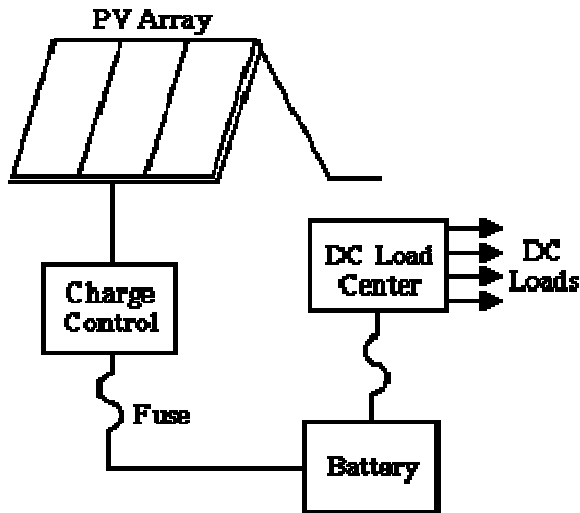


Example of a stand-alone system that powers 12 volt d.c. loads only. This shows a low-voltage direct current system which could be made more versatile with the addition of a small inverter to power a.c. loads.



12 Volt 2% Wire Loss Chart

Maximum distance one-way in feet of various gauge two conductor copper wire from power source to load for 2% voltage drop in a 12 volt system. Do not exceed the 2% drop for wire between PV modules and batteries

2% Voltage Drop Chart										
Amps	#14	#12	#10	#8	#6	#4	#2	#1/0	#2/0	#4/0
1	45	70	115	180	290	456	720	.	.	.
2	22.5	35	57.5	90	145	228	360	580	720	1060
4	10	17.5	27.5	45	72.5	114	180	290	360	580
6	7.5	12	17.5	30	47.5	75	120	193	243	380
8	5.5	8.5	11.5	22.5	35.5	57	90	145	180	290
10	4.5	7	11.5	18	28.5	45.5	72.5	115	145	230
15	3	4.5	7	12	19	30	48	76.5	96	150
20	2	3.5	5.5	9	14.5	22.5	36	57.5	72.5	116
25	1.8	2.8	4.5	7	11.5	18	29	46	58	92
30	1.5	2.4	3.5	6	9.5	15	24	38.5	48.5	77
40	.	.	2.8	4.5	7	11.5	18	29	36	56
50	.	.	2.3	3.6	5.5	9	14.5	23	29	46

Here are no-load typical voltages vs. state of charge

(figured at 10.5 volts = fully discharged, and 77 degrees F). Voltages are for a 12 volt battery system. For 24 volt systems multiply by 2, for 48 volt system, multiply by 4. VPC is the volts per individual cell - These voltages are for batteries that have been at rest for 6 hours or more. Batteries that are being charged will be higher - the voltages while under charge will not tell you anything, you have to let the battery sit for a while. For longest life, batteries should stay in the green zone. Occasional dips into the yellow are not harmful, but continual discharges to those levels will shorten battery life considerably. It is important to realize that *voltage measurements are only approximate*. The best determination is to measure the specific gravity, but in many batteries this is difficult or impossible. Note the large voltage drop in the last 10%.

State of Charge 12 Volt battery Volts per Cell

100%	12.7	2.12
90%	12.5	2.08
80%	12.42	2.07
70%	12.32	2.05
60%	12.20	2.03
50%	12.06	2.01
40%	11.9	1.98
30%	11.75	1.96
20%	11.58	1.93
10%	11.31	1.89
0	10.5	1.75

When using a small solar panel to keep a float (maintenance) charge on a battery (without using a charge controller), choose a panel that will give a maximum output of not much more than 1/1000th of the amp-hour capacity. For a pair of golf cart batteries, that would be about a 5 watt panel - the smaller panel if you get 5 or more hours of sun per day, the larger one for those long cloudy winter days.

World's biggest myth!!

Storing a battery on a concrete floor will discharge them.

A hundred years ago when battery cases were made of porous materials, such as wood, storing batteries on concrete floors would accelerate their discharge. Modern battery cases, made of polypropylene or hard rubber, which are better sealed, so external leakage, causing discharge, is no longer a problem.