TEST BED

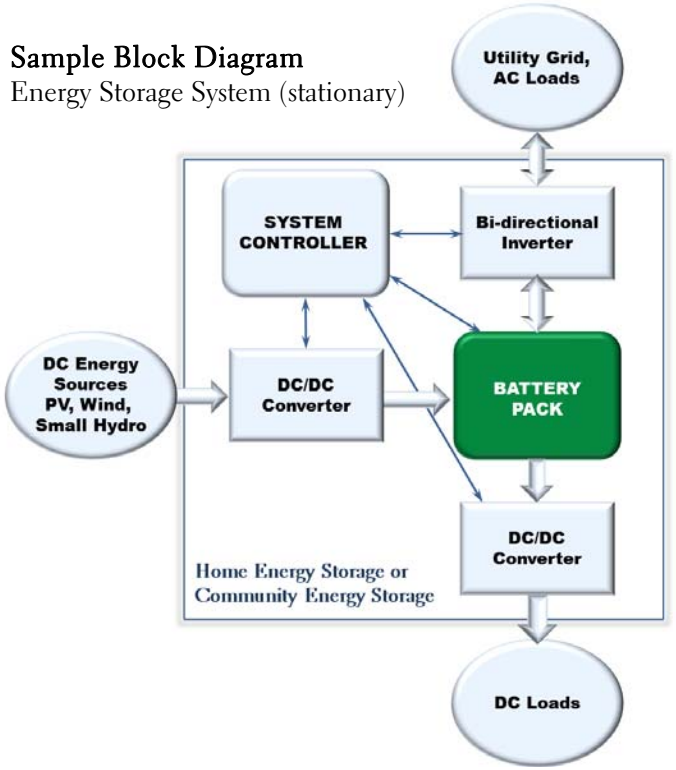
for Grid-Connected Applications
Using Recycled Electric Vehicle Batteries

Applications
- Community Energy Storage
- Home Energy Storage
- Large Uninterruptible Power Supply
- Energy Storage for Grid Services
- Energy Storage for Renewable Farms

Application Issues Addressed
- Battery Selection
- Battery System Design and Sizing
- Control System Design
- System Reliability
- System Safety

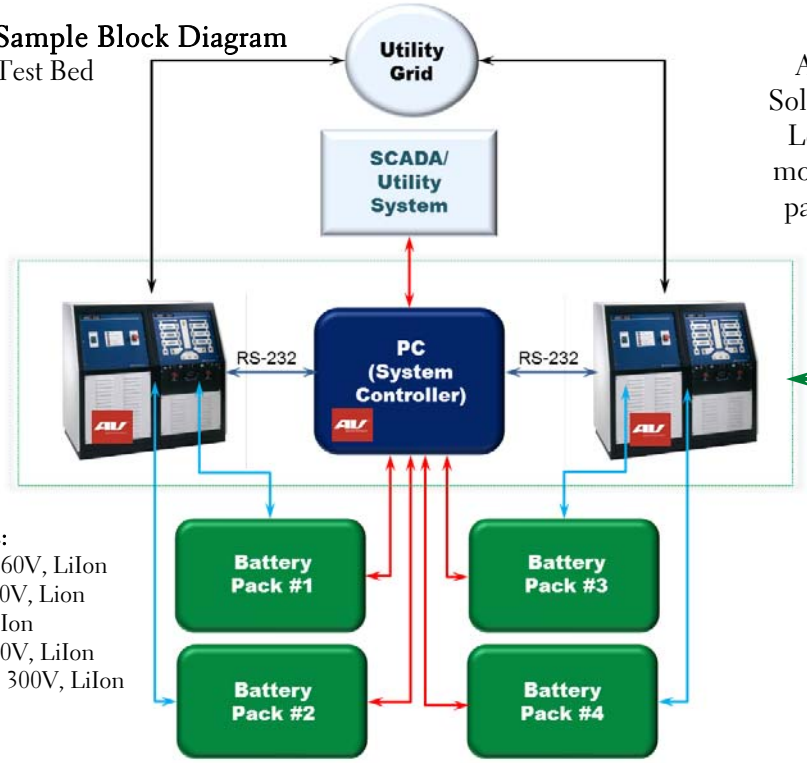
Key Testing Steps
- Deploy test bed for performance testing
- Test using realistic power profiles
- Test using range of battery conditions
- Test various control schemes
- Compare results and optimize solution

Sample Block Diagram
Energy Storage System (stationary)



TESTING

Sample Block Diagram
Test Bed



AV's Solution: Learn more on page 2

Pack Samples:
- Nissan LEAF: 24kWh, 360V, LiIon
- Chevy Volt: 16kWh, 400V, Lion
- iMiev: 16kWh, 330V, LiIon
- Ford Focus: 23kWh, 300V, LiIon
- Tesla Model S: 70kWh, 300V, LiIon

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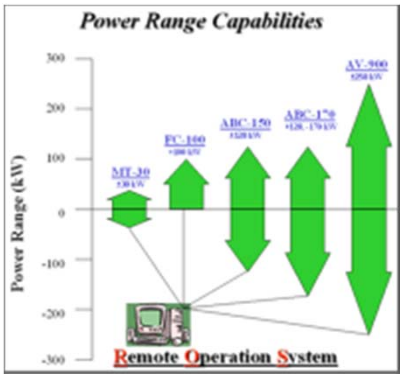
AeroVironment Power Processors

MT-30

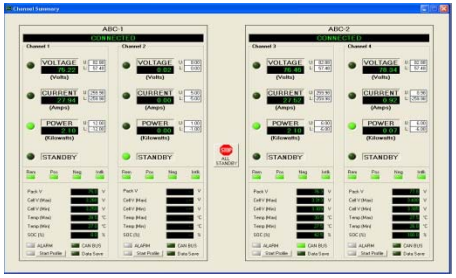


AV900 and AV900CE

Features:
- Bidirectional grid-connected power processors
- Up to four independent DC channels
- Up to four different size batteries
- Remote/Local control
- Independent Voltage/Current/Power limits per channel
- Flexible power, voltage, current settings
- Range of Power Processors available

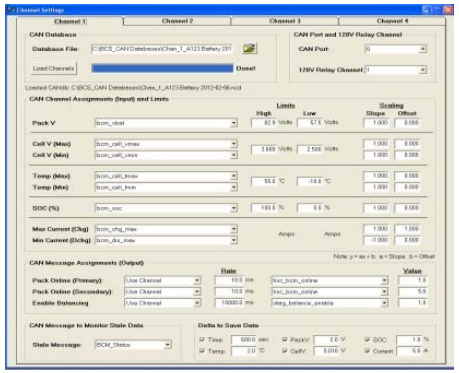
Acknowledgements: California Energy Commission; National Renewable Energy Laboratory; Mike Ferry, California Center for Sustainable Energy

System Controller PC

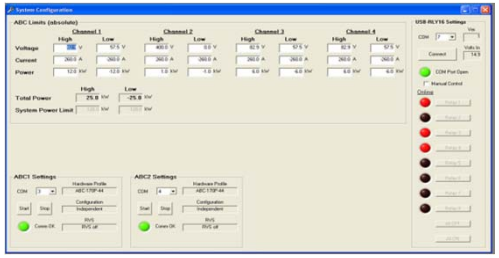


- All four channels -view
- Main operational parameters
- Color coded warnings
- Remote/Local control
- Independent control per channel

Main Screen



Limit Setting Example



Safe Limit Settings