from the Navy-Marine Corps Stadium in Annapolis, MD. And thanks to Steve for contributing this photo of the Run.

Cystic Fibrosis Cycle (CFC) for Life Bike Ride

Sunday, October 11, 2015

8 a.m.

Les Silva, KH6CUJ, sent the email below to CARA on September 9, 2015.

To All,

This is an opportunity to provide communications support to the Cystic Fibrosis Cycle (CFC) for Life Bike Ride on Sunday, October 11, 2015 at Harrington Harbor South. Herrington Harbor South is located at: 668 Friendship Road, North Beach, Maryland 20714.

The ride as described by the CFC Committee describes the "ride through the most scenic terrain along Maryland's treasured Chesapeake Bay. CF Cycle for Life features well-stocked rest stops every 10-12 miles, bike mechanics along the route support vehicles, great food and entertainment."

There will be three routes: a 20, 40, and a 60 mile route. This is not a race but a ride.

This is the CF Cycle for Life web site:

http://fightcf.cff.org/site/TR/Cycle/154_Maryland_Baltimore?fr_id=3731&pg=entry

We plan to have operators at the start/finish, rests stops, support vehicles, key intersections, and on support vehicles. Ideally, I would like to have 13 operators as a minimum.

This event is being coordinated by the Calvert Amateur Radio Association (CARA). Last year and hopefully this year we augmented the CARA with the Anne Arundel Radio Club (AARC) and the Maryland Mobileers Amateur Radio Club (MMARC) operators. Hopefully this year we get participation from the St. Mary's County Amateur Radio Association (SMCARA). This is truly a joint operation and a perfect opportunity to meet Amateur Radio Operators from other clubs in the area.

If you are interested in operating at this event, please send an Email to: kh6cuj@aol.com.

Aloha,
Les Silva
KH6CUJ
CARA Public Service Coordinator

USE THAT 75 OHM CATV HARDLINE!

by Ron Byzet / WA4PRR

The 1/2 inch 75 Ohm hardline that has become available to club members over the past few years is a high quality and low cost feedline that can be used by hams on the VHF and UHF frequencies. In order to take full advantage of this coax, it must be matched to the 50 Ohm equipment and antennas. The following matching transformer design is very inexpensive and has the advantage of not requiring expensive and hard to find connectors.

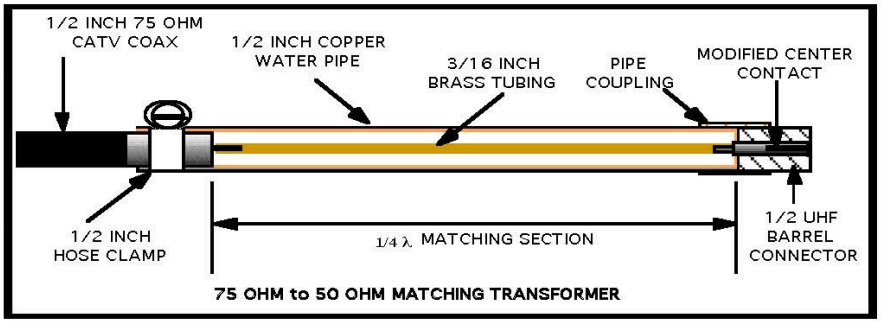
The matching transformers are simple 1/4 wave transmission lines with a characteristic impedance suitable to match a 50 Ohm load to the 75 Ohm cable. The transformers are constructed for the frequency most used, but will provide a decent match over most of the band. Two transformers are required, one for each end of the cable. A length of 1/2 water pipe is used for the outer conductor and 3/16 inch brass tubing for the inner conductor. (Those of you who would like to see how these dimensions were developed should refer to "Simple 75-Ohm Hardline to 50 Ohm Match" in the June, 1989, issue of Ham Radio magazine.) The only critical length is that of the center conductor, which can be found using the formula given below. A table of popular frequencies is also included.

The following steps should be followed in constructing your matching transformers:

* Trim both ends of the hardline so that about 1/2" of the center conductor extends beyond the outer sheath. Clean the center conductor of all insulation and other residue being careful not to remove the copper plating from the center conductor.
* Carefully trim back the outer jacket of the cable about 1 1/4". Be very careful not to nick the outer shield of the cable. (If it is nicked or scored it may break under stress at that point.)
* Select a good quality UHF coaxial feed-thru connector which has a center contact pin that has a solid center (one you cannot see through to the other end) and use a hacksaw to cut it in half. One half will be used for each transformer.
* Remove the center contact and insulation. The insulation should come out with a little persuasion.
* Using a drill motor and a file, turn down about 1/4" of the solid end of the center conductor pieces so that the 3/16" center conductor tubing will slip over the end.
* Cut the inner conductor to the proper length. If you can't find 3 foot lengths of this tubing, the more common 12" lengths can be spliced by inserting a 1" length of smaller diameter tubing inside and sweat soldering the pieces together.
* Cut a length of 1/2" copper water pipe about 1 1/2 inches longer that the center conductor length. On one end, cut four slots about 1" deep spaced evenly.
* Sweat solder the copper pipe (un-slotted end) to the pipe coupling and the barrel connector half to the coupling.
* After the assembly cools, insert the center insulator back into the coaxial connector
* Solder the turned down end of the center pin to one end of the center conductor tubing and using another short piece of the smaller brass tubing as a shim, solder the center conductor to the coaxial cable to the brass center conductor of the matching section.
* After putting on the hose clamp, carefully insert the center conductor into the pipe section until the center pin of the connector is seated in the connector insulator.
* Before final assembly, a coating of Noalox or other aluminum to copper anti-corrosive should be applied to the cable/copper pipe junction.
* Tighten the hose clamp to secure the transformer to the cable and use coax seal or tape to water-proof this connection. This completes the construction of the transformer. Remember that one is needed on each end.

These instructions were geared to using a UHF connector for the transformer. On the higher frequencies, a better connector to use would be an N type connector. When using N connectors, the copper pipe can be soldered inside the connector body for a normal cable connector, or a chassis mount or barrel connector can be cut down and used in a similar manner to the UHF barrel described above. Two versions of the transformers were constructed and tested. One transformer was constructed using UHF connectors and cut for 2 meters, and a second one for 432 MHz and using N connectors. Both units showed very little loss and made a good match to 50 Ohms. These transformers have been used in my antenna system and perform well.

4 ea 3/16" brass tubing - 12" lengths
1 ea small brass tubing to fit inside the above
2 ea 1/2" copper pipe - 20 1/2" long (for 2 meters)
2 ea 1/2" copper coupling
1 ea UHF bulkhead feedthru (or 2 ea type N connectors)
2 ea 1/2" hose clamps (to fit over pipe)
1 ea tube of Noalox or equiv. compound to prevent corrosion (from electrical supply house or Hechingers)



Center Conductor Length

Frequency	Length
144.20 MHz	19.47"
145.00 MHz	19.26"
146.00 MHz	19.23"
146.52 MHz	19.16"
147.00 MHz	19.10"
222.34 MHz	12.62"
223.38 MHz	12.57"
423.00 MHz	6.63"
432.10 MHz	6.49"
435.00 MHz	6.45"

Space Weather – It's Not Limited to Radio Propagation Effects
Shawn Donley, N3AE

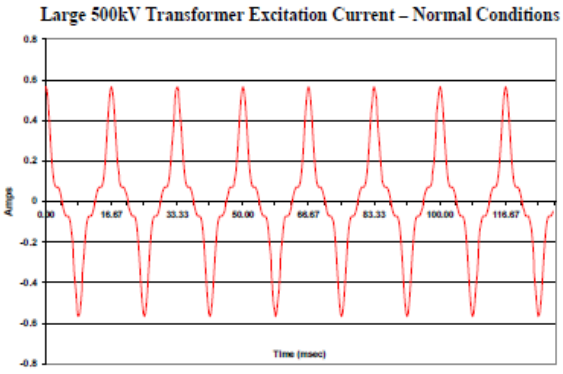
Eric, WG3K, sent out an interesting link concerning the effects of a massive solar storm hitting the earth. The link is at http://gizmodo.com/what-would-happen-if-a-massive-solar-storm-hit-the-eart-1724650105.

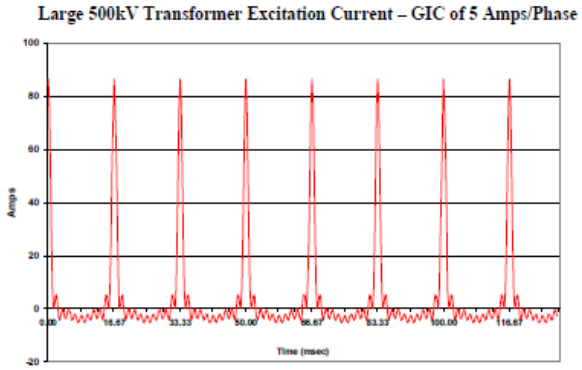
One of the possibilities is a coronal mass ejection, or CME. In a CME, the sun essentially blows off millions of tons of charged plasma into space. If the CME headed in the direction of the earth, problems follow.

Once the charged particles in a CME hit the earth's magnetosphere, enormous currents are induced in the ionosphere, which in turn induce large currents in the earth's surface over wide areas. These are called Ground Induced Currents, or GIC's. Like any current, the source of the current is voltage differences in the earth's surface between distant points. Since our electrical grid spans large areas and has one leg connected to ground for safety purposes, the GIC can flow through the power system grounds because of these ground voltage differences.

The problem with these currents is that they end up flowing through the windings of the big transformers at power stations and sub stations. A simplified circuit diagram is on page 4 of reference (2). When we learned about transformers and inductors, we learned that transformers and inductors often use ferrous materials like cores and laminates to contain the magnetic fields. But these materials have an upper limit for the strength of magnetic flux they can contain….in other words, they can become saturated.

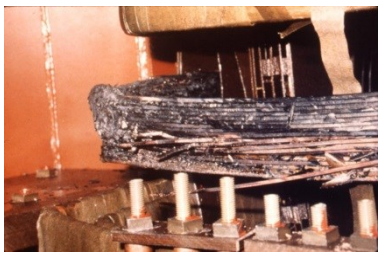
With ground induced currents, which are primarily DC (at least very low frequency), the GIC adds to the normal transformer current during one half of the 60Hz power waveform and subtracts from the normal AC current on the other half cycle. The result is what's called "half cycle saturation." The plot below from reference (5) shows the phenomena. The plots shows the transformer primary (excitation) current with and without a GIC present.





In a big CME event, that's what happens. The ground induced currents (typically between 5 and 500 amps… some say as high as 1000 amps) flowing through the transformer windings can saturate the transformer core or laminates. This causes the alternating magnetic field in the transformer to "escape" outside the confines of the transformer magnetics and into the metal frame, wiring and mounts. A conductor inside an alternating magnetic field has a current induced in it. During a CME, these currents can be large enough to

generate hot spots in many (but not all) transformer designs and essentially burn up the transformer. Here's a photo from reference (1).



These very large transformers cost millions and are not easily produced, typically having an 18-month lead time from order to delivery, and that's when the factory has power, not after a wide-area catastrophe. And therein lies the worst case risk…enough continental damage that you no longer "have the tools to make the tools."

In addition to the risk of transformer damage, the highly distorted AC power waveform can trigger protective sensors and relays, bring down the power grid possibly causing collateral damage to the grid and end-user equipment. Reference (4) points out that "The generated harmonics can resonate with inductances and capacitances in the power system near the transformer, which results in higher-than-nominal voltages that can affect the integrity of the transformer winding insulation."

There are mitigation strategies that can be used but all cost significant amounts of money, introduce new technical issues, and introduce new failure modes and mechanisms.

One simple strategy is to shut down the grid (cease power production) ahead of the large CME reaching earth. We would have 12 hours to several days' warning. But it's not that easy to shut down the grid and bring it all up again, not to mention the impacts on society during the shutdown. But a few hours without power would likely be preferable to months (or years) without power.

Other mitigations are putting high voltage, high current capacitors in series with the transformer windings, thus blocking the DC GIC, adding an opposing current to essentially cancel the GIC current, and circuitry that

would disconnect the transformers from earth ground during a GIC event. Further discussion can be found in reference (2).

What can amateur radio operators do? Not much. Having a source of power that does not depend upon the electrical grid is about our only option.

References for further reading:

(1) http://solarscience.msfc.nasa.gov/suntime/slshow6.stm

(2) http://resourcecenter.ieee-pes.org/files/2013/11/723PM-SSP7-Geomagnetically-Induced-Current-Protection-Concepts.pdf

(3) http://www.powerworld.com/files/clientconf2014/04BakieGMD_IPCO.pdf

(4) http://www.pnnl.gov/main/publications/external/technical_reports/PNNL-21033.pdf

(5) http://web.ornl.gov/sci/ees/etsd/pes/pubs/ferc_Meta-R-319.pdf

ELMER'S Q&A:

Question: *Does anyone know how to determine the date of manufacture of Kenwood Radios (vintage), i.e., TS440, TS940, by the serial number?*

Answer: *Kenwood uses a fairly simple serial number scheme. The first digit is the manufacturing year + 2. The second and third digits are the month.*
For example: 709xxxx means: 7-2=5=1985 and 09 means September.

Note: *This scheme is not applicable to items with the older Kenwood name "Trio."*
Check out: *http://www.eham.net/ehamforum/smf/index.php?topic=15120.0.*

For more info check out:
http://www.dxengineering.com/techarticles/techinfo/dxetechinfo
http://www.podxs070.com/frequently-asked-questions/introduction-to-psk

(This is a new feature for the newsletter. If you have a question, please send it in so "Elmer" can ask all the CARA members for answers!)

Organization

Calvert Amateur Radio Association, Inc.

P.O. Box 306
Huntingtown, Maryland 20639

We're on the web!

Www.k3cal.org

CLUB COMINGS AND GOINGS

Welcome home to Peter, KB3SXB, and Dave, KB3RAN from their long-distance summer journeys! Nice to have you both back!

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For the great Field Day video created by Dave, W3PQS, click on the link below.

https://youtu.be/RAzzIuVjLl8

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Note: If you really would like to share personal triumphs, new additions, notable achievements, and such, please send them for inclusion to the CARA Newsletter to Monica (KC3DAS mnoell1@verizon.net) or Ed (KC3EN, enoell@verizon.net).

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Field Day is June 25-26, 2016. Save those dates!

And don't forget lunch every Wednesday at noon at Mount Hope Community Center, Sunderland, MD

Calvert Amateur Radio Association, Inc.

Calvert County, MD

The Calvert Amateur Radio Association, Inc. is an active and community-minded group of Amateur Radio Operators located in Calvert County in Southern Maryland. Our association is a non-profit 501(C)3 organization supporting amateur radio operation, experimentation, and public

Dear Readers,

This is YOUR newsletter. If you have stories or photos of your hobby that you would like to share with the club, please do so! We will keep covering all the CARA Club events, but it's also nice to include your personal perspectives. Connecting through experiences is what makes CARA a real club. ***Thanks, Monica and Ed***