

Power Generation and Distribution Spring 1998 Review

Brad McCarthy Team Leader



- Last Semester: 1 member
- This Semester: 11 active members
- Mentor: Dr. Hal Tharp (ECE)
- Leader: Brad McCarthy
- Members:
- » Suryadi Adiputra
- » Hanee Omar Barqawi
- » Hua-chih Chen
- » Mason Hereford
- » Weechye Lim
- » Ferry Lukito
- » David Lundell
- » Brandon Miller
- » Appandi Mustafa
- » Omar Shafiq



Areas of Investigation

- Power Source Solar Panels
- Energy Storage Batteries
- Source Control Peak Power Trackers
- Miscellaneous Web Site



- Setback Global Solar (CuInDiSe)
- 20W 35W power requirement
- \$1000 Cost Cap
- Bus Voltage = 28V DC
- Material = Si
- » Theoretical Efficiency = 18%
- \gg Percentage of Time in Sunlight = 40%
- » Probable Achieved Efficiency = 8% to 14.5%
- » Output Power = 33.88W to 59.28W
- » Degradation = 2 years
- » Interconnection Material = Al
- » Configuration = Cells in Series, Strings of Cells in Parallel
- » Redundancy and Protection = Bypass and Blocking Diodes



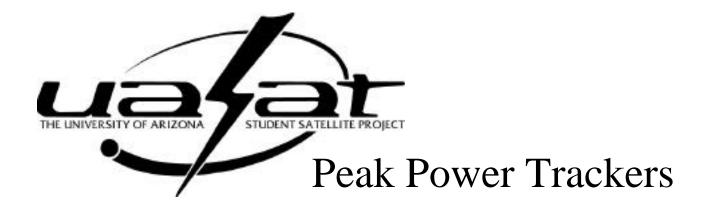
- Need for Further Investigation:
 - » Prototyping of Power Source
 - More Thorough Testing of Cells Dr. Peck (AME), Ray Ramadori (Solar Car)
 - » Vendor to Provide Space Grade Cells
 - » Material of Satellite
 - » Adhesion of Cells to Satellite
 - » Integration With Other PGD Systems



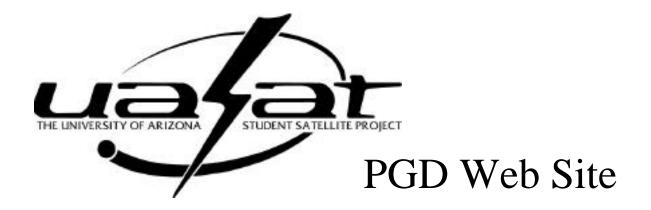
- Investigated: NiCd, NiMH, Li-ion
- Chose NiCd D Size Cell:
 - » Capacity = 600 to 800 mAH
 - » Output Voltage = 1.2V
 - » Lifecycle = 1000
 - » Memory Effect
 - » High Self-Discharge Rate
 - » Simple Charging Mechanism
 - » Moderate Weight
 - » Low Price



- Configuration = 3 Batteries in Parallel, 24 Sets in Series
- Supplied Voltage = 28.8V DC
- Supplied Power = 35W
- Redundancy of Design Current and Power Decrease with Failure
- Charging Mechanism
- Memory Effect Solution = Complete Discharge of Batteries
- Need for Further Investigation:
 - » Testing of Charge and Discharge of Batteries
 - » High Cycle Testing
 - » Integration with Other PGD Systems
 - » Careful Consideration of Battery Lot for Flight



- Function = Source Control
- Will Regulate Output Voltage to Maintain 28V Bus
- Will Work at Maximum Power Point
- Need for Further Investigation:
 - » Prototyping Circuit
 - » Integration with Other PGD Systems



- URL = http://www.ece.arizona.edu/~pgd/
- Will Serve as a PGD Information Resource for Other Teams
- Will Provide Links to PGD Related and SSP Related Sites
- Will Provide Detailed Information About PGD for Interested Students



- Much Has Been Accomplished This Semester
- There Remains a Great Deal of Work Ahead
- PGD Team Need for Further Investigation:
 - » Power Needs of Other Teams
 - » Power Needs Hierarchy and Budgeting
 - » Maximum Power Availability
 - » DC Voltage Needs DC-DC Converters
 - » Distribution of Power Throughout Satellite
 - » Work Much Closer with Other Teams
 - » Prototyping of Entire PGD System
 - » Bus Protection and Grounding