

# Simple system sizing guide

## Solar Module Calculations

Pre-requisites:

1. Average daily load in ampere hours
2. Load voltage
3. Average insolation in peak sun hours (Fig. 2)
4. Type of battery to be used.  
(This can vary system losses  
i.e. lead acid 20%, nicad 40%)

With this information, the peak output of the solar array can be determined.

$\frac{\text{Ampere Hours Per Day} + \text{System Loss}}{\text{Peak Sun Hours}} = \text{Solar Array Output Required}$

Peak Sun Hours

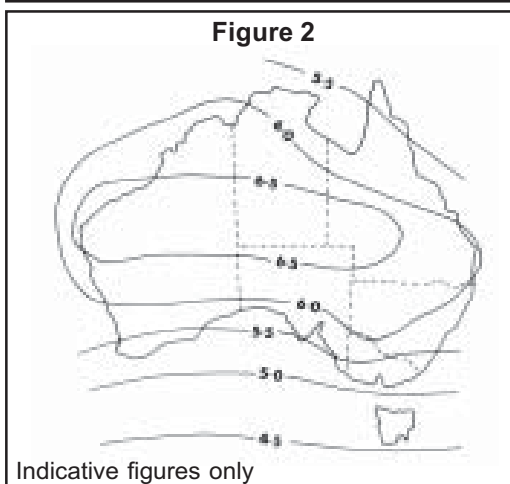
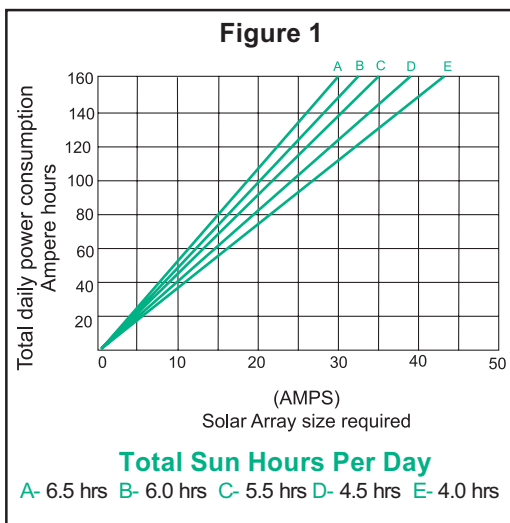
For example:

A solar system is required to operate a 12v radio transceiver, transmit current of 8 amps, receive current of 0.35 A and quiescent current of 0.2A. It is estimated Tx 2 hrs per day + Rx3 hrs per day. The location is S.E. Queensland and the type of battery is lead acid.

2 hrs @ 8.0 Amps = 16 Ah per day  
 3 hrs @ 0.35 Amps = 1.05 Ah per day  
 19 hrs @ 0.2 Amps = 3.8 Ah per day  
 Total = 20.85 Ah per day

Peak Output required =  $\frac{20.85 + 20\%}{6} = 4.17 \text{ A @ } 14 \text{ VDC}$

Therefore 1 x SX80U or 2 x SX40U wired in parallel would be sufficient.



## Battery Capacity Calculations

In general a 5-day storage capacity will suffice (5 days autonomy, no sun). Batteries should not be discharged below 50% of the normal capacity.

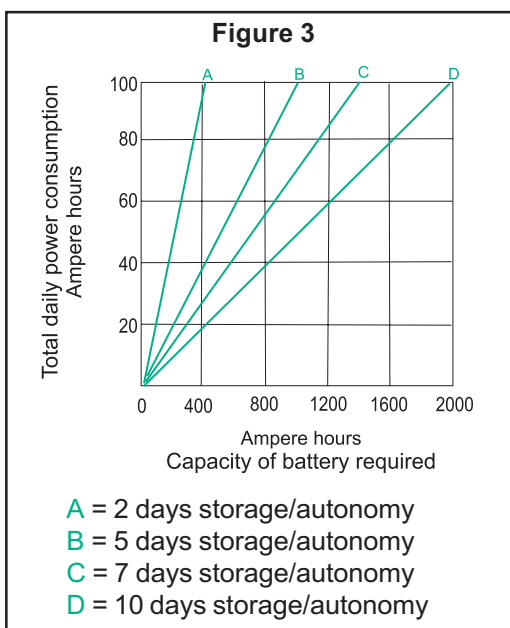
$\frac{\text{Average daily load} \times \text{No. of days autonomy}}{0.5} = \text{Battery Capacity}$

For example:

$\frac{20.85 \times 5}{0.5} = 208.5 \text{ Ah Battery}$

The following table shows comparative costs of batteries used based @12 v 100 Ah.

Battery Type	Cost per Ah	Life (years)	Maintenance
Nicad	\$50.00	15-20	Min top up 1 year
Deep Cycle Traction	\$30.00	7-10	Top up 3-6 months
Flat Plate Pur Lead	\$18.00	5-8	Top up 3-6 months
Sealed Recom.	\$7.00	4-7	Nil
Flat Plate Cycle	\$4.00	3-5	Top up 3-6 months
Cycle Automotive	\$2.00	1-1.5	Top up 3-6 months



The above calculations and formulas are in their simplest form and should be used only as a guide. Other factors have to be taken into consideration for correct sizing for a particular site. Contact your nearest RFI sales office for specific requirements.