"TALKING ELECTRIC FENCING" SOLAR POWERED ELECTRIC FENCES

by Bob Woodhead

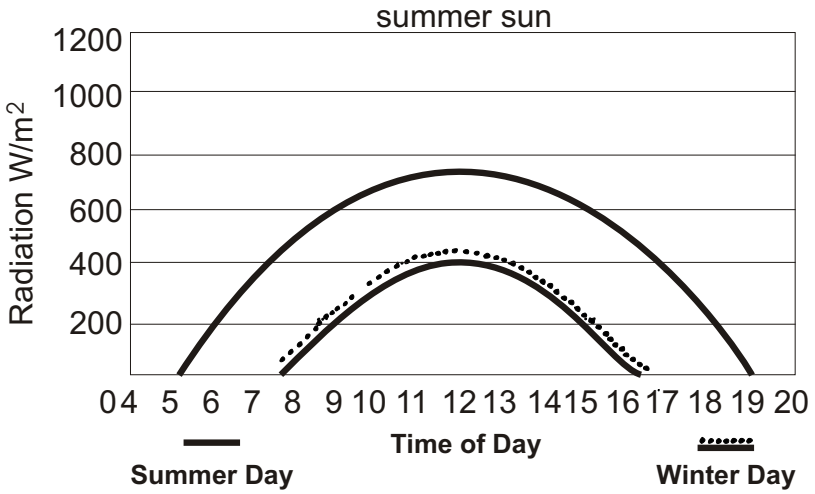
Solar powered electric fencing systems really do work and well installed solar powered electric fence system should operate trouble free for up to 20 years. Why then is it that so many people experience problems with their solar installations? The answer is quite simple. When sizing solar panels, and the batteries for a solar powered electric fence system, one should it properly or not at all.

The power one can extract from the sun is dependent on a number of factors, i.e. locality, the time of year, the time of day, the weather, the size, angle, condition and quality of the solar panel. No wonder one finds it hard to give a straight answer to a customer's apparently simple question -*"What size panel do I need?"* What usually happens is, after a bit of head scratching, one takes a stab at the panel size. (Regrettably often the main considerations applied are, how much is ones customer prepared to spend or how high can a salesman go without losing the sale to an opposition salesman) Then, just when you think you've clinched the deal, the customer .spoils everything by asking *"what size battery do I need?"*

So lets take a look at how to answer these questions -properly.

The standard energy unit used for the sun is called a PEAK SUN HOUR, which is the *peak power* obtained from the mid-day summer sun (1000W/sq.m) delivered to the panel for one hour. All solar panel manufacturers use this unit and rate their panels accordingly. However, what they don't tell you is that this peak energy is only available from the sun for a few hours a day, and not at all in winter .

The graph below of the Clear Sky Radiation for a summer and a winter day shows that the winter sun typically has only 40% of the intensity of the summer sun.



The equivalent "peak sun hours" for the site shown in the graph would be :-
Summer -8 hours
Winter -only 3 hours

Obviously it's during winter that things fall apart if a solar installation hasn't been sized properly. *"So who cares if the battery gets discharged. I will just charge it up again in the shed.* ..Well unfortunately it doesn't work like that. The battery on a solar system that has been undersized (panels too small) is discharged slowly over an extended period of time -each day it just doesn't quite make it. Eventually, when the energiser starts coughing and you realize that the battery is flat, sulphation has set in and the battery is ruined. I have been to sites where the battery has been ruined after only 6 weeks of use.

Just because the sun is out it doesn't mean that the solar panel is producing output. Add a few clouds into the equation and suddenly your solar panel output starts to look a little shabby. Standard solar panels are manufactured to produce an output voltage that is suitable for connection to a standard 12 volt lead acid battery.

It is the output current from the panel that changes with the sun's intensity .You can measure 17 volts as soon as the sun rises in the morning, but the panel will not be producing any power at that time.

Below are the "ampre hours" of charging energy that you can get from standard solar panels for every Peak Sun Hour (1000W/sq.m)

15W Panel 1,0 Ah	22W Panel 1,5 Ah	30W Panel 2,0 Ah	46W Panel 3,0 Ah

When sizing a solar powered fencing system one needs to work on the worst case scenario. This is June in South Africa. Your local solar panel supplier should be able to provide you with the exact value for the average *Minimum Peak Sun -Hours* for your area. An indication is down in Cape Town it falls to 4.5 sun hours per day, in Gauteng 5.5 sun hours, and towards Botswana one can reach levels as high as 6.8 sun hours. (Some of the highest levels in the world)

The daily energiser needs of Stafix 12 volt enregisers is given below:-

Model	Half Power	Full Power
B1,5	4,3 Ah	7,0 Ah
B3	6,7 Ah	12,0 Ah
B6	8,4 Ah	19,2 Ah
B12	18 Ah	41 Ah
B18	22,8 Ah	50,4 Ah

Now, with the information we have at our disposal, and by way of an easy example, let us work out the solar panel and battery size needed to supply a B3 energiser in Johannesburg.

Panel Size :- Minimum suns hours -5.5 h (I)

Energiser daily requirement -12 Ah (2)

Solar panel current requirement -(2) / (I) 12 Ah /15.5 = 2.2 A

Add an extra 20% to allow for battery charge recovery 2.2 x 1.2 = 2.6 A

Select a solar panel from..the table above, which is the nearest size above this value.

The correct solar panel to use is 46 Watt (3.0 A)

Battery Size :- The battery size is even easier to work out.

You need to allow for 5 days of complete blackness (heavy cloud) and the battery must only discharge to half charge level

No. of days of battery stand-by 5 days (I)

Energiser daily requirement -12 Ah (2) Total discharge amount -0.5 (3)

Total energiser drain over the standby period -(I) x (2) = 60 Ah (4)

Battery size -(4) / (3) = 60 Ah 10.5 = 120 Ah

In conclusion remember :

.To make sure your solar panels are not shaded over at any time during the day

.To get the panel correct/right tilt it flat for the site (no greater than your latitude is if at 30 degrees latitude angle 40%)

To face the panels "true north" -not magnetic north.

.To keep your panels clean.

.A 12 volt battery at 12 volts is flat. You should measure no less than 12.4 volts at any time.