The Beacon

A monthly newsletter of the Albemarle Amateur Radio Club serving Central Virginia

Celebrating our 50th Anniversary

July 2013

Club Meeting Set for Tuesday, July 9, 7:30 pm

The Albemarle Amateur Radio Club will meet in the National Radio Astronomy Observatory, 520 Edgemont Road, Charlottesville, VA on July 9 at 7:30 pm. Charles Battig K4TY will give a presentation on Smart Meters (home electric service meters) and RFI.

The president has called a board meeting for 7 pm. prior to the 7:30 General Membership Meeting.

Photos by Jim K4BAV

President's Remarks

By Bob Pattison – K4DU

Field Day 2013 – The Best Field Day Yet!

Field Day 2013 was a smashing success for the Albemarle Amateur Radio Club. My hat is off to our Field Day organizing team, the publicity committee and everyone who participated. Holding a VE Session at EVFD the morning of Field Day was a nice addition. Good food, great fellowship and a weekend of radio made the mix a winning combination. If for some reason you missed it, put the fourth weekend in June 2014 on your calendar and plan to join us next year to see if we can top it. On behalf of the Albemarle Amateur Radio Club, thank you to all who made this Field Day a success.

Communications

In the early 80's when I joined the AARC we did not have a monthly newsletter, meeting announcements were accomplished by post card. There was no website, no email to blast. Facebook didn't exist and we did not have a webpage. The tools we use today have evolved over the last 30 years. Nevertheless the time has come to review our communications strategy and refine our tools. We live in a time where different generations gravitate to different communications media. We need to leverage that knowledge and hone our message.

What is the most effective way to communicate with the audiences that we need to reach? What are the audiences or groups that we need to communicate with (members, hams in the area who are not members, people who would like to become hams, the general public, public officials)? If we were starting from scratch, what would we create to accomplish these tasks? I have asked Marty Wangberg W4MBW to head up a task force to address these issues and others in this area. In the coming weeks we will be asking a number of you to join that effort. If you have an interest in being part of this please let me know.

Time and Change

The Ohio State Alma Mater has a verse that goes "time and change will surely show how firm our friendship". As an organization we must not only perform the functions that are set before us, we must prepare the way for those who will step into our shoes in the months and years to come. For those who serve as officers and committee chair people this means that we should create a portfolio that outlines the duties of the position and the projects that are active and planned. It also means that one needs to recruit and train others so that they can step into leadership when the time comes. Failure to do so makes transitions less than smooth and jeopardizes the success of the enterprise.

The technical committee took a step in this direction this month by asking people to step forward to act as repeater captains. The idea is to form a small team for each repeater with a leader who would take the responsibility for a specific machine. We would provide the necessary training and guidance, but we need people to step forward to help. Our network of machines has grown. There is much work to be done. If you have interest in working with repeaters call Bill Pond N0WP.

Speaking of transition, I would like to start a conversation with the club about amending the Bylaws.

Under the previous version of the By-Laws elections were held in the fall and the club used the November and December meetings as orientation for new officers and board members by having them attend the board meetings to get up to speed. I would like the club to consider returning to that structure. The current structure has the officers elected at an Annual Meeting in January with terms that begin at that meeting. In the event of a significant change of leadership, this does not provide for a smooth transition.

Thunder and Lightning

Summer is upon us and it is time to review the steps we have taken to protect our shacks and our homes from the damage that Lightening can do. Alan Swinger, K9MBQ gave a wonderful presentation on "Station Grounding and Lightening Protection" to the club in February 2008. There is more to this subject than simply unplugging your antenna from the rig. I am going to see if we can post a link to this presentation on the web. Stay tuned!

The food service was fine. (Photos by Jim K4BAV)

Bill Pond on Field Day

Jim, regarding additional information for the Beacon, I wish I had pictures from members that show the very significant other side of the effort. Mark's information says pretty much everything about the operating effort, but doesn't show members doing setup, tear-down, or the amazing work done by Mike and Dawn Gilmore, along with Mike Elliott and AJ Miller at the food tent. Teri Henderson and others also provided additional items, and work surrounding that side of Field Day. I hesitate to name names since it would be very difficult to thank everyone who helped and worked in all the heat, but I certainly would want to include them in those who contributed to our Field Day weekend. Every person I've spoken to has expressed that they felt this was the best Field Day they've experienced, and it was a combination of the location, the overall physical arrangement, the food, the fellowship, and mother nature co-operating by not providing rain during (most) of our time onsite. I know that I had a great time, and I hope that everyone else enjoyed it as much as I did.

Thanks and 73,
Bill N0WP

A couple of photo's taken during the MS-150 at Rest Stop 14 on Sunday, June 9. Marty's (W4MBW) first time using a new "go rig" in an EMP shielded aluminum case.

LED light vs Incandescent vs CFL lamps

By Ron K4RKA

Christmas a year ago, I bought a replacement LED lamp for a fixture which kept blowing incandescent and CFL bulbs, probably due to the captured heat at the base. I figured the LED lamp was worth a try for $10. The light output amazed me so I rigged up a fixture to actually measure the light output at 4.5 feet from the bulb in the fixture to my dining room table. The results are presented below but to save you a lot of understanding, let me say that an 8 watt LED light will put more light on the table than a 75 watt incandescent bulb and more than an 18 watt CFL (even after it has warmed up).

It dims smoothly which you can't do with most CFLs and produces less heat than either of the other two.. It has now been in our fixture for a year and a half and none of the other bulbs lasted more than 3-4 months. The only disadvantage we can see is that there isn't as much light past

about 45 degrees from the vertical as with either other kind of lamp, so it is more like a 2 element beam antenna than a ground plane. Try one, you might like it.

The measurements were made with a Fluke DVM using a Weston Illumination Meter, Model 756, which ".. is provided with a filter which changes the color sensitivity of the photoelectric cells to match that of a human eye and can therefore be used to measure tungsten light, florescent lights of various colors, etc, without correction."

Listed by light output

Lamp type	rating	claimed equivalent	measured 4.5 fm cntr	comment
led daylight	8.6 w	40 w	81 mv	lowest wattage
brightest light cfl #2 soft wht	15 w	60 w	66 mv	
Daylight Incandescent	75 w	75 w	60 mv	highest wattage
cfl #3 daylight	10 w	40 w	60 mv	
cfl #4 warm white	9 w	40 w	58 mv	
Soft white incandescent	60 w	60 w	56 mv	
cfl #1	18 w	unkn	52 mv	
Soft white incandescent	25 w	25 w	25 mv	

The Beacon

The Beacon is the official newsletter of the Albemarle Amateur Radio Club, Inc. It will strive to communicate with, enlighten, and entertain the members of the club in strict compliance with the official word of the club as set forth in the Articles of Incorporation and Bylaws. The newsletter shall be published monthly on or before the 1st day of the month of issue. The deadline for submissions shall be the 25th of the month preceding the month of publication. The primary role of the publication shall be to promote upcoming activities, report past activities and accomplishments of the club and its members, carry the minutes of the preceding month's meetings, as well as, become a recorded history of the club by the archival of all past issues.

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Minutes of the June Meeting

The Board Meeting convened at 7:07 pm and in the absence of K4DU was presided over by Carter Elliot WD4AYS. Officers and Board Members present:
N4UVA, WD4AYS, W4BXG, K4CGY, AD6JV, N0WP, K4BAV, KT4UO

The president is resting comfortably at an undisclosed location. The recuperation is proceeding as planned. Bob Pattison K4DU is recovering from surgery on his Achilles tendon.

1. Approval of money for field day food and refreshments. Expenditures in the past for Field Day have been - $150 food, $200 donation to Earlysville Volunteer Fire Department. We want to increase the FD Food budget to $225 – motion made by Don N4UVA and seconded by Bill Pond N0WP. The motion carries. The increase in food monies is due to plans to serve more meals than in the past and we will have more people Saturday morning (breakfast).

Keith Shifflett, the fire chief has been asked to bush hog back there, and to spray for critters, and move the destruction vehicles. Cars should be taken care of, and will mow 3 days beforehand.

We are reminded the VE session will be Saturday June 22nd 9 am at the EVFD Field Day location

The summer picnic plans are still unresolved. Will bring up at the general meeting
Don will call to check on availability. Will need a picnic budget by the July meeting.

The board meeting adjourned at 7:25

Club Meeting

1. The meeting is called to order at 7:31 pm
2. Introductions
3. Chair recognizes the secretary. Teri Henderson KT4UO asks for additions or corrections to the minutes of the May meeting. None being offered KT4UO asks for a motion to approve the minutes. Joe Giovanelli W2PVY moved; and the motion was seconded by Don Eason N4UVA. The motion carries.

4. Program – AARC Field Day 2013 – Bill Pond N0WP, Jim Owens K4CGY and Michael Gilmore K8RVR discuss field day plans.

Every year Amateur Radio operators, including Albemarle Amateur Radio club (AARC) members, set up stations in the field to have fun, play radio, and to ensure that we'll be able to do so when real emergencies arrive.

ARRL Field Day is the most popular on-the-air operating event in amateur radio. During Field Day weekend, tens of thousands of amateur radio operators gather for a public

demonstration of our service. Field Day is part educational event, part operating event, part public relations event – and ALL about FUN!

The AARC will again be operating Field Day from the Earlysville Volunteer Fire Department at 283 Reas Ford Rd, Earlysville, VA. We will begin setup on Friday morning, June 21 around 9:30 or 10:00, hoping to avoid some of the hottest hours of the day. Then we will begin our on the air operations at 2:00 PM Saturday June 22, and will be on the air continuously until 2:00 PM Sunday, June 23.

This year, we plan to operate class 3A again with two HF stations available for phone and CW in addition to our digital station. However, we also plan to have a "Get On the Air" station and a VHF station, neither of which increase our official transmitter "count". The GOTA station will be available for new hams licensed less than a year, licensed operators who are not "generally active", or even unlicensed visitors under the supervision of a licensed ham. This station should be a great opportunity for visitors to get on the air and have their first taste of our hobby.

Field Day is many things to many people. The overall purpose of the AARC Field Day operation is to hone our skills in operating under varying environmental conditions, fun, demonstrating our skills and capabilities to the public and public officials, fun, fellowship with other club members, testing equipment and trying out new modes, etc. While Field Day is officially an "operating event" and not a contest, for those who view Field Day primarily as a contest, we welcome your commitment, enthusiasm, skills, and experience. We encourage you to sign up for one or more operator shifts and to run a station in contest mode during your shift.

Mike McPherson, KQ9P has setup an online sign-up facility for anyone desiring to assist with setup/teardown, or operate any of the 3 main HF stations. This should allow anyone with an interest or desire to try out a new mode, or experience the fun of operating Field Day, to reserve a convenient time for them, and know that the radio will be available. Please take a look and enter your desired slots at the following URL: http://vols.pt/Z5G6yp

The group of club members who have been gathering on alternating Saturday mornings at Panera Bread in Barracks road will be having their get-together at the Field Day site beginning around 8:00 on Saturday morning, June 21 for breakfast. Anyone is welcome to come by and enjoy the fellowship of this informal group.

Mike Gilmore, K8RVR will be camping on the Field Day site all weekend, and will be cooking not only for the above-mentioned breakfast on Saturday, but also lunch on Saturday, Dinner on Saturday, and breakfast on Sunday morning. The Saturday Dinner will be our usual arrangement where participating members are asked to bring a covered dish to share, and the club will be providing drinks and the main entree' along with paper plates, cups, utensils, napkins, etc. He promises to bring this part of the Field Day experience to a new level, but in order to help him plan it's important to have an idea of how many folks expect to attend. Michael passed a sign-up sheet around at last night's club meeting, but if you were not at the club meeting, and would like to participate in any of these Field Day meals, please let him know. You can email him at "mdg.gilmore@gmail.com" as soon as possible.

Lastly, but far from least, this year, this quarter's AARC sponsored ARRL VE test session will be held at the Earlysville Fire Department beginning at 9:00 on Field Day morning, Saturday, June 22. ARRL VE's are always needed and welcome to participate. .

5. Raffle Item reviewed by KA4KKD

(Break) The meeting reconvenes at 8:12

6. Chair recognizes the treasurer for his report
Beginning Balance: $8,836.92
Checks Paid: $ 912.47
Deposits: $ 201.33
Ending Balance: $8,083.45

7. Chair recognizes committee chairs for their reports
   a. Technical Committee – Bill Pond N0WP

Technical committee report: Noise/interference Issues continue with 146.760. Next visit depends on weather. Site needs to be dry to allow visit.
We have received the Real Time clock modules for all repeaters. Installation will be performed during next site visits. New 444.000 repeater hardware is on hand. Installation will occur as soon as weather conditions allow.
We have determined that the spectrum analyzer (approved for purchase at last meeting) will not provide all functionality desired. Therefore, we are evaluating options to purchase a full service monitor that will provide all functionality needed/desired.

Bill Arnold K4IB – Provided an update on the Sprites satellites. They are scheduled for mid December launch. Information is in the current issue of beacon.

   b. Public Service – Joe Flamini W4BXG - The MS150 bike race was a success, thanks to the Herculean efforts of Jon Scott (KJ4RPW) as Net Control. The .76 repeater had a nervous breakdown Saturday afternoon, and Dave Damon (K4DND) was kind enough to reconfigure his .730 machine so the show could go on. Many thanks go to all who made the weekend possible.

Miller School Race is planned for July 28 – We will need volunteers. Joe will be meeting with organizer to arrange plans and advise we will not be driving our own vehicles.

   c. Estate Committee – Dayton Haugh AA4DH

We sent flowers/dish garden to the funeral of David Jones K4NZ; there are no plans at this time for distribution of his equipment

d. Education Committee – Bill Phillips AD6JV
Three students have completed the latest Technician class license course and are planning to take the exam June 22.

e. Fund Raising Committee – Michael Ryan KA4JJD
Mike planning a BIG report for the next meeting

f. Public Relations Committee – Jim Wilson K4BAV
Field Day advertisements under way

8. Old Business
a. Announce VE Session Saturday June 22nd at EVFD

9. New Business
Increased food budget for FD - board increased this to $225
Annual picnic - discussion about having it at a different date / time; Don is checking into availability.

10. Announce July Program - Charles Battig K4TY will give a talk about smart meters and WIFI in schools

11. Raffle

In KA4JJD's absence, the June raffle will be run by Bill, K4IB, ably assisted by Marty W4MBW. Raffle items for the June meeting consist of two "bricks" of great historical significance.

Item number 1. A fabulous ICOM IC-04AT 430 MHz transceiver, 2.5W, 0.5W. This fine prize includes: 10 Memory Channels, Tone, Spare Battery Pack, and Power Supply. It appears to have a street value of about $70. This is a great starter unit. It was originally donated by Joe W2PVY and has been re-donated by original winner Michael KA4JJD. This item was won by Bill Pond

Item number 2A. An exciting trip Down Memory Lane: Remember Henry Radio? This is the famous Tempo CS-15 synthesized 2M transceiver with excellent mods. It is described by its manufacturer, the aforementioned Henry Radio, as “rugged” and “sophisticated”. This dandy prize includes: Rapid charger, Antenna, Extra crystal, Extra battery, External microphone, Manual and circuit diagram. When first raffled, it was on sale on Ebay $359, but of course, it had not sold at that price.
Originally scored and donated by Teri KT4UO, it has been re-donated by original winner Michael KA4JJD.•+

The meeting adjournment 8:50pm.

ARES® KICK OFF MEETING *in Greene County*

By Bill Sterling, K4OOO

For the past six months several radio amateurs have been working with Melissa McDaniel, Greene County Emergency Services Manager, to form a Greene County ARES® team.

In May, Melissa mailed a letter to Greene County, Virginia, radio amateurs in asking them to attend an ARES® "Kick-Off" meeting June 4, 2013 at the Sheriff's Office. Attending were Melissa McDaniel, Greene County Emergency Services Manager; John Underwood, K4EBS; Bill Sterling, K4OOO; Jack Smith, KE4LWT; Suzette Smith, KD5YBF; Bill Steo, K4FZE; Jeanne Rexroad, N4ZGI; Max Vickery, N3DFS; and Dave Damon,K4DND (Virginia Section District 3 Emergency Coordinator from Albemarle County). Two additional amateurs (Wes Soper, W4SNP; and Bill Pond, N0WP; were in absentia but considered present) previously notified us that for personal reasons were unable to attend; and informed us of their desire to be members of the Greene County ARES® team.
Meeting Points of discussion:

- We spoke of the need for emergency communications within the borders of Greene, as we have none at present. Other adjoining counties do.
- An Amateur Radio Emergency Services (ARES®) coordinator is needed for a 1-on-1 with Melissa McDaniel. Emergency Communications is only one facet of Melissa's job in GC and she would need a "point" person to make contacts, etc, under her direction.
- In the event of potential emergency situations (tornadoes, flooding, etc.) pre-planning meetings would be held. One or more members of the ARES team would necessarily attend.
- In the event of a power outage, it may be that the only repeater available for communication would be the one in Buckingham (146.790 MHz), as it is off the grid. However, we must make certain that this repeater (and all other appropriate repeaters) can be "hit" from all points in Greene.

ARES® Registration forms were completed by those who had not done so previously. Amateur radio operators will eventually be working in the Greene County sheriff's office periodically, therefore it is necessary individual background checks be performed.

The next meeting is scheduled for Wednesday, July, 17th at 10:00 AM in the sheriff's office. Between now and then, the homework assignment for all is to make sure our ham radios are in working order.

At the conclusion of this meeting, we were given a tour of the area where the EC central office will be built and to see the tower where the EC antenna will be installed.

Solar Energy-based Power for Ham Radio and beyond

By Roland Beard KK4EDU

About a year ago we did a presentation on the subject and have not changed our opinion: solar-based energy power is a good way to go. However, we have made a few technical changes in our system and learned a few more things that might be helpful for someone considering this direction. But remember that I am a user—not a solar expert. I want power when I want it, and I want it simple to set-up, operate, and put

away. That kind of pragmatism is similar to my approach with radio communications: I want it to work when I need it but I don't want to be an electronic expert—I already have too much on my plate. With these things in view, the guidance that follows is oriented for a layman because I am one.

REQUIREMENTS FOR POWER. Everything goes back to why you need energy, how long you need it, and how much you need. In most cases, HAM radio is touted (I believe correctly) as a saving grace in time of disaster or calamity or where power sources are not available. In these cases, power requirements almost always reach further than a radio. At minimum, someone usually wants some lighting, basic refrigeration, electronics (laptops…phones…etc.) with enough power to spare so these things can remain powered for awhile. Of course, power requirements usually dovetail with other requirements that I won't talk about here, like food, water, and shelter, but these things are addressed in emergency preparedness sorts of references so they are not covered here. Regardless, everything gets easier when there is power, so the first step in a solar-based energy system is determining power requirements. The math is simple, but deciding what you need takes a bit more thinking. Our requirements boiled down to this: run a small chest freezer as a frig (run it part time) to keep food/medicines, run two radios (100w output for each), have enough lighting for security and comfort to operate the radios or read, charge some rechargeable tool sets, run a small battery charger for other batteries, and be able to do all of this for several consecutive days (meaning an average amount of sun is available over the period). IF a person only wants to run one radio, the equation for what needed is quite a bit smaller; you don't need much. If you want to run a regular frig and load up a couple of 15 amp circuits, things get a lot bigger quickly. We were in between these two data points. Last, but not least, my system had to be car portable.

DESIGNING A SYSTEM. I cannot do it. That may come as a surprise, but remember my pragmatism. Once we knew our requirements, I wanted our system to work easily, which included an easy setup and breakdown. I understand the basics, but after that, I am a layman. So, we needed help to design. I recommend getting help because it is not trivial to figure the balance among battery storage capacity, panel capacity (how many and how big), the proper controller, and the correctly-sized inverter unless you are buying a complete prepackaged system. Those are available, but I wanted something with more capacity, a little growth potential, and mobility. I used Randy Peltola at Genesis Home and Energy (www.genesishomeandenergy.com). He is new at the business but an experienced engineer. He does mostly larger fixed systems but took the time to talk with me to design my mobile system. He got the components and helped me assemble and test everything. He is willing to give advice and guidance to folks wanting to have solar energy capability in emergencies. He even gives classes to the public on the subject. So if you have tech questions, I recommend asking him. And, he is willing to give a class to a small group as a public service.

OUR SYSTEM DEFINITION: At the outset, let me report that we have run our system multiple times with multiple loads. The basic design works. We changed out panels (went to a smaller 140 watt panel instead of the larger 240 watt panel) and controllers (went to a MPPT or staged controller), but everything else stayed the same compared to the presentation we did at the club last year. So, at the present time we have 2 100 Ah solar batteries, double controllers (Blue Energy--Solar Boost 2512i, 25A MPPT charge controllers), 2x140W Kiocera PV panels, and various lines, connectors, and safety features (fuses are required for a couple spots in the system). There are lethal currents and voltages involved like radios, so you have to fuse them correctly.

While radios like 12V, we have inverters for 110V applications, including power supplies if we decide not to go direct to 12V. We use, depending on the power needs, one of two inverters. The larger one is a PROwatt SW 2000 (a popular hearty controller) that has two AC outlets. The smaller capacity inverter is a COBRA 800, which could be hooked up to the same system. The COBRA, of course, has more limited capacity. The numbers indicate watts.

We can run two panels, one controller, both batteries and the big inverter as one system. Or, we can run one panel with a controller to one battery and run either the larger or the smaller inverter. We can also operate two completely separate systems (each with one 140 watt panel) at two locations on our property or be mobile with both systems. If I buy two more panels (which we will probably do), I will have duplicate 280 watt capacity systems. Our approach gives us lots of flexibility and some expansion capacity. It may sound like too much is duplicated, but the only added costs were those associated with an additional controller, wiring, connectors, and an additional control box (a Stanley tool box on wheels). When you lose power indefinitely, we have learned the nice feature of having systems that can be operating from two different locations, even if they are feeding things on the same property.

At the recent field day, I brought the "Stanley tool box-based system" to power one of the HF stations. I could have powered more without cracking a sweat for several more days. It would be interesting if someone would do the math with some assumptions about duty time to see if the 2-panel/2-100 A-h battery system would power most everything for field day (the radio stations, computers/screens, and lighting). The desk computers with the large screens would drive the requirements, unless it was some big fans for the operators to stay cool. ☺ Radios do NOT generally drive the power requirements.

ENERGY CAPTURE CAPABILITY: The bottom line for anyone's solar system is simple: can you last a night and still have something left when the sun gets to the tree line in the morning? If the designer and customer have done the calculations right—the estimates are properly based on average sets of days (some cloudy, some sunny, some in between)—then you should be able to get through most nights with what you want to power and be able to recharge the batteries the next day to capacity.

In terms of energy capture capability at any moment, I have seen one panel charging at 2 amps when the sun is barely visible on the horizon and panel angled almost 120 degrees from the sun! I regularly see, during the middle 6

hours of most cloudy days, the controller delivering 3-5 amps to the batteries. A single panel easily delivers 7-8 amps on a clear midday. This assumes a panel that faces 30 degrees or so from the sun (not an optimum position).

Two panels, when our storage is somewhat depleted from the evening before, can (through the controller) pump 14-15 amps into our two storage batteries at a little under 15 volts. That is pretty good charge capacity. And, the controller "senses" when to go from a bulk charge to a lower charge rate to a float charge. My arrangement keeps the voltage below 15, which keeps some inverters and some more sensitive equipment from getting upset and shutting down. The controller is "smart" and keeps the amperage adjusted to meet the demand if it goes up, but does not over "pressure" the batteries or connected loads.

The right controller choice and the right balance of panel size/number with storage capacity really help things work right. The right number of panels means the requirements were estimated correctly. The right battery capacity means it can run what you want through the night but the panels can recover that capacity during the next day. A decent controller will adjust its delivery to the batteries as conditions or battery status change but not waste energy doing so. With a few adjustments, we were pretty close to right the first time but adjusted panel size and controller to optimize the design.

COST: The initial capital outlay for solar-powered battery storage systems is not cheap but a lot cheaper than it used to be. And, components are better these days. Panels do more with less light, controllers have better features for staged charging (which batteries like better) and batteries have gotten better. Controllers typically have 5 year warranty periods; inverters a little less; panels can last well over 10 years. Home fixed panels have 20-25 year lives. That said, a whole system is still a bit pricey, but this goes back to your requirements. We went to Katrina twice; we learned not to depend on fuel and generators exclusively. My doubled system (two controllers and two batteries and two panels along with all the stuff to put everything together, including the inverters for output at "house voltage") was about 3.6K, but the federal tax credit was $1100 (not a deduction…a straight credit). I think the credit is still going.

240 watt panels run about 300 per panel or a little more. They are great for systems that don't move around a lot. The 140 watt panels work better for our mobility requirements but cost about the same (they are better panels, also.) The MPPT charge controller is around 300 (I hope I remember this right). Larger controllers can get a lot more expensive but they run larger numbers of panels and supply larger storage capacity. One good sized mobile inverter (like our PROwatt 2000) is often most costly single component. Solar batteries are a bit expensive, but they also have larger capacity and a few more nice features than a deep cycle AGM that you can buy at most auto stores. For portability, if I did all this over again, I would probably get 2 or 3 deep cycle AGM at 50 A-h each…simply because they are not so heavy to move around. For a relatively fixed system, I would get what I have: solar batteries with as much capacity as I needed.

THE RANGE OF OPTIONS: By all means I recommend getting a small pre-packaged system if you just want to maintain a small battery storage (which is bought separately) for 1 or 2 radios, and a tablet/laptop, and some LED lighting. There are lots of vendors and possibilities, and they range in price (a few hundred dollars) and quality (so-so). For what they do, they are OK. Watch out for poor quality components and short warranty periods; many systems have marginal characteristics.

There are also little flexible panel systems. I have one designed for 25 watts with all the hook-ups for little electronics. It can keep a small storage capacity relatively topped off if my demand is pretty low. The price per kW for this type of system is typically twice as high as rigid panel system; their controllers (that ones I have seen) are not nearly as capable. They can be linked together to get 50 or 75 watts but then you have stuff strung everywhere to make it happen. I wish these were better and had higher capacity, but I have not seen a product I liked that reaches 140-200 watts (equivalent to one regular sized photo voltaic panel) without being unwieldy and costly.

If you have wider and deeper power requirements like us, most of the prepackaged systems I looked at did not hack the load requirements that we had estimated. The next stage up is something like ours. RV-oriented systems are about the same capacity, but I found many had poor warranties and had little mobility because they were permanently fastened and hardwired to the coach.

The next size up is a fixed system for emergencies in a home. They have a wide range in cost that is dependent on the power requirements (what you want to run). The largest systems run the home. A modest system to run a few circuits and critical appliances AND tie to the grid is what Randy does most of the time. House/fixed systems are wonderful and have much more capacity than ours; they cost a lot more. However, a person can start with a system that can be expanded later in terms of storage capacity and panel capability. Again…it depends on requirements for power.

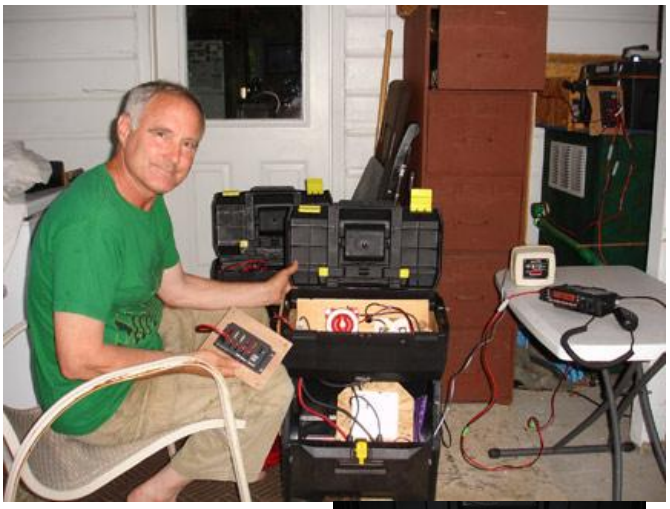
WHERE TO GO FROM HERE: If you want to see our mobile emergency system again, I would be glad to show it. If you have an idea of what you want to power and for how long, those requirements with some questions should be put to a solar expert. That is where Randy (or someone like him) comes in—especially if you want to tie it to your home. Some vendors have pre-packaged systems for emergency use or RV use that can be bought but ensure that you read the fine print about how it can be used and what its limits are. Last, if enough people are interested, Randy will give his solar class again. He said he would be glad to do it.

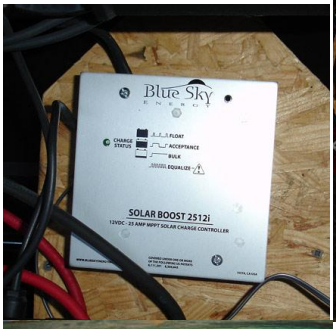
IF WE RESTARTED TODAY, WOULD IT BE DIFFERENT? The simple answer is "no". Our mobility requirement has proven its value several times between our travels as well as being able to relocate power generation on our property as we wanted it. If we were younger and/or starting with a home that we expected to live in for awhile, I would put in a fixed system with 3-4 times the capacity of our "mobile" system…and tie it to the grid. BUT, we would still have a little mobile system, too.

A solar-based system is a good way to go. It's clean power. It works.

Last but not least: a system likes to be used. Batteries don't like non-use. Our system powers our observing station,

mobile radio stuff, charging other systems (I charge all other batteries using a staged charger that hooks to a 110 outlet of the inverter), and our little chest freezer (about 1/3 of the time). I make it work…not just for emergencies. A solar system is really happy if you make this kind of attitude adjustment to make sure it gets used periodically. Mine does. I am a skinflint: I will make it pay for itself….and provide emergency power needs.





Classified Item Listing

To place an item in the Classified Listings just send an email to k4rka@juno.com

= NEW SWAPFEST ITEMS & MOST RECENT LISTINGS as of 5/25/2013 =

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Base Antennas for sale

2 meter Spectral Isopole-$50.00 good for repeater use
6 meter Ringo vertical -$25.00
10 meter Maco V58 5/8th wave-75.00

Thanks
Jaime Bernate-KA3NXN@COMCAST.NET

==========

FOR SALE

2 meter / 450 beam. 10 Horizontal and 10 Vertical elements, 2 feed lines. $50

2 element 5 band quad antenna, 20-10 meters. Fiberglass spreaders. $75

G5RV 80 - 10 meter version w/about 40 ft of RG9x co-ax. $35

pictures available. contact ron at K4RKA@JUNO.COM or 434-973-3640.

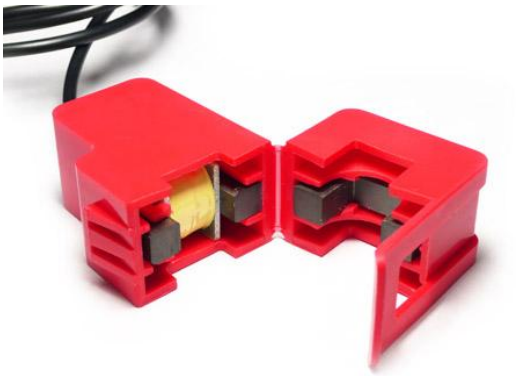
FOR SALE - posted 6/30/2013
Nelson Ross spectrum analyzer model PSA 236 with a model MF-9 plug in.
The unit covers 100 Hz through 25 MHz. Center frequency tuning to 25 MHz.
scans: full scans 0 to 25 MHz. Adj. 1 KHz to 10 MHz scan width.
Resolution: 100 Hz - 20 KHz, automatic optimum and manual.
Vertical displays: Linear, 60 dB log and Square Law.
Distortion Dynamic Range: 60 dB, Sensitivity: -105 dBM.
Markers: Xtal Comb at 1 MHz and 100 KHz intervals. $100 or best offer
W4RAE, Tom Rae (434) 978 2003

My backup generator and more . . . By Sam Gentry N 4WJQ

Like many home owners I have a backup generator. For a long time I have wanted to know how much power I am using from the generator and if the load is more or less balanced on the two legs. Recently I decided to tackle this issue.

I could installed 30 amp shunts in the box that has the transfer switch. and read the current with a meter. In fact, this is a relatively low cost solution. I found a number of little digital panel meters that included the shunt on eBay. The price was not bad, less than $25 (X2 for two legs). However, I really did not want to get into rewiring the transfer switch to route the generator through the shunts. Also, even at 30 amps the shunt is fairly large and would present a mounting problem in the switch box.

The other issue was that I wanted this to be a project and the shunt was a little too easy. In addition, at about $50 it was more than I thought it was worth. I wanted a solution that would be interesting and as low cost as possible. A little research led me to an interesting little gadget... a split core sensor that provides an analog output of 1VAC for 30 amps AC. At less than $10 this seemed like a good choice.



Non-invasive AC current sensor

I bought a couple of these things and clamped one around each leg of the generator feed. They seemed to work very well. However, I was not satisfied with reading the 1 VAC for 30 amps output with an AC voltmeter. I wanted to display the power in KW on a digital display. I decided to build a circuit that would display the power.

My first thought was an OP AMP that would amplify the 1VAC signal to something like 3.6VAC. That would represent 3.6KW (30 amps in each leg is 3.6KW in each leg or 7.2KW total generator capacity).. My OP AMP circuit worked fine and I could read out the power with a digital multi meter (DMM).

I found a couple of small three digit AC panel meters on eBay for about $4.00 each. Well... they did not like the output of my OP AMP. A look with the oscilloscope revealed what I think was the problem. The output of the current sensor is a very strange looking “sine” wave (very accurately reproduce by the OP AMP). Apparently my DMM could handle it but the $4.00 panel meter could not.

The next approach was to rectify the AC output of the OP AMP and use a DC panel meter. The addition of a diode to the output provided a half wave rectified version of my original signal. With a little adjustment of the amplifier gain I could read 3.6VDC for 30 Amps AC with my DMM. Back to eBay... I found dozens of small DC digital panel meters in the 0-10V range. The price was right at about $2.00-$3.00. These incredibly cheap meters worked perfectly. I could now read out the power in KW as volts on my meters.

I was still not entirely satisfied. The diode drop created a dead band. I could not read any power below about 600 watts. I could play with the gain to make the higher power come out more or less correct, but I could not see the lower power. Then I discovered the precision rectifier or “super diode”

The “super diode” is an OP AMP trick to eliminate the diode drop and rectify a small AC signal. An improvement on the “super diode” circuit makes it full wave instead of half wave. There are plenty of papers describing how this all works and I am not going to go into that here. What I will do is give you the circuit that I ended up with and tell you where to get all the parts.

The LM324 is a quad OP AMP in a 16 pin package. Two of the amplifiers channels are required, duplicating this circuit for each one. The 9VDC is provided by a 9V battery. This battery also provides the power for the little panel meters. I built the circuit on a Radio Shack project board and mounted it, the two panel meters an on/off switch and two 1/8” stereo jacks (the sensors come with a pigtail terminated in 1/8 stereo plugs) in a Radio Shack plastic project box..

I assembled the project and checked it out. I separated the two wires of an extension cord and clamped one of the sensors around one wire, then used several loads to get the calibration to my satisfaction. I used a an electric heater that would do 600, 900, and 1500 watts. After adjusted the pot to get 1.5VDC with the load at 1.5KW it was tested it at 900, 600, and using

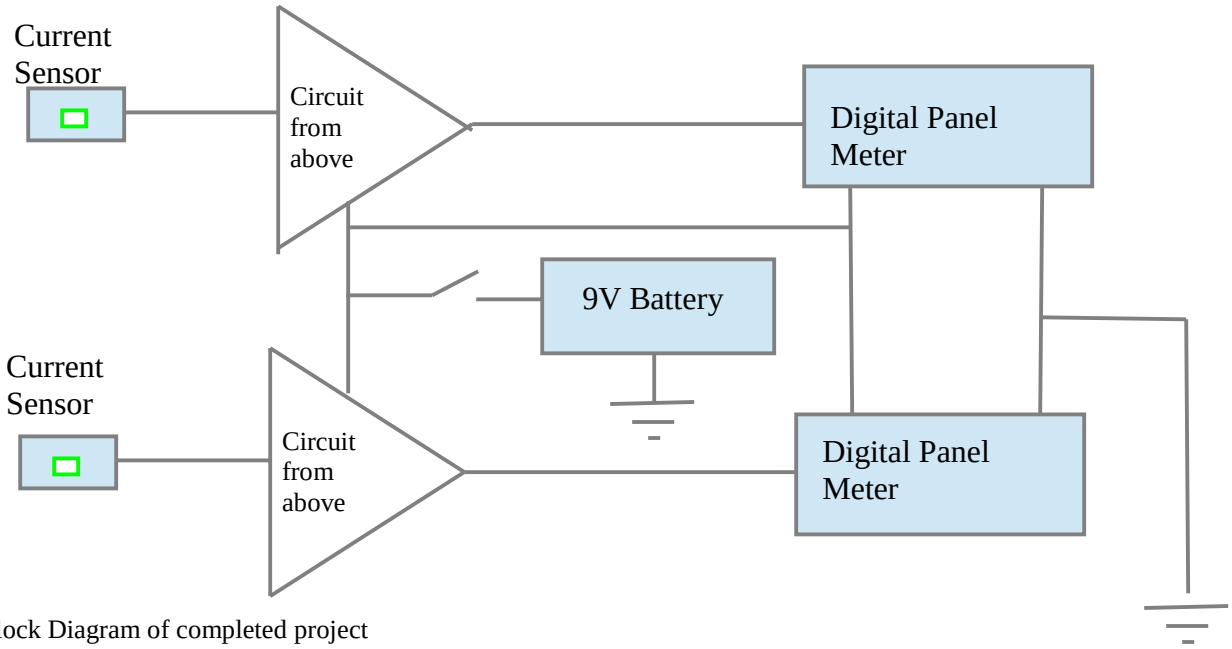
several lamps at 180, 150, 60 and 40 watts. The answer was actually surprisingly accurate. Each test reading was correct to within the 10 watt resolution of the 3 digit meter.

Parts List

Part	Qty	Source	Part Number
LM324	1	Radio Shack	276-1711
Project Board	1	Radio Shack	276-159
Project Box	1	Radio Shack	270-1803
100K pot	2	Radio Shack	271-0284
Toggle switch	1	Radio Shack	275-0636
Phone Jack	2	Radio Shack	274-0249
Current Sensor	2	seeed (see note 1)	SCT-013-030
300K Resistor	2	Your work bench	
Diode	4	Your work bench	1N914
Filter Capacitor	2	Your work bench	
DC panel meter	2	ebay (see note 2)	

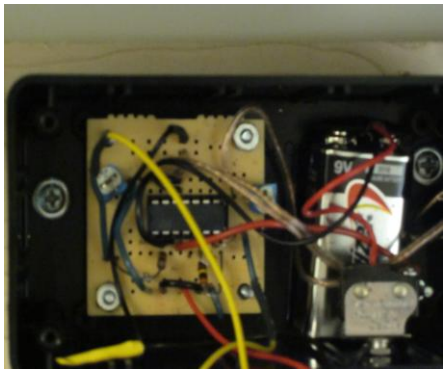
NOTE 1: http://www.seeedstudio.com/depot/noninvasive-ac-current-sensor-30a-max-p-519.html?cPath=144_154 or just search for STC-013 several US suppliers have it or you can get it from the manufacturer in China..

NOTE 2: Be sure you get a meter that is three wire. Some of them are two wire and use the sample voltage to power the meter. These will not display voltages less than about 3.2V.



Block Diagram of completed project

Completed project installed above the generator sub-panel



Elected Leadership 2013

Bob Pattison – K4DU	President	rep4@aol.com
Carter Elliott – WD4AYS	Vice President	celliott14@aol.com
Teri Henderson – KT4UO	Secretary	kt4uo@earthlink.net
Don Eason, Jr. – N4UVA	Treasurer	deason@comcast.net
Joe Flamini – W4BXG	2-year Director of Public Services	oeflamini@gmail.com
Dayton Haugh – AA4DH	2-year Director of Estate Services	dayton@compuserve.com
Bill Pond – N0WP	2-year Director – Technical	wdpond@mac.com
Bill Phillips – AD6JV	1-year Director – Education	billp1048@earthlink.net
Michael Rein – KA4JJD	1-year Director – Fundraising	mfr6t@virginia.edu
Jim Wilson – K4BAV	1-year Director – Public Relations	jwilsonphoto@earthlink.net

Please Note

Submissions are welcome and encouraged. Please consider what you would like to share with your fellow club members. It could be unique knowledge or approach to solving an amateur radio problem. It could be a piece of history you discovered related to the club and/or its members. It could be a photograph of some club activity or individual member activity – all ideas are welcome. In all cases electronic submissions are appreciated because my keyboarding can only introduce gross errors.

Submit your input and/or ideas to:

jecrosby@comcast.net
434-823-2277

The End

That's all I have for this month.