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## Buckeye vs WilliamsRDM Smart Solar Rock Performance Test

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**Company Name:** WilliamsRDM, Inc.  
**Website:** [www.WilliamsRDM.com/START](http://www.WilliamsRDM.com/START)  
**Date of Incorporation:** 4/1/1963  
**Number of Employees:** 67  
**GSA Schedule:** The solar rocks are available for purchase on the GSA Advantage website ([gsaadvantage.gov](http://gsaadvantage.gov)) under the name Smart Solar Rock  
**Technology:** START Covert Solar Power System  
**Maturity:** The Covert Solar Power System is at a TRL 9, with production units sold and shipped to border patrol sectors and border sheriffs.

WilliamsRDM Inc. is a woman-owned small business located in Fort Worth, Texas, which designs and manufactures military-grade automated test equipment, cable assemblies, connectors, adapters, electronic hardware, and sensor systems. We have over five decades of experience in all phases of electrical, mechanical, and software development, all of which is designed and manufactured at our facilities in Texas. WilliamsRDM is registered to the ISO 9001 and AS9100 quality management standards.

WilliamsRDM is proud to have held a 100% rating in quality and on-time delivery to the government for consecutive years. We have also received dozens of other awards and recognitions over our five-plus decades of service to government and civilian industries alike. These recognitions and awards attest to our company's experience and expertise in developing and delivering quality products.

## 1 Test Summary

WilliamsRDM conducted a test to compare the battery charging performance of the Buckeye 5W and 10W solar rocks to the WilliamsRDM covert smart solar rock. We tested one Buckeye 5W Desert Tan solar rock and two Buckeye 10W Desert Tan solar rocks alongside the WilliamsRDM covert solar rock. The Buckeye solar rocks consist of solar panels encapsulated in a rock like housing. The WilliamsRDM smart solar rock also incorporates solar panels encapsulated in a rock like housing along with a Maximum Power Point Tracking (MPPT) 12V battery charger. The Figure below shows a picture of the test setup.

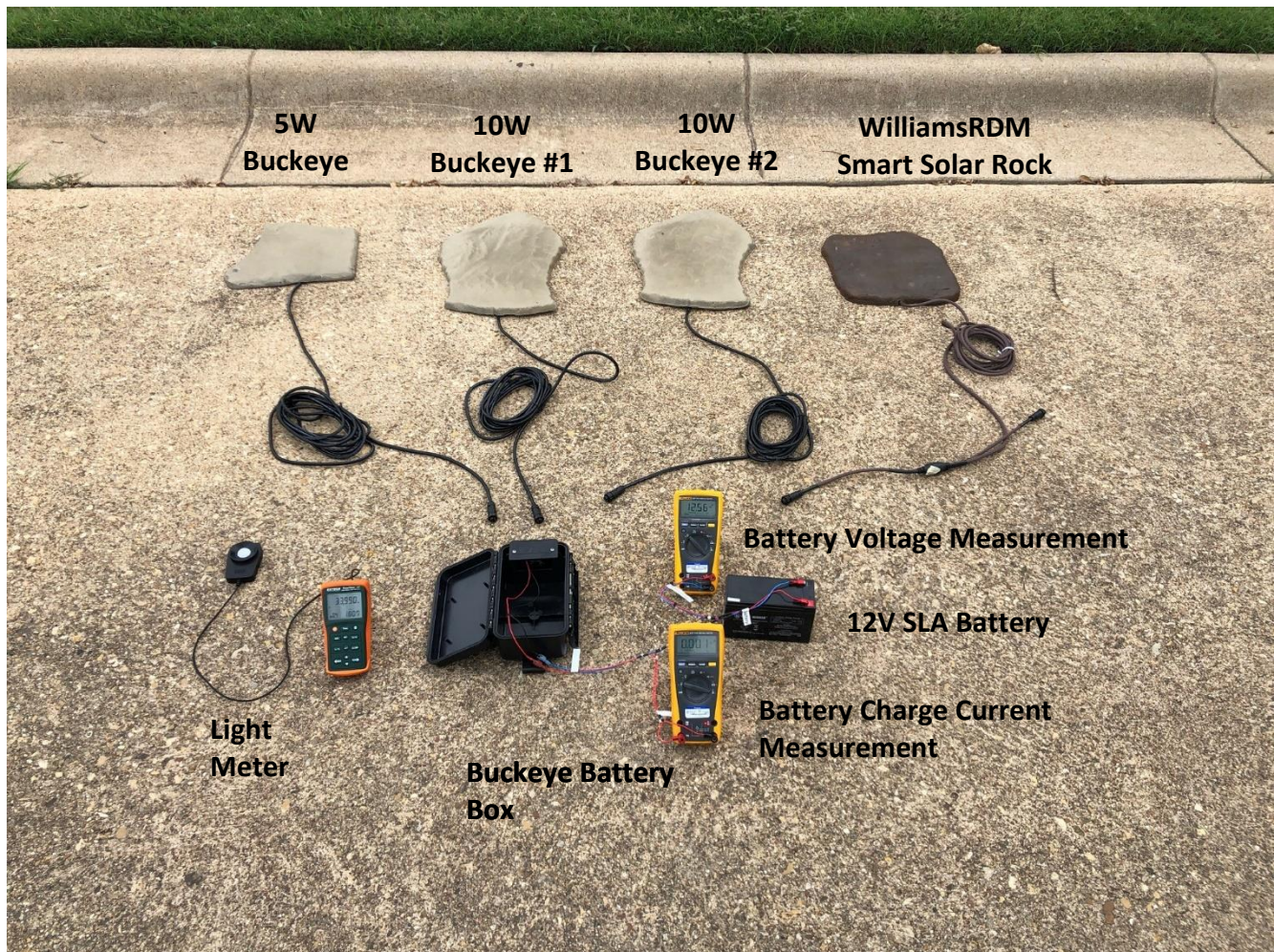


Figure 1: Test Setup

All testing was performed using a Buckeye Battery Box with a 12V 7Ah Sealed Lead Acid (SLA) battery. Each solar rock was connected to the battery box the way it is intended to be deployed in the field. The Buckeye solar rocks connect to the Buckeye battery box charging port and use the battery box's built in charger to charge the battery. The WilliamsRDM smart solar rock uses a Y-Cable to connect to the power output connector of the Buckeye battery box. This bypasses the battery box charger allowing the MPPT battery charger inside of the WilliamsRDM smart solar rock to operate. We then measured the battery voltage and charging current using two separate calibrated Fluke 177 digital multi-meters (DMM). We then used this data to calculate the charging power provided by each solar device. Lastly, we used a light meter to measure the solar illuminance during the test.

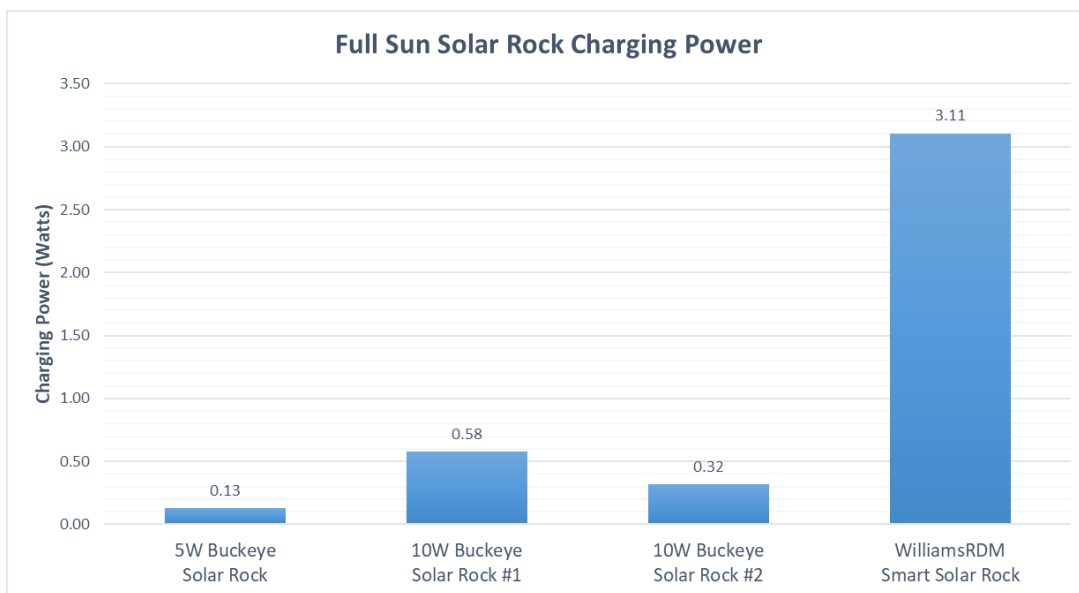
## **2 Full Sun Test Results**

The test was performed on 8/3/2020 at 3:20 PM, the sky was clear and sunny. Solar illuminance was measured to be 93,867 lux indicating that it was a bright summer day. Each solar rock was connected to the battery box in succession. We then measured the battery voltage and battery charge current provided by each device using calibrated DMMs. The test results are summarized in the table below.

**Table 1: Full Sun Solar Rock Charging Power**

Device Under Test	Battery Voltage (V)	Battery Charge Current (mA)	Solar Panel Charge Power (W)
5W Buckeye Solar Rock	12.58	10	0.13
10W Buckeye Solar Rock #1	12.60	46	0.58
10W Buckeye Solar Rock #2	12.60	25	0.32
WRDM Smart Solar Rock	12.68	245	3.11

The Graph below compares the charging power of the 5W and 10W buckeye solar rocks with WilliamsRDM smart solar rock.



## **3 Overcast Day Test Results**

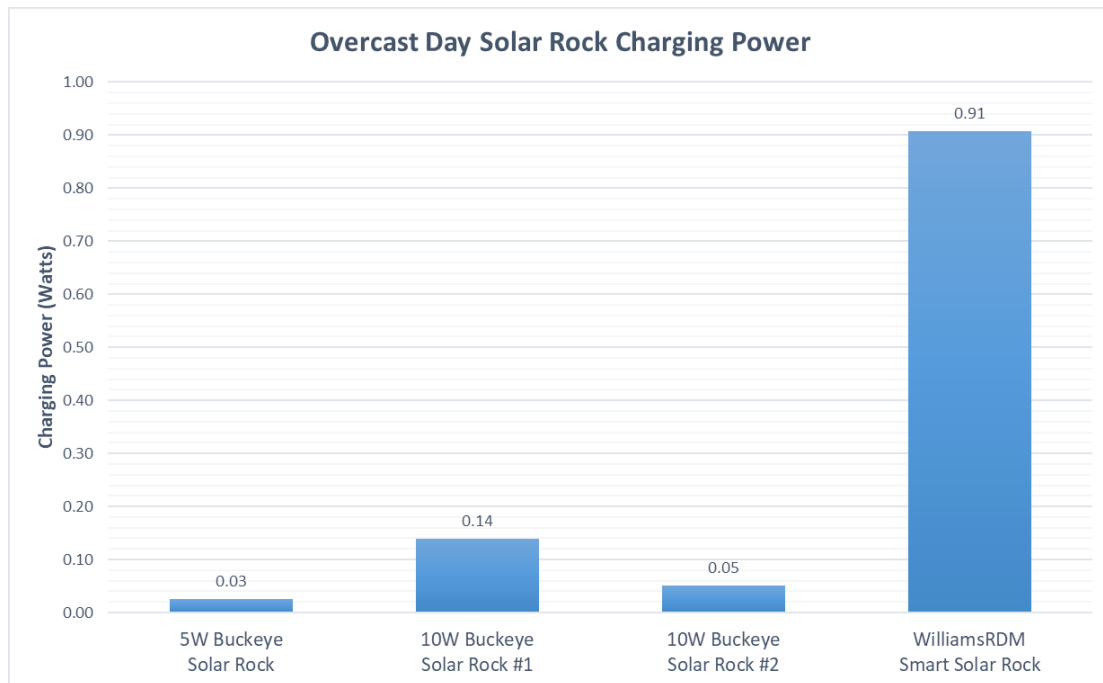
This test was performed on 9/4/2020 at 2:10 PM, the sky was cloudy overcast. The solar illuminance was measured to be 31,760 lux indicating that it was an overcast day. Each solar rock was connected to the battery box in succession and measured the battery voltage and battery charge current provided by each device using calibrated DMMs. The test results are summarized in the table below.



Table 2: Overcast Day Solar Rock Charging Power

Device Under Test	Battery Voltage (V)	Battery Charge Current (mA)	Solar Panel Charge Power (W)
5W Buckeye Solar Rock	12.58	2	0.03
10W Buckeye Solar Rock #1	12.58	11	0.14
10W Buckeye Solar Rock #2	12.58	4	0.05
WRDM Smart Solar Rock	12.60	72	0.91

The Graph below compares the charging power of the 5W and 10W buckeye solar rocks with WilliamsRDM smart solar rock.



#### **4 Test Equipment**

For All Tests the following Calibrated Digital Multi-Meters Were used:

- 1) Voltage Measurement DMM: Fluke 177, WPI563, Calibration Due 9/6/2020
- 2) Battery Charge Current Measurement DMM: Fluke 117, WPI266, Calibration Due 9/5/2020

#### **5 Benefits of the WilliamsRDM Smart Solar Rock**

- 1) The WilliamsRDM Smart Solar Rock Produces about 23 times the power of the Buckeye 5W solar rock and over 5 times the power of the 10W buckeye solar rock in a smaller footprint.



- 2) The WilliamsRDM smart solar rock cost \$439.00 with rodent resistant braiding standard on each assembly while the Buckeye 5W and 10W solar rocks with the rodent resistant braiding -option cost \$410.00<sup>1</sup> and \$510.00<sup>2</sup> respectively.
- 3) Additionally, WilliamsRDM has a lower cost solar rock which costs \$325.00 but removes the power point tracking solar charger and has a reduced size. Please see the “Buckeye vs WilliamsRDM Solar Rock Performance Test” report for more information.

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<sup>1</sup> Buckeye Rock Pricing from the Buckeye Website as of 9/4/2020

<https://store.buckeyecam.com/accessories/batteries-and-chargers/solar-panels/12v-hidden-ground-solar-panel-5w>

<sup>2</sup> Buckeye Rock Pricing from the Buckeye Website as of 9/4/2020

<https://store.buckeyecam.com/accessories/batteries-and-chargers/solar-panels/12v-hidden-ground-solar-panel-10w-rock-gray>