

A History of Power Development in Wildwood – Generator Power

This is the first article in a series in which I will share with you our Wildwood electrical experience over a period of 28 years. The first article will cover the 1980 to 1987 period.

Water is essential. Power in 1980 was a convenience and has evolved into a necessity today through the technological evolution in our culture. Faye and I both grew up in a rural farming area in eastern Idaho in the 30's when power, where available, was barely affordable. Those were the "olden days" as we tell our grandchildren, when we (our parents) cooked on wood stoves from scratch, raised much of our own meat animals and had large vegetable gardens, made bread by hand, milked our cows by hand, set the milk in a pantry (no refrigerator) in pans for the cream to rise, then churned the cream into butter by hand. Early on, we stored ice in straw to last into the summer. We had a root cellar to store our vegetables. Our meat, that we butchered ourselves, was frozen and stored in a community locker. We pumped our water by hand and had outdoor privies. Our firewood and carpentry work was done with hand saws and tools. We still have the scrubbing board and wash tub that my mother used and we both remember as kids bathing in a galvanized tub with not so hot water heated on the wood stove. The memories of the inconveniences and hardships of the so called "good old days" compared to today are endless and priceless. Some of you who grew up in rural areas at that time will surely relate to these memories.

So starting from scratch at Wild wood in 1980 was to some degree an opportunity to relive our pioneering childhood as Wildwood in 1980 was really quite primitive. The Intermountain Rural Electric Association (IREA) had built a power line to the caretaker house and Sales Office two miles away. Rosemary Parkinson (now Meyers at filing 1, lot 162) had the power line extended about ½ mile north of the Caretaker's house about 1981. So, commercial power was sometime off in the distant future for us. We hauled our water and camped using an old 1968 truck and camper. It did have a propane bottle but no generator. We cooked out a lot with a gas stove and gas lanterns for a several years. We had a well drilled in July of 1982 and had a long handled cast iron hand pump installed. Back then we bought 200-300 seedling pine trees each spring which needed watering by hand to get started. It took 75 pumps for a five gallon bucket of water. Needless to say, that was excellent exercise but got old in a hurry.

We got tired of roughing it in that manner and decided in 1984 to buy a Sears ¾ horsepower, 220 volt submersible pump and a 110/220 volt, gas generator (Generac). We pulled the hand pump and sold it to a neighbor. I built a tripod using 3, 16 foot 2x4's and lowered the pump, pipe and electrical wiring 135 feet into the well using a block and tackle. I built a 4'x4' pump house and installed the generator in it over the well. We put a hose bib and

wash basin on the pump house and we were really moving up in the world. Of course that was followed by buying hundreds of feet of pipe and hoses so we didn't have to pack water so far for the seedlings. For each advance in convenience we had to experience some new inconveniences. This required hauling gas in five gallon cans. Also by 1983, we bought a 30', 5<sup>th</sup> wheel trailer that was a modern self contained unit with a small built in generator. That of course required a nice 8'x8' redwood deck. I also installed an electric yard light over the pump house and fire pit area. But now having generator power, allowed me to start using some electric hand tools. So the gas powered electric generator made it much easier, from a number of standpoints, to enjoy our camping and recreation on our own property at Wildwood.

Now I need to digress a moment and let you know why I have such an interest in power and most things electrical. After a three year stint in the Marine Corps as a radio /electronics specialist, I completed a three year associate degree course in electronics and television broadcasting at Idaho State College. During that time, I worked for Western Electric Corporation, repaired electronic equipment and televisions on the side and worked as a technician for the FFA. Then I returned to college and earned a five year professional engineering degree in Electrical Engineering. During that time I worked as the electronic technician for the electrical engineering department as well as an engineer for KFOR Television station. Also during that time I became well versed, both from a theoretical and practical engineering standpoint, in all aspects of electric motors, generators, power stations, power line distribution systems, electronic control systems, National Electric Code, and much more. I did research in the areas of wave propagation and photo-voltaic systems, which technology was just starting up. Then I made a career in communications engineering for AT&T.

So with that background, you can well imagine how interested and anxious I was to someday design and install the latest in photo voltaic (now solar) equipment.

Also I was experienced in maintaining air to ground radio repeater sites powered by large fixed generators for the FAA on remote mountain tops. That experience served us well early on at Wildwood. Generators are the standard power sources in rural areas. Portable generators now are relatively inexpensive and over the years have become quite small and light weight. Consequently, many of our occasional use residents have used portable generators in the past, and still enjoy the benefits of them today. Larger and much heavier generators that can be permanently mounted are available and generally used at some of our Wildwood homes that are located where commercial power is still not available.

Plans for a solar system got side tracked in 1985 when Faye and I started making plans to build an all cedar home by ourselves. I laid out the foundation plan using a garden hose one night aligned with the North Star. We bought a cedar log home package and after lots of red tape in getting our Park County permits at Fairplay, we broke ground in June 1986. I managed

engineering operations from coast to coast for AT&T and traveled a lot. However, every weekend and holiday was spent at Wildwood. The Generac gas generator was a godsend. It did double duty and saw hundreds of hours of use. It operated at 3600 RPM and always sounded like it was ready to blow up or take flight. Not surprisingly one Sunday morning it threw a rod about two months before our one year construction permit was up. The good thing about it was that it allowed me to plan for the purchase of a large permanent generator that would serve us well until commercial power would become available.

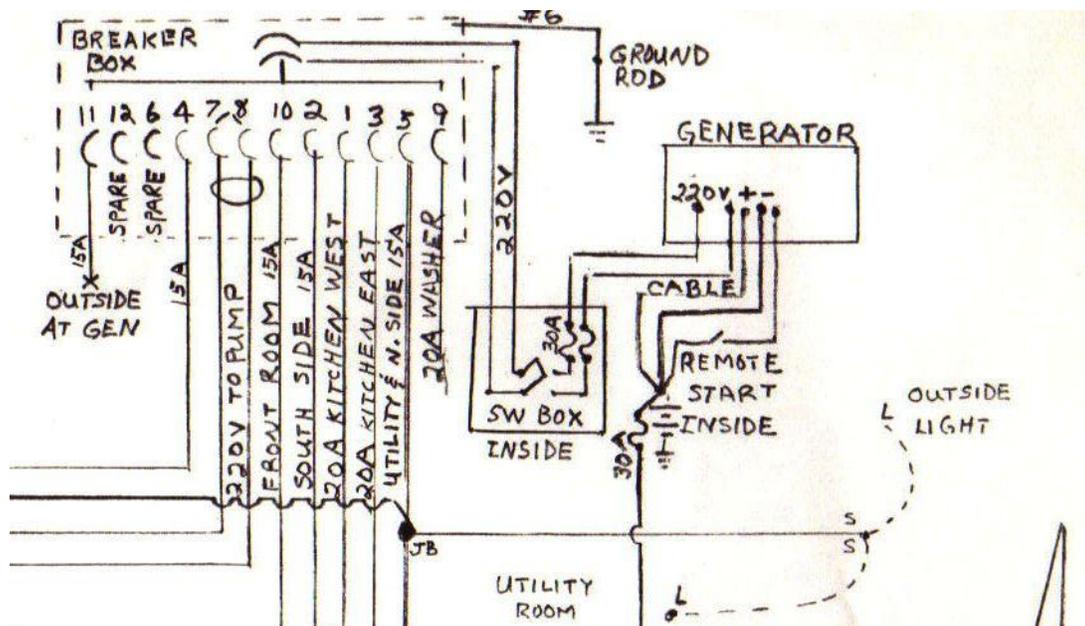
Now a few tips about using generators and pumps at Wildwood. Most of our wells are 150 to 400 feet deep. The ft-lbs of energy required to lift water (a pint per pound) from that depth requires a minimum of  $\frac{3}{4}$  horsepower pumps at 220 volts. A  $\frac{3}{4}$  hp generator, running at full load, is doing 24,750 ft-lb of work for every minute it runs. The relationship between work and energy is complex. Although it is not technically accurate, it has become common place to use the terms horsepower and watts. Suffice it to say that 1 hp = 746 watts or  $\frac{3}{4}$  kilowatt. There is a relationship of power (watts) = volts x current (amps). 1000 watts = 1 kilowatt. 1 kilowatt x hours = 1 kilowatt hour etcetera. It is not generally understood that gas generators are inherently inefficient. This inefficiency is compounded at high elevations. Wildwood is at 9200 feet above sea level. A generator will lose about 2 % of its efficiency for every 1000 feet elevation. So, at wild wood, at 80 % efficiency, a typical 1500 watt rated portable generator would only produce about 1200 watts. Another problem with generators is that the starting voltage generated is low and ramps up. Also the greater the load, the greater the resulting drag on the motor and the lower the voltage will be. The startup power required by a pump motor will cause a spike of power demand. The simultaneous start up of a pump motor and a saw or sander can easily burn out one of the motors as well as damage the generator.

The point of all this is that you should look ahead and identify what your projected loads will be. Plan to buy a generator larger than you think is necessary considering that the start up demand for appliances, tools and motors can be substantial and compounded if starting simultaneously. Always be aware of and protect it from multiple simultaneous loads. The same holds true for solar systems. Also look to the future and plan accordingly.

The two common brand names in fixed power plants in 1987 was Onan and Khoeler and of which I was familiar. We had to rent a portable generator temporarily to finish our construction within the permit year while I planned for and found a suitable fixed generator. I found a fairly large (250+ lb., 6500 watt (4500 watts at 9200 feet), 220 volt, Onan generator available in Thornton that could be converted to propane versus gasoline. Propane has a number of advantages. It does not require a carburetor and choking. And importantly at our altitude and temperatures, it fires instantly. You don't have to carry five gallon gas cans back and forth. And I didn't have to worry about stale gas left in the carburetor over winter. This all

combined allows for remotely controlling the generator and other than noise, a fairly suitable power source.

I had planned ahead for eventual commercial power and installed a 100 amp power service panel and appropriate breakers, both 220 volts for the pump and electric range and 110 volts for household use, all in accordance with the national electrical code. I installed the large fixed generator adjacent to the service panel and wired into the bottom of the service panel as the primary 220 volt power source. This would allow an easy transition in the future (1991) when I would add a large photo voltaic system and even later, (1995) commercial power. I will cover those additions in a later article. I had prewired the house and had it inspected by the State inspector as though commercial power was available. I wired in an external generator start/stop switch inside the utility room along with voltage, current and other meters so that I could control and monitor all aspects of my power delivery and demand. My generator system and house wiring was passed by the State electrical inspector on 5/11/87 under permit # 36116 just one month before our one year permit was up and receipt of our certificate of occupancy.



Partial view of my electrical plan and layout using 6500 watt generator.

Del Bills is a 28 year Wildwood resident; past Board president; liaison with the state water engineer and district water commissioner; was instrumental in extending power through filings 1 & 2 and an electrical engineer. You can e-mail him at: [www.delbertbills@msn.com](mailto:www.delbertbills@msn.com).