Powercheq Battery Equalizer Performance Tests

By Don McGrath, Secretary, North Bay Electric Auto Association

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Abstract

A 2001 Corbin Sparrow, with a battery pack of 13 Optima Blue-top batteries, and a set of 12 Powercheq equalizers, Model PCHC-12V-2A (the latest model) was tested for battery equalization with, and without the Powercheqs connected. The pack has powered the Sparrow for 1914 miles (120 cycles). The pack has one failing battery.
Conclusions of the tests are:

1) *Powercheqs will not do much for a failing battery, i.e., the installation of Powercheqs will not keep a failing battery equalized to the rest of the pack.*
2) *During driving, the Powercheqs reduced standard deviation of the remaining 12 good batteries by about 24%. In other words, using Powercheqs kept the good batteries <u>much better balanced</u> during discharge than if they were not installed.*
3) *During charging, the Powercheqs reduced standard deviation of the remaining 12 good batteries by about 7%. In other words, using Powercheqs kept the good batteries <u>slightly better balanced</u> during charging than if they were not installed.*

Procedure and Results

The author's Sparrow is shown in Figure 1. In June, 2005, the original battery pack was replaced with a new set of Optima Blue-tops. At the same time, a set of 12 Powercheq equalizers, Model PCHC-12-2A was installed. Figure 2 shows the wiring scheme.
To facilitate voltage measurements, 14 fused voltage monitor wires were attached to the pack, to positive and negative of battery No. 1 and the positive of all remaining batteries. The monitor wires were attached to a 14-wire female connector mounted under the steering column (Figure 3). The author constructed a Battery Voltage Monitor (BVM) black box incorporating two rotary switches and a Radio Shack voltmeter (Figure 4).

The battery pack has now accumulated 120 cycles (1914 miles), or about 15 miles per cycle. The author prefers to recharge the pack at about 50% SOC.

Charging and driving tests were conducted with regulators connected and with regulators disabled (the fuses were pulled from the regulators).

Table I, Individual Battery Voltages, shows the individual battery voltages in several conditions:

Condition ND: N = No, regulators not connected
D = after Discharge (driving to approx 50% SOC)

Condition YD Y = Yes, regulators connected
D = after Discharge
Condition YC Y = Yes, regulators connected
C = after Charging

Condition NC N = No, regulators not connected
C = after Charging

Figure 4 shows the same data in the form of a 3-D histogram.

From these data, it appears that the Powercheqs will not do much for a failing battery, which in the pack is Battery No. 1. During charging, battery no. 1 came up to almost full voltage but during discharge, it sagged badly, regardless of whether or not the Powercheqs were connected.

Table II is very interesting. If one disregards the bad battery, battery No. 1, and looks at the data for the remaining 12 batteries, and calculates the standard deviation, it is obvious that the Powercheqs do keep the batteries in better balance, especially during discharge. During discharge, the spread in values was reduced by about 24 %. During charging, the spread was also reduced, but only by about 7%.

Conclusions

4) Powercheqs will not do much for a failing battery, i.e., the installation of Powercheqs will not keep a failing battery equalized to the rest of the pack.
5) During driving, the Powercheqs reduced standard deviation of the remaining 12 good batteries by 24%. In other words, using Powercheqs kept the good batteries <u>much better balanced</u> during discharge than if they were not installed.
6) During charging, the Powercheqs reduced standard deviation of the remaining 12 good batteries by 7%. In other words, using Powercheqs kept the good batteries <u>slightly better balanced</u> during charging than if they were not installed.