4 Battery Considerations

Battery Selection

Given a fixed output power requirement, the operating time that the ***Stove Sentry*** will provide in the absence of electricity, is determined only by the size and condition of the battery. **It is important for the user to select a deep cycle, sealed, and maintenance free type, such as a marine battery. Automotive batteries are not recommended.** The battery clamps provided with the Surefire 503A are for top-post batteries. If a side-post battery is used then the user will need to buy two side post clamps.

The following table relates the battery size to operating time:

Battery Size	Reserve Capacity	Wood Pellet Stove **(without igniter)**	Wood Pellet Stove **(with igniter)**
A-Hr.	Minutes	Hours	Hours
50	80	5	4
75	140	7	5.7
100	180	10	8
200	380	20	16

The above data applies to the Advantage III wood pellet stove.

The **condition** of a battery is determined by its ability to attain and maintain a 100% state of charge. In order to measure the state of charge the user should use a digital voltmeter that can display hundredths of a volt when measuring 12 Volts. The user should measure battery voltage at the battery posts, with the battery disconnected. For deep cycle batteries, the following table relates the State of Charge to Battery Voltage.

State of Charge	Battery Voltage
100%	12.7-12.9
80%	12.5-12.6
60%	12.3-12.4
40%	12.1-12.2
20%	11.9-12.0

How to Calculate Backup Operating Time During Power Outage

Determining operating time requires the following inputs:

a) The size of the battery bank
i.e. its total Ampere-Hour (A-hr) capacity
Ampere-Hour capacity is calculated by adding the A-hr ratings of all of the batteries in the battery bank where the batteries are connected in parallel. (For Parallel Connection See Fig. #1)

b) The current draw for the sentry in Amps (C).
This can be computed by summing all of the electrical loads which the sentry is expected to operate

c) The average operating duty cycle of the system
The duty cycle of a system is the ratio of its "on" time to its "on" time plus "off" time
e.g. if a water circulation pump will work for one minute and is then off for two minutes, its duty cycle is calculated as follows:

Duty cycle= 1/(1+2) = 0.33

d) Once (a) (b) and (c) are known the operating time of the sentry (in hours) can be calculated by the formula:

T= A-hr/(C x 10 x D)

e.g. for a system with 3 batteries each rated 90 A-hr.
1) 3 batteries each rated 90 A-hr., A-hr = 3 x 90
2) A load that draws 4 Amps, C=4
3) Duty cycle which operates 1 minute "on" followed by 3 minutes "off", D = 1/(1+3) = 0.25

T (Hours)= (3 x 90)/(4 x 10 x 0.25) = 27

Multiple batteries (2 or 3) may be connected as shown to increase operating time.

Figure 3
To Sentry DC Connections
Parallel Connection