HandyBob's Blog
Making off grid RV electrical systems work

April 2012 – The Money Question

Many people keep asking for an update. I hate to tell you that very little has changed in the RV Solar world so most of what I am saying here is just going to be repetition. However, this is the latest as of April. 2012 with some new information about what is going on in Montana. We are slowly developing our cheap rural Montana property. We have less invested here than a city lot would have cost where we had our last real home. Again, DO NOT CONTACT ME THROUGH THE BLOG. My email address can be found, but you will need to read to find it.

Bob builds a new road. The original one took two weeks using a shovel and wheelbarrow. You saw that one on an earlier page. This one took two days.

Meet Daffodil, a 40 year old British Ford 3 cylinder diesel backhoe found on eBay. She is a wonderful old girl. A set of new tires would cost what I paid for her and she starts better than the truck. Those tires had the original size markings visible on the treads! Yes she leaks and needs work but wow!

We had a 45ft motor home come in on this new road last summer so now anybody can make it. The road to our remote slice of Heaven is 2 miles of sometimes wash boarded gravel after 4 miles of the roughest paved road most have ever seen from town. People who visit are going to some effort to get here. We think it is worthwhile. Only 6 miles from town and we feel like we are camping in the wilderness.

You have to use your imagination but there is that shop building. The slab was finished September 2011. The shop should be completed this summer. Notice the orchard of fruit trees just downhill from the septic drain field. (Passive waste water recycling.) This picture was taken from the roof of the "house". Our beautiful view is in the other direction.

THE ISSUE OF MONEY KEEPS COMING UP……..

For the past couple of years I have gotten dragged kicking and screaming into running a real solar system repair and installation business. Previously I was running a little part time home remodeling business; HandyBob, craftsman at large. The same discussion happens over and over with the people I help. This statement has been said in one version or another many times: "Bob, you should be getting paid for what you have done for all of us." The other one, after I have done what people thought was impossible and made their system work, many times while talking them out of buying more solar panels and sometimes after they have paid not one, but two or even three of those professional dealers a lot of money for things that never worked before finding me is: "Bob, you are not charging enough." Don't I know it, but many cannot afford that $110 an hour that is posted on the wall at some of those places. I charge what I need to get and I keep the cost as low as I can. I am a low budget guy & my customers are my friends. I am a one man show so

people who come to me are enlisted to help. People who want to spend a lot of money can and should look elsewhere. I have encouraged some people to do just that. I only work for people I believe can be successful using solar power and this requires some effort and learning. My business is HandyBobSolar, Boondocking Support. It is not just hooking up solar panels.
People like to assume that anybody who can afford solar panels must have lots of money. I have news for them; we did it instead of buying a generator or paying to plug in at RV parks and I spent a lot of time & what I now know was too much money before I got it right. It was a very frustrating experience. I have also done a lot of free work for people who really needed it. Our trailer is 16 years old, our truck 13 and we cannot afford to replace them. After 12 years in an RV we have decided to concentrate on developing our cheap, rural property in south eastern Montana and try to build a home. The first thing going up here is a shop building so I have a place to work from. The address is not given out on purpose. I talk with people via email before they get the phone number or the address. If I have people showing up just to talk I will be forced to hire help and while the price goes up, the quality suffers. We do not have enough funds to complete our house after what happened to our investments in 2000, even doing it all myself and not paying for that power line or a $15,000 well. We will do it as we can. We are never going into debt again.
So…… Anybody who really believes that I have helped them enough to be worth something can use PayPal to donate funds to my email address: bobanene@gmail.com PayPal has made this easy; you don't even need to have an account with them. They take credit cards and they deal internationally. Donations to our favorite charity (us) are very much appreciated. Some of the people I have worked for have tipped me very generously when they realized just what I had done for them. Some of the gifts we have received are amazing. There are some wonderful people in this world.
The reality is that many people I have worked for cannot afford to pay anything at all after they have been taken advantage of by some crook. Therefore, I will continue to help many via internet for free and the goal is unchanged. But please realize that I cannot do detailed designs for rigs I have not seen and that kit idea just isn't practical.

NOW FOR THE UPDATE:
I still believe that the Morningstar Tristar PWM with the optional temperature sensor at under $200 is the best bang for the buck in charge controllers. Consider MPPT only if you are going big, over 600 watts and then, if you can use the big 24V panels, buy them. Do not buy a cheap, "budget" MPPT controller. You get more energy late in the charge cycle with a smart PWM controller that stays in absorption mode than you get early in the day due to "boost". People who have bought those things do not want hear this and of course the glossy marketing you read will also not agree. It takes a lot of thinking to understand it, but it is true. There really is not enough boost to measure late in the charge cycle and when the panels are hot. You need to realize that the conditions that supply extra amps do not last all day. You get the 25% boost when a system is not producing much anyway. It goes away as the sun gets higher and the panels get hot. Yes it works, but adding a panel costs less on small systems than buying an expensive controller. I still use a Tristar PWM with 600 watts on our rig and I have no plans to change it. (We bought a freezer, so I finally had to add panels.) I will be using 24V panels in series for higher voltage and MPPT on my shop building where it does makes sense. Which controller I will use is undecided. However, a few of the overly complicated, very expensive things have been ruled out.

I will not work on a system without installing a real battery monitor. On the surface this does not look like something a low budget guy would say and people with pop up trailers and pick-up campers can get by without one, but many people with those have thanked me later when they realize just how knowing what is going on with their batteries has allowed them to live instead of to worry. When somebody tells you that you can monitor your batteries with nothing but a volt meter, ask them if they would like to drive a car with a fuel pressure meter, but no fuel tank gauge. This is a very similar concept. You need to know how much fuel you have left if you are going to expect to be able to live decently on battery power. A volt meter or a charger remote will not do this. I like the Trimetric 2025 the best, with a 500 amp shunt. I do sell these, but I am not set up to ship anything yet. The Magnum BMK is easier to install and is self adjusting, requiring very little input from the installer. That is why dealers like it and I understand. However, IMHO the BMK is not as user friendly (just try to find it in the inverter remote by pushing buttons) and the self adjusting program is just not as accurate as I think it needs to be. I have installed Trimetrics on three systems that already had a BMK. But I do love Magnum inverters and am recommending them to everybody. I am now using one bought for my shop building to run construction tools from some 6 year old Trojans that were given to me.

Go big on the solar wire, but don't get carried away. Please don't carry this statement over into the rest of the rig and think you need to run big wires everywhere, either. Copper is expensive and it comes out of the earth. Don't waste it. Anything over #4 in an RV is ridiculous. Do the voltage drop calculation or just look it up on a chart. Realize that the difference in $$ between #6 & #4 is not much, but using #4 for one or two panels when #8 would be fine does not make any sense, either. By the way, that dealer who said that #4 would have cost $100 more than #8 on a 30 foot run over three years ago is a liar. 30 ft of 2- #4's should cost a bit over $3 per ft total today, not $3 per ft more. Maybe $45 more today. Definitely the right thing on 600 watts. Put that controller as close to the batteries as you can. You have to get the voltage coming out of the controller to the battery and wire length is the enemy, even if it is big. This is 90% of the secret. Well, that and a "real" controller that keeps charging after reaching set point voltage.

AGM batteries only make sense if you have a severe access problem, where checking and adding water is very difficult. They cost a lot of money and most people find that they do not last any longer. Undercharging can quickly kill them. I am not the only person who says this: http://www.sterling-power.com/support-faq-2.htm. The people who tell you that AGM's take a charge a LOT faster are reading it off of glossy marketing brochures or believing people who heard it from somebody else who did. Just how much better could they possibly be than my 6 year old Trojans that are running at over 98% efficiency as measured with a Trimetric?

I will still recommend no installer without reservation. You have to know enough before you hire anybody so you can demand that it be installed right. If you are the type of person who thinks that you can just hire some professional and you don't need to get involved, you should not buy solar power. Seriously, becoming your own electrical utility is not for everybody. It takes some thought and involvement. I spend a lot of time in education with the people I work for, something absolutely lacking at the professional dealers. Well, what should I expect? If they don't know how to make it work, how can I expect them to educate their customers?

Oh I know, they are not ALL crooks. However, I wish you could show me just one who was installing, wiring and setting systems correctly ten years ago. You cannot. Everybody was using 10 gauge wire to hook up multiple panels systems that would charge the batteries only if people would turn everything off and sit and wait. And there is still a mind set in our world saying this is the normal thing to do. We do not live like that; nobody has to. None of those guys is willing to provide free labor to fix the stupid things they did back then, either. Most controllers were being installed at the other end of the rig from the batteries back then (many still are). Before I published my ranting this was standard operating procedure. I don't think I ever saw a single

professionally installed system from those days that actually worked. The only ones that did work were owned by people like me, the ones who figured it out on their own. And there are still a lot of systems that do not work, owned by people who don't know any better and they defend or brag about their systems as if they work. Ask enough questions about what they successfully run on solar power or how often the generator runs and you may get to the truth, but be careful who you ask for advice.

I know that as much as those dealers bad mouth me, they are having to do better because of my efforts and this is why I am bringing the money issue up now. I have hundreds of hours and a lot of sleepless nights invested in turning this problem around. A couple of the dealers (both located somewhere besides Quartzsite) are now doing fairly well, but most are not. Systems that work to full potential are still rare. The best dealer in the country by reputation, who does beautifully installed systems, still defends his past under wiring of systems by designing based on the lowest amps produced during the worst winter conditions, so unless you go there with enough knowledge to demand better, you can still end up with a very expensive system that doesn't do what it should when the sun is higher during the summer. Why shouldn't you be able to live better when the sun is higher? What is wrong with this idea? This dealer is not a low budget guy either, so take your big fat checkbook. Late last year he charged a lady whose fuse had melted down hundreds of dollars to change her #8 wire on a 300 watt system to #6 and then left her charge controller 15 ft away from the batteries, where it would never work. I know this because she traveled across several states for me to look at it and tell her why it looked to her that it still didn't work right. She moved her controller herself and now it works! He spends time on discussion forums using techno speak to defend his past use of #8 on 600 watt systems, coming across as perfectly reasonable and then does this on a 300 watt system. Make up your mind, guy. Maybe you should conduct that recall that I suggested when you contacted me several years ago to complain about my blog. If you would just get this one last thing right, I might start recommending you.

At this point I want to say that the only reason I don't come right out and name these idiots is I don't want to have to hire a lawyer. Not that any law suit could ever be successful, truth is truth. I don't name them but you can figure out who they are. When they recognize themselves and complain, as far as I am concerned it just lends credibility to my statements. You will notice that I do say good things about people who deserve it. All of the happy, politically correct, feel good posts on the internet forums are not solving any problems. That is why I gave up there. People who are "nice" can get free advertising. People who tell the truth are banned. When you see some installer recommended there you need to ask yourself what I say in my puzzle. Does this guy live off grid in an RV? Does he know how to make solar work, or is he just doing nice looking things that don't really work, for customers who don't know any better? The two best dealers I know of, who are somewhere besides Quartzsite, have their businesses connected to the grid and I think that speaks volumes. Some of those guys have never heard of voltage drop and many are still using charge controllers that are not set at the voltage needed to work. The majority of the charge controllers sold today are set at the voltage that was thought to be correct 15 years ago and most are located too far away from the batteries to work. That voltage changed years ago when Sandia Labs published a study on solar battery charging.
Anything turned out in Quartzsite that actually works right today is still a happy accident. I hear one dealer is using #6 on big systems now, but he is the guy who has used romex staples and exposed terminals on many people's roofs. The word craftsman does not come to mind when I think about the things I have seen that came from there. How many inverters has he installed with the transfer switch wired wrong? How many paralleled controllers that say right in the directions this will not work? I would not let him work on my rig if he were the only dealer left on the face of the earth. I am not making these things up. The people I have worked for have witnessed my temper tantrums when I took these things apart and started ranting about his stupidity. Ask them! The lack of concern and sloppiness there is not to be believed. Yet, you will still find people who recommend him. Recently I got a report from somebody who just had to buy from him even after we talked, saying he got a great deal at the end of the year. When he got back home two states away and opened the box, he found that the panels were not the ones he had paid for. Then, the temperature sensor supplied for the charge controller was the wrong one and didn't work. Just great! Buy from him and keep him in business. Thanks for helping.

One of those Quartzsite guys contacted me via email last winter and said that he agreed with my writings and wanted to meet. He went on to say that he spent a year working for the above dealer and could confirm everything I have been saying about him. I went to his place incognito to look around and found that he is still selling old technology on-off controllers and inverters that will not work at over 15V. Guess what I replied to him in an email. It was not nice and politically correct and I never heard from him again. Saying one thing and doing another does not get my support.

There is one semi professional dealer in Quartzsite who does nice "looking" work and many recommend him. However, he still refuses to set controllers at the proper charge voltage. And his favorite charge controller manufacturer agrees with him. I tried to talk to both of them, suggesting that they need to talk with Trojan and I had to give up. They have no clue that the sun does not shine 24 hr per day. Having a charger that is set too low going 24 hr per day would work but the sun sets every day. If you have not gotten your batteries charged up by then, you certainly are not going to "boil" them in the dark. Winter charge days are 5 hours long, people. That is all you get! I just retired 11 year old batteries, so I obviously have no clue about the truth here. (Sorry, sarcasm is my way of coping.) He is also very fond of #8 wire on big systems and can't seem to figure out that drilling a hole once in a while so the wire can be routed better and made short enough to minimize voltage drop might just help. The shadow issue on panels is another that will never be understood in that place. I wonder if he is smart enough to use a meter. Actually I think he does know better. You need to remember how he makes money and look at the price of his solar panels to understand it. This guy charges the highest prices in the country and people who don't have enough power do go back to buy more expensive solar panels. I have rewired many of his systems and made them work. Not once have I seen a system installed there was done entirely correct and that could not be improved. Most do not work and people do go back to buy more solar panels, so the business plan is working well.

Beware of Chinese AGM batteries that sound like a great deal. NOT. The failure rate is very high. I recently found out that even Trojan AGM's come from China after a friend's had failed after only five years. Egad. Is there nobody we can trust? If you have to buy AGM's, buy the Concorde (Life Line) or maybe Deka (Penn), both are US made. Trying to skimp on the heart of your system is foolish. Flooded 6V golf cart batteries from Trojan, Crown, maybe some others, (but not the cheap ones) are what make sense. One more time; L16's do not belong in RV's.
As usual, I have gotten carried away again. I wish I could be reporting better things. Now, please go and read the RV Battery Charging Puzzle before asking me any questions. Then, bobanene@gmail.com.

For you DIY folks, here are some photos of installations that will help.

A simple cheap combiner box. All of the parts came from a big box store, and #4 booster cables from Walmart.

Tristar PWM, air conditioner disconnect, shunt for the Trimetric in the middle, inverter fuse at the bottom & inverter to left, insulated positive lug in lower right corner. AC power comes into the back of the 4×4 box on the right. It looks like spaghetti but this is just about the cleanest installation you will ever see and you can trace the wires. The batteries are through the wall on the right. (There Jim; now your rig is famous.) Warning: Do not buy the cheap air conditioner disconnect like this one if you are hooking up more than 25 amps. Find a Midwest Industries one. They are built a lot heavier.