

Solar Enhancement for KM6EON-R

To increase the resilience of the KM6EON-R EchoLink station, we decided to buy and install a Biolite Solar Home 620 system. This purchase did two things: 1) it supports Biolite's efforts to bring affordable, sustainable living to millions of people living off the grid with little or no access to power; 2) the Solar Home 620 system enables us to light the station without tapping into the station's batter back up power system.



The Solar Home 620 comes with a 6W solar panel, a control box (integrating a light, radio, MP3 player, and 2 USB charging ports), and 3 lights (with individual switches with low, medium, and high settings). One of the lights has a motion sensor. Fully charged the system can last 14 hours with all 4 lights at low power (or 4.5 hours if all 4 lights are at high power).

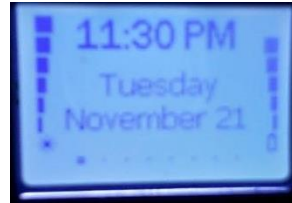


The panel has a small footprint (29 cm X 19 cm) easy for our apartment. When it arrived, we installed the panel at night. The photo on the right is the first exposure of the panel to local sunlight.

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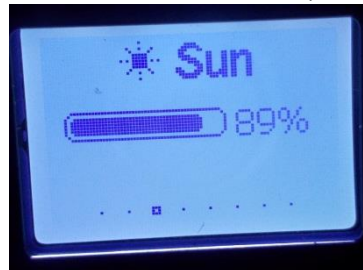
FOOTPRINTS

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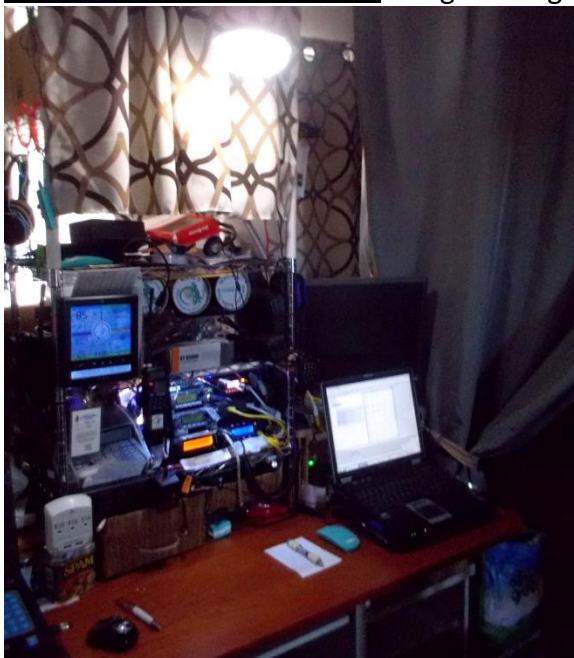
By 11:30 am the system was close to 69% charged after 5 hours of sunlight!

The photos on the left show the location of the control box in the KM6EON-R station. The smaller photos below show the control box screen displays. The solar light will help us conserve battery power for the radios and EchoLink station. Up to now, we had to draw power from the back-



-up battery bank to have minimal lighting for night operations. As you can imagine, writing errors can increase when taking notes in the dark or trying to read notes, too.

This set up isn't impressive in the urban setting of Los Angeles. But imagine this system in a rural area far from the nearest city. Many rural villages have no electricity at all. Light at night might be via a fire or a smoky kerosene lamp.



One solar light is dedicated to the station desk.



The motion sensor light is positioned near the door. It will only turn on as needed.


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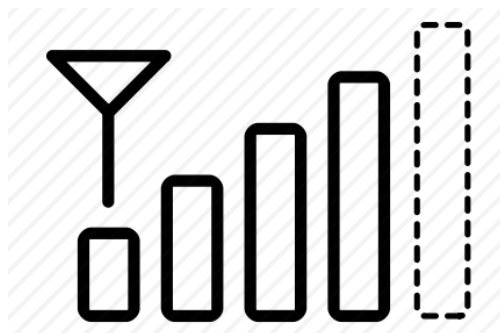
Another solar light is over the convertible futon couches. Both couches open as beds. The light can be switched on separately from the regular pole light in the corner. We have yet to see how much electricity we will save by using the solar lights in place of the usual household lights on commercial power.

For us, one key advantage is that the Solar Home 620 system comes in a small box (30 cm X 35 cm X 14 cm). So, if we had to evacuate, we could quickly pack up the system and take it with us to the field. We could then monitor local FM station for news as well. The system is essentially “plug n’ play.” [Note: All components except for the solar panel are not for outdoor use. So be sure to keep them out of the weather if using this outdoors]. And don’t forget, you can also charge your cell phones in the field with this unit.

If you are interested in this system, you can get more information at the Biolite site <https://www.bioliteenergy.com/products/solarhome-620> . 

Determining Your Cell Phone Signal Strength: When 5 Bars Is Really Less Than 5 Bars

On several occasions during the past year, we have noticed many EchoLink cell phone Users have trouble connecting to the KM6EON-R. A classic symptom is to see a cell user connect to our station. But within less than a minute (but as few as 10 seconds), they are disconnected. The reasons can be many, but usually not clearly known. Among the variables: distance to the nearest cell tower, available band width, low cell phone battery power, or a combination of numerous factors.



What does this really mean?

If your phone shows a maximum of 5 bars for the signal strength, four bars is less than the best but still a “relatively” strong signal. A full “5-bars” is the BEST signal possible. Or is it? What we tend to forget is that “best” is a relative term. It is not a finite measurement. Add this simple fact: much like Internet service speed, you get what the cell service company gives. Once you decide on a service provider (if in fact you have a choice), the internet speed will be whatever you happen to get REGARDLESS of the advertisements put out by the company. Cell service is similar. Here’s the tip of the iceberg:

<https://www.wilsonamplifiers.com/blog/how-to-read-cell-phone-signal-strength-the-right-way/>

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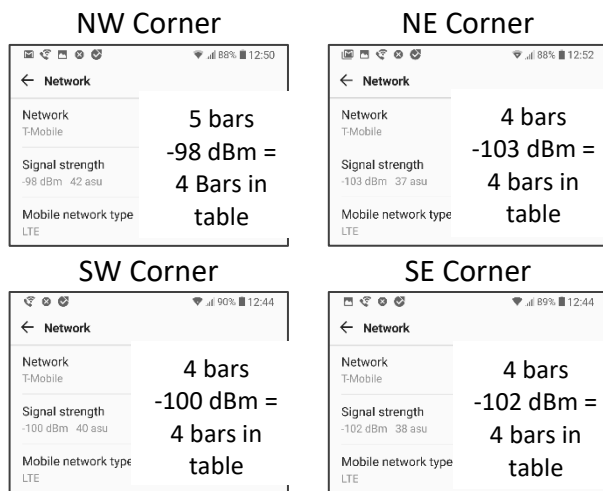
Step 1: Use the link to see the article and get the instructions for either Apple or Android phone.

Step 2: Walk around your area of interest and make a note of the signal strength reading you get. Try to find the spots for your best signal when at home, at work, or other places you frequent. Keep a record of the number of bars displayed on your screen along with the dBm value.

The dBm scale ranges from -50 to -120. (Different companies use slightly different ranges.) A dBm of -120 is the strongest signal and should be represented by 5 bars. A -50 dBm means no signal. So, for sake of ease, the table to the right simplifies the dBm values to number of bars linearly.

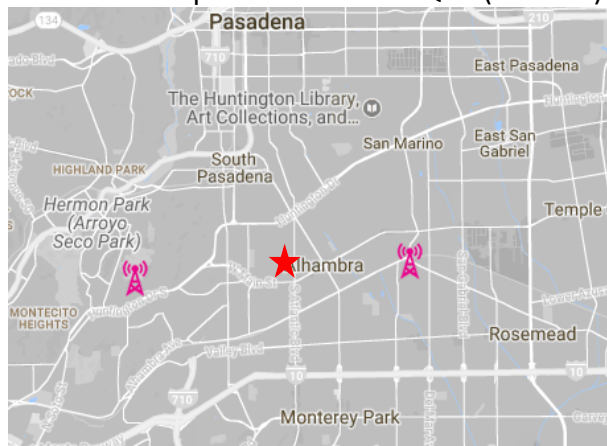
Below are screen shots of signal measurements and the number of bars displayed at 4 different locations inside our QTH. Look at the dBm value and the corresponding number of bars displayed. Then contrast

dBm	Bars
-120 to -108	5
-108 to -96	4
-96 to -85	3
-85 to -73	2
-73 to -62	1
-62 to -50	0



the screen shots to the table above. On a relative scale, the best signal strength displayed on our phone the strongest (i.e. the “best”) signal. The phone displays are fairly with the table values for 3 out of the 4 samples. For the NW, the phone display is a bit optimistic, showing 5 bars.

The map below shows the cell phone towers of our service provider and our QTH (red star).



We don't know the exact location of the towers. Our QTH seems to be about mid-way between the towers. However, the signal strength in dBm is averaging ~-101 dBm. So, although it is not the best (5 bars), it seems we are lucky and have a relatively strong signal.

We will be using this ability to “map” cell signal strength using dBm to assess field sites planning field events and portable EchoLink demonstrations. With the use of a mobile “hot spot,” we can hold EchoLink demos even then out of RF range of our station. This gives us added flexibility. It is one more options in our bag of “tricks” when it comes to showing others the magic of HAM radio. Stack the deck in your favor to improve your chances of a successful and event. 📶

GECO HTs Hanging Out



Bao Feng UV5R on a simple wire bracket in the car.

A three-position antenna switch in the car will let us connect the HT to other antennas we can set up when stopped and parked. These optional antennas include dual band (144/440) roll up antennas (a Slim Jim and a J-Pole). PVC mast sections attach to a bracket on the roof rack of the car to raise antennas 3-4m AGL (above ground level). A special adapter can be attached to the top mast section to support a magnetic antenna mount. **[Note:** In the future, we plan to add beam antennas to the inventory.]

In the station, a special wire bracket holds an HT radio for easy access. The HT's speaker/mic is on a special clip above the radio. The 12 VDC battery eliminator is connected to the radio. A 12 VDC accessory outlet is near the radio. **[Note:** The power outlet is on the station battery bank. So, in case of commercial power failure, the radios have an uninterrupted 12 VDC power supply. If the base station mobile radio is down, the HT can quickly be put into service. It is also hand for testing duty if needed. Li-Ion batter packs are close at hand if needed. 📶]

HT (Handi-Talkie) radios are compact and easy to carry. While waiting to complete a mobile radio set up in the car, we opted for an interim step: We make a wire bracket to hold one HT in the car. The belt clip on the radio uses the wire bracket to hold the HT in place out of the way of the steering wheel and other dash controls. Using a speaker/mic should help ease operations.

When leaving the car, it only takes about 2 minutes or less to disconnect the mobile antenna and attach the high gain dual band whip. The 12 VDC battery eliminator is removed and the Li-Ion battery attached. Now the radio is free for pedestrian mobile operation.

The installation hasn't been completed. We need to make a jumper cable to connect the HT to the mobile dual band antenna (144/440 MHz). We also need to install a 12 VDC power outlet for the Bao Feng battery eliminator. This will help conserve radio

