Solar Panel Requirements…

Solar Recharged gate operators are nearly as reliable as AC recharged systems. The primary concern in a solar system is to provide enough solar power to accommodate the duty cycle of the system and the options that will be used with the system. With any solar system you must put as much power back into the battery (or more) than you are using on a daily basis.

DUTY CYCLES: The first thing to consider in a solar application is the number of cycles per day that the gate is going to be expected to operate. Once the number of cycles is determined, use the following equation to find the solar requirements of a basic Apollo gate operator including the standard receiver. This is a conservative equation estimating that for every 5 watts of solar a minimum of 10 cycles of power will be put into the battery.

Cycles / 2 = Watts of Solar

Example: if 35 cycles per day are needed…

35 / 2 = 17.5 watts

A minimum of 17.5 watts would be needed to handle the duty cycles of this system.

OPTIONS: Optional equipment is possibly even more important to consider when determining solar requirements. Most of the time, options such as probe detectors, loop detectors, keypads, photo beams, and the like, will draw current constantly – 24 hours a day. When this is taken into account, it is likely that the options will draw more current than the operator itself. The first step in calculating solar needs will be to determine the current draw of each and every option that is going to be added to the operator. This is to include any optional radio equipment as well. These values may be obtained from specification sheets or by testing the equipment with a multi-meter. Total these values and use the following equation to determine solar requirements:

$$\frac{\text{(Total Current Draw) X 24 hours}}{300} = \text{Watts of Solar}$$

For example: options are to include a loop detector (16mA), 2 hard wired keypads (80mA each), and a probe detector (10mA).

$$\frac{(16 + 80 + 80 + 10) \times (24)}{300} = \text{Solar Watts}$$

$\frac{186x24}{300}$ = Solar Watts $\frac{4464}{300}$ = Solar Watts 14.88 = Watts Needed

GEOGRAPHIC LOCATION: Geographic location also has a large part in determining the solar requirements of a system. Obviously if your area receives less sun than average, your solar requirements will be greater. The equations discussed earlier are based on an average of 5 to 6 hours of sun per day. If the sunlight in your area is less than this, you should add 5 or more watts of power to your estimates.

Geographic location also determines the direction and angle that the solar panel(s) should be facing. Normally the solar panels should face south or southwest at an angle of approximately 40 degrees.

HIGH CURRENT OPTIONS: Accessories such as phone systems and the like draw very high amounts of continuous current. For this reason they are best used where AC recharge is available or with a timing circuit to shut off power to the unit when it is not being used. However, AC power is not always available and some customers are not willing to give up the features they lose with a timing circuit. If this is the case, a phone system may be done solar, but it should be a completely isolated system. This means the phone system will have its own battery, solar array, and regulator. The only connection between the phone system and the gate operator will be the relay contacts used to activate the gate.

Solar wattage is determined the same as with other options, but a larger buffer should be added for unexpected circumstances. Also the largest possible battery should be used in order to have the largest amount of reserve time available. Last, a regulator should always be used any time there is more than 20 watts on a system to eliminate the possibility of overcharging the battery.

SOLAR TOTALS: When the total wattage for the duty cycles and the options is determined, add them together to get the total wattage needed for the system. It is often times a good idea to add a buffer for 5 or more watts to this total for safety. Also, keep in mind that a system's usage may change after a period of time or seasonally. It is always more appealing for a customer to purchase the extra solar panels with the initial purchase rather than 6 or 8 months down the road.

SUGGESTIONS: Solar systems are only as good as their design and installation. Keep solar cells clear of any obstructions. Even small branches can cause a significant drop in power output. If the leads of a panel need to be extended, use wire of adequate size and type to prevent power loss. Minimum is 18ga for 100 ft at 10 watts. Larger panels need larger wire. When tying multiple panels together, you may tie the positives of all the panels together and the negatives all together and run only one pair of lead in wires to the battery. Again, make sure the wire used is sufficient for the distance and total wattage of the solar system. Any time there is to be 20 watts or more of power in a system a regulator should be used to prevent the overcharging of the battery. Also, the water level of the battery should be checked at lest every 30 to 60 days. More often on high current (20+ watt) installations