The Doc's Battery Test Report

Battery Details	
Brand	Sanyo 2100
Size	AAA AA C D 9V 6V
Type	Ni-MH Ni-Cd RAM Alkaline Titanium
Current in mAhs	2100
Stated Voltage	1.5 volts 1.2 volts
Number of batteries	Single Set of 2 Set of 4
Battery Set used	Set 2
Times charged before test started	5
Charger used to charge	Rezap RBC883 Vanson Speedy Box UBA4
Time Batteries charged in charger	See UBA graph at end of report.

Test Procedures	
Spreadsheet name	Sanyo2100NiMH-AA-Set2.123 (Discharge data file)
UBA file name	Sanyo2100NiMH-AA-Set2-5.uba (Charge file)
Select Resistance 5 or 10 ohms	5 ohms 10 ohms
Voltage cut off	3.5 volts 3.6 volts
Date of test	22/11/03

Summary of test	
Voltage	Starting voltage 5.8 volts, cut off voltage 3.6 volts
Test duration	8,510 seconds or 141.83 minutes
Max Battery Temp	31.8 degrees Celsius
Min Battery Temp	27.5 degrees Celsius

Methodology

The battery set being tested has been charged at least 5 times. The charge actually used in the test is noted above. The battery set is charged in a Universal Battery Charger (UBA4). It is then tested under a load of 5 ohms, in the scientific dooverlackie. In this test the battery set was also charged in several different types of charger. Once the charger tests were completed, the battery set was charged in the UBA4 and tested. The last test is designed to discover whether the battery set's charging capacity has been materially affected during the tests. The first and last test in the UBA, while not identical, should not be materially different. The following pages give various data, including:

1. charging information from the UBA4;
2. a graph of the voltage during the test (cut off voltage being 3.6 volts);
3. a graph of the battery temperature during the test;
4. a graph of the battery temperature verse ambient air temperature during the test;
5. a graph comparing the charging performance of different chargers with the Sanyos; and
6. a graph comparing the initial test with the concluding test, using the UBA4 as the charger.

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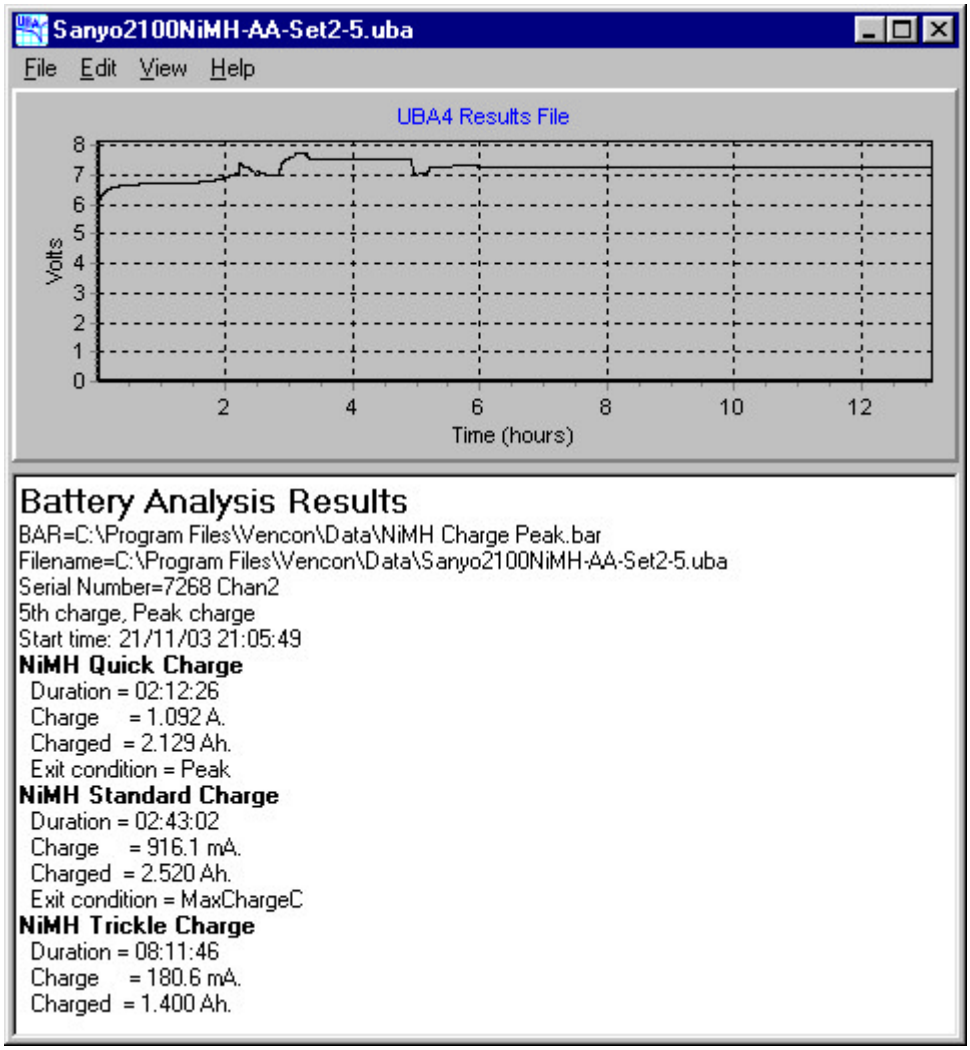
UBA report

The graph and charging information from the UBA4.



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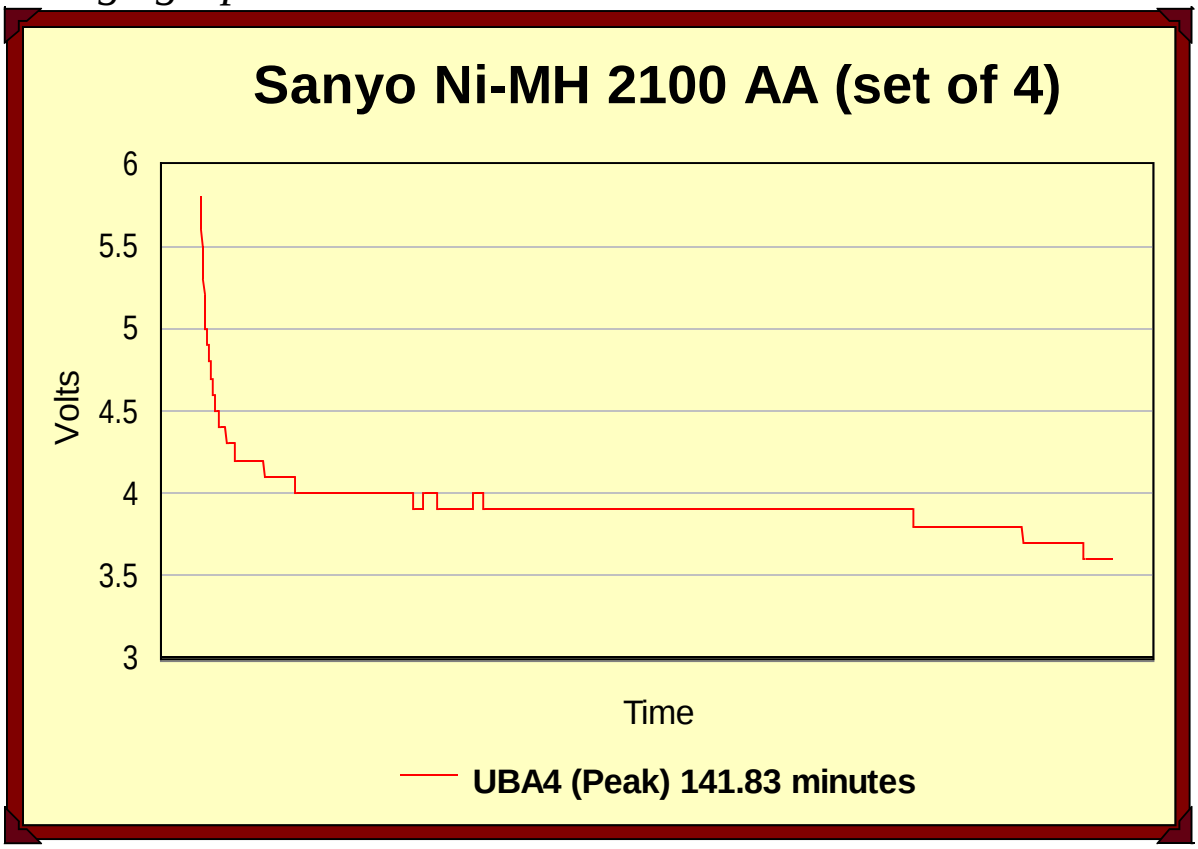
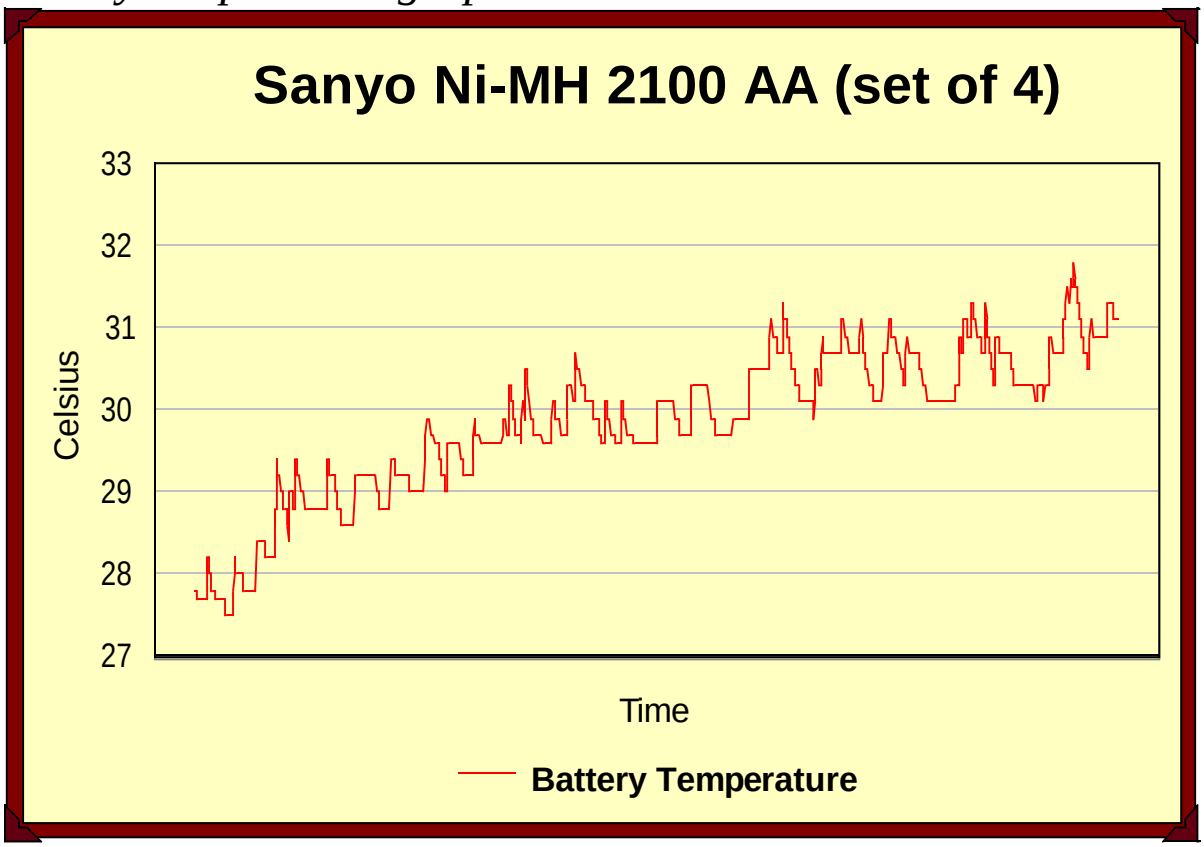
Voltage graph



Battery temperature graph



Note the battery temperature rises as the battery discharges more energy.

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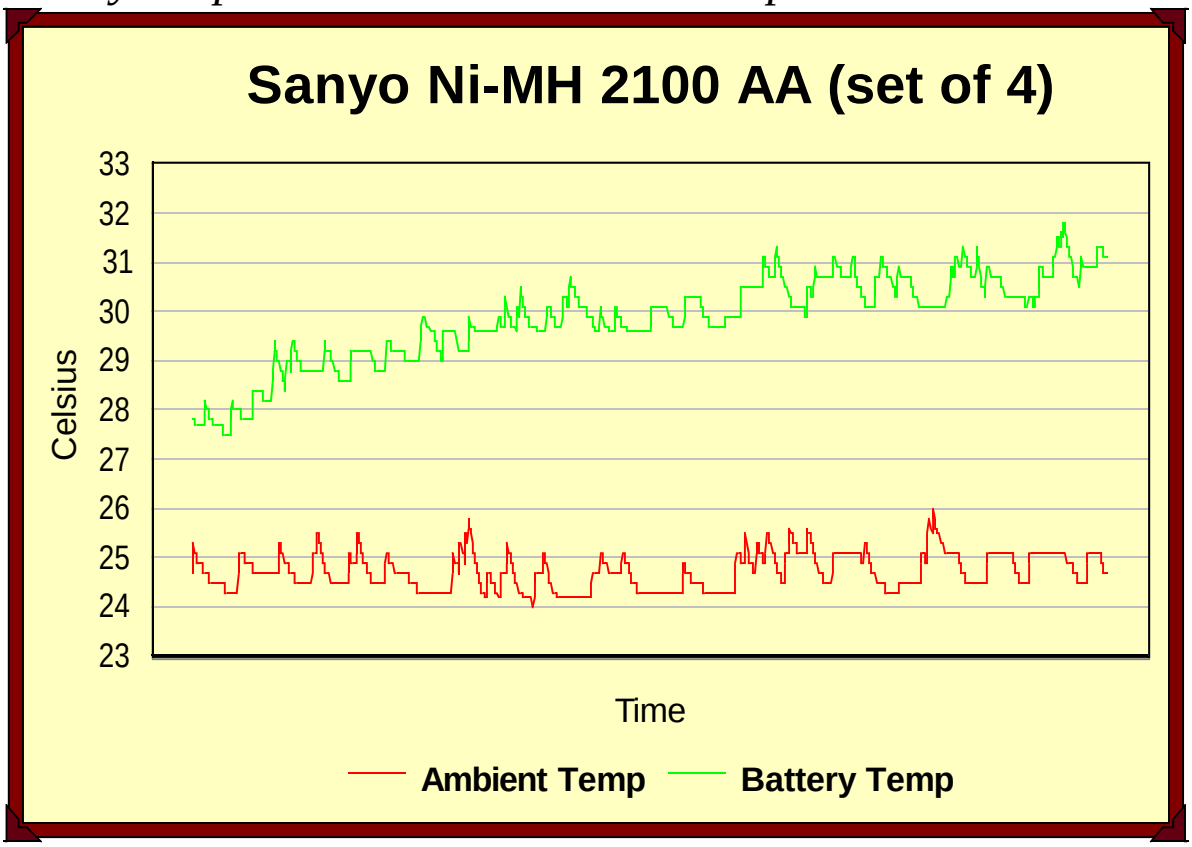
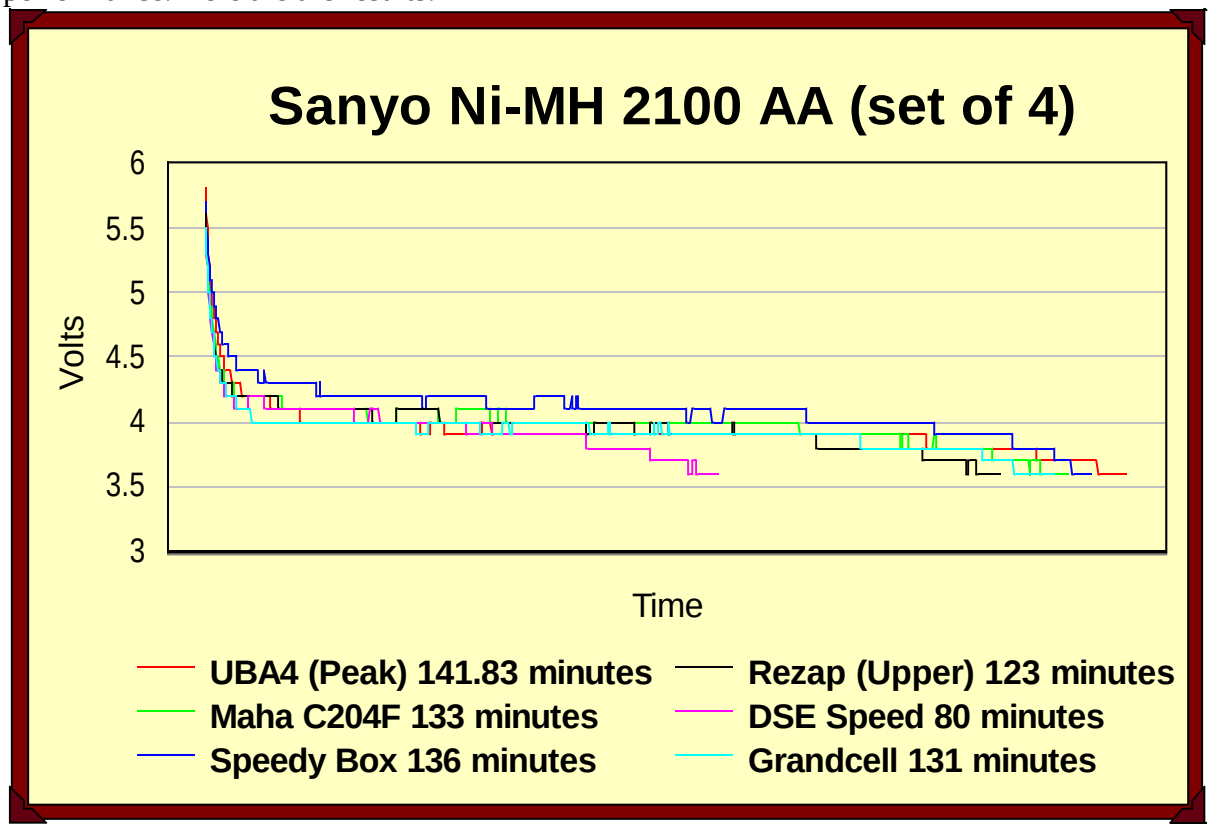
Battery temperature -v- Ambient air temperature



Charger comparison

The Sanyo battery set was then tested in various battery chargers to compare charging performance. Here are the results:



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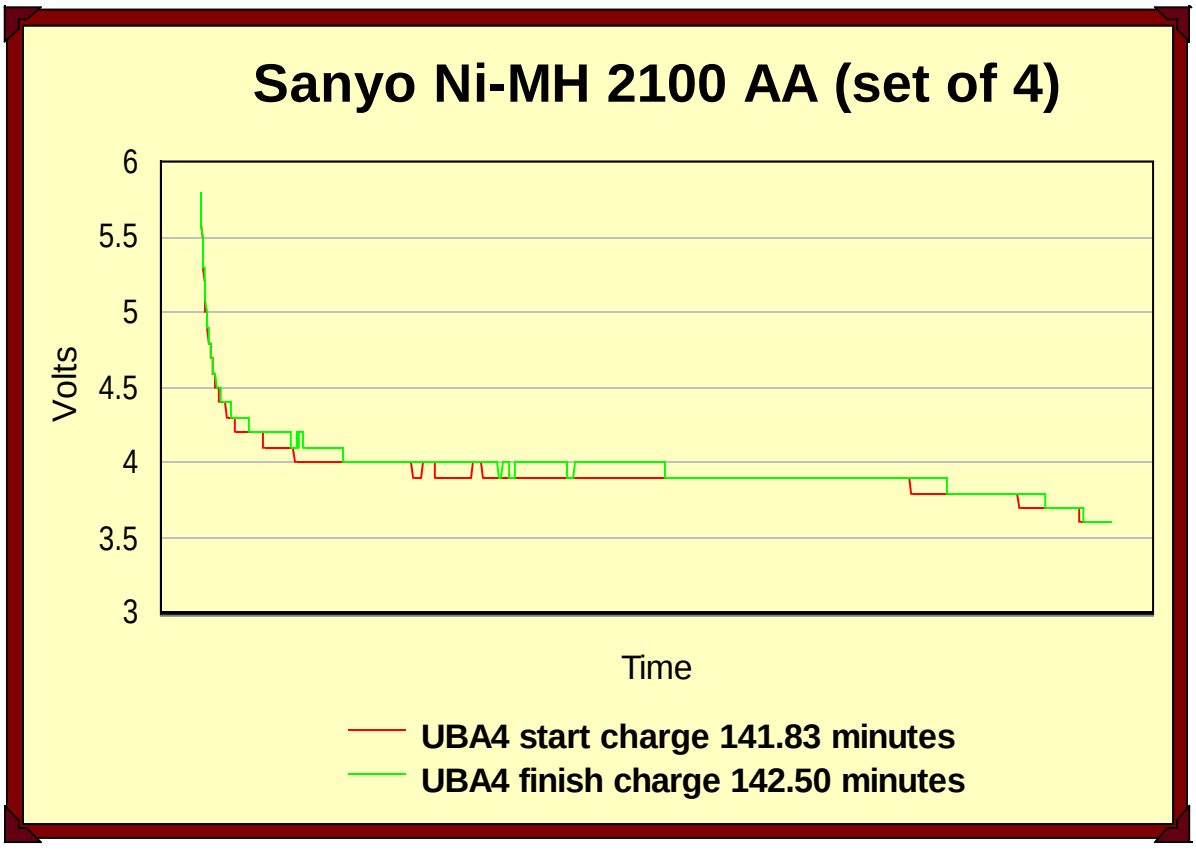
The Maha C204F and the Speedy Box do a very good job with the Sanyos getting closest to the UBA4 charge. The Grandcell charger gave similar results, but only after charging for 24 hours (ie the Doc basically overcharged the batteries in the Grancell). For this reason it is not reasonable to compare the Grandcell results to the other chargers. The DSE Speed charger has a time cut off after 7 hours and therefore can never fully charge high capacity Ni-MH batteries such as the Sanyos. The Rezap, which uses the most conservative charging technique also scores well. And is a good compromise between performance and long battery life.

Starting charge compared to finishing charge

This graph compares the charge used in the test, to the one done at the conclusion of testing. Both charges were in the UBA4. The difference between the two tests is less than one minute. Allowing us to conclude that the battery's ability to take a charge during the charger tests was consistent. Differences in the charger test results can be explained by charger performance rather than battery differences.



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Conclusion

The results are not surprising since Sanyo invented both Ni-Cd and Ni-MH battery technology. You would therefore expect the Sanyos to be leaders in the field. Which the tests demonstrate. Not only do the batteries perform exceptionally well, the built quality is also first class. The Sanyos are made in Japan and are of a better build quality than those of Chinese or Taiwanese origin. Sanyo 2100 mAh batteries are both exceptional in performance and quality. They get the Doc's performance award.

Run Time (5 ohm)	**141.83 minutes**
Battery build quality	**Excellent**
Place of Origin	**Japan**
Cost (set of 4)	**AUD$25.00**

Report date: 7 December 2003

http://www.users.on.net/mhains/

thedoc@internode.on.net

