# NEWSLETTER

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Mercury Amateur Radio Association - MARA - North America - North East


## CONTENTS



## OTHER STUFF

E-mail your comments, ideas, or submissions to marane@mara.net

# FEATURE ARTICLE

By VE1VQ

## WHAT'S ALL THIS STUFF ABOUT GENERATORS?

**or**

## WHAT TO DO *BEFORE* THE LIGHTS GO OUT

This article is adapted from a presentation to my Stake Bishop's Council several years ago.

**PART TWO**

**APPENDIX A**

EXAMPLE #1

In a couple of months after all the panic generator buying has ended you see a 5 kW (5 kilowatt or 5000 watt) generator at the local hardware store. That must certainly be more than enough to run your entire house, you think. You place a call to the Bishop, the Elder's Quorum President and your home teachers with a request for help when you get it home. An hour later the missionaries show up to help you lift it out of the back of your utility trailer. Will it be enough for what you want? When you get home you figure out you need the following to keep you comfortable during a power outage:

| Item | Watts |
|---|---|
| 1. Refrigerator | 2000 (surge) |
| 2. Freezer | 1200 (surge) |
| 3. Furnace | 2300 (surge) |
| 4. Microwave | 800 |
| 5. Electric range | 1500 one element |
| 6. Electric oven | 3410 |
| 7. Electric water heater | 4000 |
| 8. TV | 300 |
| 9. Radio | 100 |
| 10. Hair dryer | 1200 - your wife insisted! |
| 11. Lights | 500 five 100 watt bulbs |
| TOTAL | 17,310 WATTS (17.31 kW)! |

Perhaps you should have bought a few more generators when you had those missionaries to help! Or you can be a bit more realistic about what you need. You don't need to use the electric range or the oven when you have a microwave. Cut 4910 watts from the previous total for a new one of 12,400 watts. Your good wife absolutely refuses to do without her hair dryer – don't even think about it.

EXAMPLE #2

| | |
|---|---|
| 1. Refrigerator | 2000 (surge) |
| 2. Freezer | 1200 (surge) |
| 3. Furnace | 2300 (surge) |
| 4. Microwave | 800 |
| 5. Electric water heater | 4000 |
| 6. TV | 300 |
| 7. Radio | 100 |
| 8. Hair dryer | 1200 |
| 9. Lights | 500 five 100 watt bulbs |
| TOTAL | 12,400 WATTS (12.4 kW) |

Maybe the store still has a generator or two left? You decide that you can heat water in the microwave and take sponge baths instead of running the water heater. This will cut another 4,000 watts and leave you with 8,400 watts.

EXAMPLE #3

| | |
|---|---|
| 1. Refrigerator | 2000 (surge) |
| 2. Freezer | 1200 (surge) |
| 3. Furnace | 2300 (surge) |
| 4. Microwave | 800 |
| 5. TV | 300 |
| 6. Radio | 100 |
| 7. Hair dryer | 1200 |
| 8. Lights | 500 five 100 watt bulbs |
| TOTAL | 8,400 WATTS |

And your wife still won't give up her hair dryer! Looks like we should have bought a bigger generator. I really only have to operate what I need, when I need it! What if I operate the furnace for a while until the house is warm then shut it off? Then I can run the fridge and freezer for an hour or so to keep my food from thawing. And when those two are off I can use the microwave to cook the meal while the kids watch tv and the wife dries her hair. We only turn on what lights we really need. You could even run the electric water heater by itself so you all could have showers.

EXAMPLE #4

Instead of a forced air furnace you have electric wall heaters. After the calculations you find the total watts required are more than you can afford in a generator. You decide to get a space heater with an 1800 watt requirement and wear sweaters instead. Your wife decides she doesn't need a hair dryer since everyone else is in the same predicament.

| | |
|---|---|
| 1. Refrigerator | 2000 (surge) |
| 2. Freezer | 1200 (surge) |
| 3. Space heater | 1800 |
| 4. Microwave | 800 |
| 5. TV | 300 |
| 6. Radio | 100 |
| 7. Lights | 500 five 100 watt bulbs |

TOTAL 6,700 WATTS

Again, we only run what we need at any given time as a 5,000 watt generator will not support all of the devices at the same time. Note that a 3000 or 4000 watt generator would support selected combinations of appliances as well.

You don't want to go to the trouble of having a transfer switch panel installed and decide to use the direct connection method. You plan on buying good quality extension cords, which will handle the necessary current to run the appliances.

P = IE
Where P = Power (watts)
I = Current (amps/amperes)
E = Voltage (volts)

Using the refrigerator as an example,
P = IE or I = P/E (Power divided by the Voltage)
I = P/E
I = 2000/120 (E or voltage is 120 volts)
I = 16.7 amps

Purchase an extension cord capable of handling 15 amps. Remember, this current is for the starting or surge current and once the motor is running, the power requirement drops back to a lower value. Extension cords with a 15 amp rating are standard and can be used for all of the devices in this example. Don't scrimp on these cords. Buy good quality.

Any generator with a wattage rating of 3000 watts or higher can be used by only plugging in devices where the total watts do not exceed the generator rating (less a 10% de-rating factor). So, if you have a 3000 watt unit, you can provide power for the refrigerator, radio and the lights (total of 2000+500+100=2600 watts). Running the refrigerator and the space heater along with tv would be too much

(2000+1800+300=3100 watts).

**APPENDIX B**

**How Much Electricity Do You Need to Produce?**

| Appliances | Rated Watts | Surge Watts |
|---|---|---|
| Refrigerator (1/4 HP) | 500 | 2000 |
| Freezer (1/4 HP) | 600 | 1200 |
| Sump Pump | 800 | 2000 |
| Water Pump (1 HP) | 1900 | 5700 |
| Water Pump (2 HP) | 2500 | 7500 |
| **Heating** | | |
| Furnace Fan (1/2 HP) | 875 | 2300 |
| Electric Blanket | 400 | 400 |
| Space Heater | 1800 | 1800 |
| Heat Pump | 4700 | 12000 |
| **Cooling** | | |
| Dehumidifier | 650 | 800 |
| Attic Fan | 300 | 900 |
| Table Fan | 800 | 2000 |
| Window Air | 1200 | 4800 |
| Central Air (10k BTU) | 1500 | 6000 |
| Central Air (24k BTU) | 3800 | 15000 |
| Central Air (40k BTU) | 6000 | 24000 |
| **Family Room** | | |
| Computer System: CPU, Monitor, Laser Printer | 1500 | 1500 |
| UPS System | 2000 | 2500 |
| CD Player | 100 | 100 |
| VCR | 100 | 100 |
| Radio | 100 | 100 |
| Television | 300 | 300 |
| Receiver | 420 | 420 |
| **Kitchen** | | |
| Microwave | 800 | 800 |
| Blender | 300 | 900 |
| Coffee Maker | 1500 | 1500 |
| Electric Range (1 element) | 1500 | 1500 |
| Toaster (2-slice) | 1000 | 1600 |
| Dishwasher (Hot Dry) | 1500 | 3000 |
| Electric Oven | 3410 | 3410 |
| **Laundry Room** | | |
| Iron | 1200 | 1200 |
| Washing Machine | 1150 | 3400 |
| Gas Clothes Dryer | 700 | 2500 |
| Electric Clothes Dryer | 5400 | 6750 |
| **Power Tools** | | |
| Hand Drill (1/4 inch) | 350 | 350 |
| Hand Drill (1/2 inch) | 600 | 600 |
| Skill Saw (7.25 inch) | 1800 | 2600 |
| Band Saw (14 inch) | 1100 | 1400 |
| Circular Saw (6.5 inch) | 800 | 1400 |
| Sawzall | 750 | 1400 |
| Drills (3/8 inch) | 440 | 600 |
| **Contractor Tools** | | |
| Air Compressor (1 HP) | 1500 | 4500 |
| High-Pressure Washer (1 HP) | 1200 | 3600 |
| Submersible Pump (400 gph) | 200 | 400 |
| Electric Chainsaw (1/2 HP) | 900 | 900 |
| **Electric Motors** | | |
| 1/6 HP Motor | 300 | 850 |
| 1/4 HP Motor | 400 | 1150 |
| 1/3 HP Motor | 475 | 1325 |
| 1/2 HP Motor | 650 | 1800 |
| 3/4 HP Motor | 900 | 2500 |
| 1 HP Motor | 1000 | 2800 |
| 1-1/2 HP Motor | 1700 | 4800 |
| 2 HP Motor | 2000 | 5900 |
| 3 HP Motor | 3200 | 9000 |
| 5 HP Motor | 5000 | 13750 |
| **Other Important Items** | | |
| Security System | 500 | 500 |
| Deep Freezer | 500 | 1000 |
| Hair Dryer | 1200 | 1200 |
| Garage Door Opener (1/3 HP) | 750 | 750 |
| Electric Water Heater | 4000 | 4000 |

The statistics for APPENDIX B are from the Central Maine Diesel web site located at http://www.generator-sales.com/wattage-calculator.asp Go to this site and use the fill-in form to calculate your requirements. Some of the wattage figures for the entertainment devices may be high by current standards so you may be able to adjust these downward slightly. Also, since this form was created, energy efficient light bulbs have become available.

Whatever size generator you purchase, don't overload it. Treat it well (change the oil on the schedule the manufacturer says, use the fuel grade recommended) and it will last for a long time - and keep your lights on.

## ANYONE INTERESTED?

***Is there anyone who would like to try their hand at writing a monthly column for the newsletter? Or perhaps every other month, every third; how about once a year? Technical, operational, humorous, whatever. Spelling and grammar not your strong points? Our highly skilled staff will make everything right.***

# *Grandma Mara's*
## RAMBLINGS

Back in the USA, and in my own bed again, back to the family squabbles, back to all of the day to day problems. Ah, it's great to be home again.

Got my antenna tuned up, the SWR down to within reasonable limits. Now I've just got to find out who I'm supposed to contact in case something ever happens. I think I'm the only ward in the stake with this calling of ward emergency communications person, and there doesn't seem to be anyone to talk with at the stake level. But I guess that problem is beyond my 'pay grade', and I've done what I was asked to do. Someone else will eventually figure this out!

In the meantime, I think I'll go work some DX.

# CULTURED CORNER
**by ANØNMS**

### SOME HAM LIMERICKS

*There once was a ham from Connecticut*
*Who lived top a hill on the west of it*
*He took it in stride*
*When his receiver died*
*But broke down completely on transmit*

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*There once was a ham from Wisconsin*
*Who dressed for outdoors all in deerskin*
*Come fall he did say*
*No antennas today*
*'Cause opens first day of deer season*

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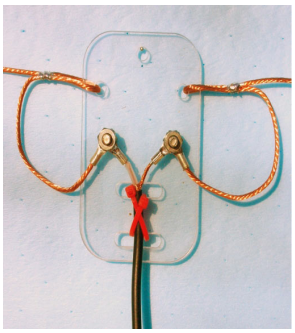
*There once was a ham bought some new stuff*
*He then found it all of a fool's bluff*
*That summer he did*
*Sell it off to a lid*
*To bad, so said he to the* mischief

---

There once was a ham raised a tower
High up over limb, leaf, and bower
Only then thought he
'Bout the next door biddy
And hoped he'd not need a good lawyer

# TECH STUFF
**By VE1VQ**

Insulators for antennas are certainly not rocket science! Anything that doesn't conduct or absorb moisture will do for the power levels we work with. Years ago, there were descriptions in the various handbooks of insulators made from hardwood impregnated with varnish to make them waterproof. Now, we have many kinds of 'plastic' compounds machined or molded into all kinds of shapes. Some of these shapes are directly useful, like pipe which can be cut into length as end insulators, or a tee as a center insulator.

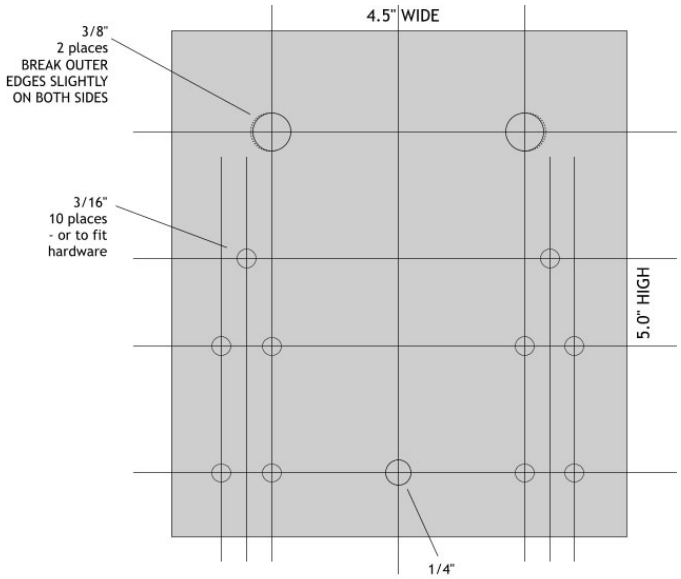


**Here's a commercial antenna insulator for $8 at www.fingerdimple.com**

Material in sheet form is readily available. I picked up a 12" x 8.75" x 0.25" cutting board at one of the local dollar stores (for $2) to build something to replace the existing one on my 500' horizontal loop. I'd noticed when I repaired the feed line last year that the old center insulator was kind of brittle in places, probably from the ultraviolet effects of sunlight. I know from experience that black ty-wraps last longer outdoors than the white ones but where do you find black cutting boards?

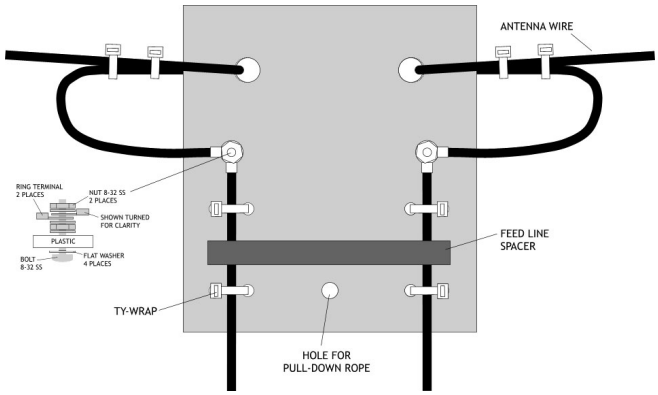
I used drawing software that I use for work to lay out the lines and holes. Pencil and paper with a ruler will work just as well. The layout provides for strain relief transition between the balanced wire line and the loop. Failure to allow for some sort of relief will result in conductor work hardening and eventual breakage. Using rubber cement I attached the paper pattern to the plastic, then

**Use a cheap ($2) plastic cutting board for insulator material**




**Layout of a center insulator for balanced wire line. Your line width may vary and will have to be adjusted to fit. If desired for coaxial cable then move one of the side series of four holes to the middle to ty-wrap the coax. To use this as a template - photocopy and enlarge until the width and height are at the dimensions shown.**

cut it out to the lines with a table saw. A hacksaw or a handsaw will to the same thing but take a little longer, and with edges that are perhaps not so straight and smooth. Whichever way you use, smooth the edges with a flat file for appearance. The holes were drilled with a drill press but a hand drill would work just as well. Use a sharp hobby knife to relieve the edges of the two large holes




**Drawing showing feed line and antenna wire placement and fastening. Stainless steel hardware is recommended to prevent corrosion and the resultant poor electrical connection.**

where the antenna wire is fastened so that stress on the wire bend is lessened.

There you have it - one feed point insulator, and cheap too!

# QUOTE OF THE MONTH

*Old age is like everything else. To make a success of it, you've got to start young.*

*- Theodore Roosevelt*

# DI-DAH-DI-DAH-DIT

## HOPE SPRINGS ETERNAL!

Spring is the time of year when hope is renewed. There is a feeling in the air that something is about to happen, and things are about to get better; that just perhaps life might be good after all.

No one has that eternal hope like a ham! Look at the countless antenna designs and articles in the amateur radio magazines, month after month, and year after year. Countless variations of the same thing. All in the effort to obtain that perfect antenna; something that will work as a killer for local nets, and that fantastic radiator for DX.

But then hams are noted for that hope. Look at all of the antenna and electronic things that have been developed or improved, or theory changed, by members of our fraternity over the last century. Remember how the 'experts' said that HF and higher frequencies were useless for anything so they were given to the hams. So much for 'experts'!

Even if you or I, as an individual ham, never discover a new form of communication, never invent a new widget, never become famous or do anything to be remembered by the ham world, we can still personally discover things for ourselves. We can come to new and better understanding of the physical and spiritual world around us.

And cheer up, spring and warmer weather are just around the corner, probably following after the next snow storm.

Until next month,
VE1VQ