DURACELL®

# Calculating Battery Run Times

## Application Note

**976-0165-10-01 Rev A**

## Overview

How long your appliance will operate from a particular battery is dependent on the appliance's power consumption in watts (or AC amps x 115 V), and the battery capacity. Low inverter efficiency, and improper battery wiring during installation can also reduce run time.

## Calculating run time

The following formula can be used to determine run time in most applications using a 12 V battery or bank:

$$\frac{\textbf{10 x (Battery Capacity in Amp Hours)}}{\textbf{(Load power in Watts)}} = \textbf{Run time in hours}$$

Example:

How long will my 100 watt TV run with my 150 W inverter from my car's engine start battery (60 Ah)?
The load is well within the inverter's maximum power rating, therefore the inverter itself will not limit the run time.

$$\frac{\textbf{10 x (60 Ah)}}{\textbf{(100 W)}} = \textbf{=6 hours maximum run time before the battery is completely discharged, or 3 hours run time before the battery is 50\% discharged. You should still be able to start your car at this point.}$$

**Table 1** Estimated Run time for continuous operation using standard battery capacities

| Appliance power in Watts | BCI Group Size > | 22NF | 24 | 27 | 4D | 8D |
|---|---|---|---|---|---|---|
| | Reserve Capacity > | 90 minutes | 140 min. | 180 min. | 325 min. | 400 min. |
| | Appliance | 50 amp hours | 75 Ah | 100 Ah | 160 Ah | 200 Ah |
| 50 | Stereo | 9 hours | 14 hrs | 20 hrs | 32 hrs | 40 hrs |
| 100 | 19" Color TV | 4 | 6 | 10 | 16 | 20 |
| 200 | Computer | 2 | 3 | 4.5 | 7 | 10 |
| 300 | Blender | 1.3 | 2.2 | 3 | 4.5 | 6 |
| 400 | Drill | 1 | 1.5 | 2 | 3 | 4.5 |
| 600 | Coffee Maker | N.R. | N.R. | 1 | 2 | 2.5 |
| 800 | Small Microwave | N.R. | N.R. | N.R. | 1 | 1.5 |
| 1000 | Toaster | N.R. | N.R. | N.R. | 0.5 | 1 |
| 1500 | Large Microwave | N.R. | N.R. | N.R. | N.R. | 0.5 |

## Tips

Engine start batteries should not be discharged below 90% remaining charge-state, and marine deep cycle batteries should not be discharged below 50% remaining charge state. Doing this will shorten the life of the battery based on most battery manufacturers' recommendations.

Some inverters are factory equipped with a lighter plug for easy connection of smaller loads, however, for loads above 100 W you will require direct connection to the battery terminals to eliminate a thin/long battery wire voltage loss that could drastically shorten the run time on a given system.

If you intend to use power tools for commercial use, or any load of 200 W for more than 1 hour regularly (between battery recharging) you should install an auxiliary battery to provide power to the inverter. This battery should be a deep cycle type and sized to meet your run time expectations with the engine off. Deep cycle batteries most commonly available are 27 (90 Ah), 4D (150 Ah), 8D (220 Ah) capacity. The auxiliary battery should be connected to the alternator through an isolator module to prevent the inverter from discharging the engine start battery when the engine is off.

See our Web site, or your inverter manual for more information, or contact Customer Support.



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