Joint Service Power Expo

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US Marine Corps Portable Power R&D Efforts

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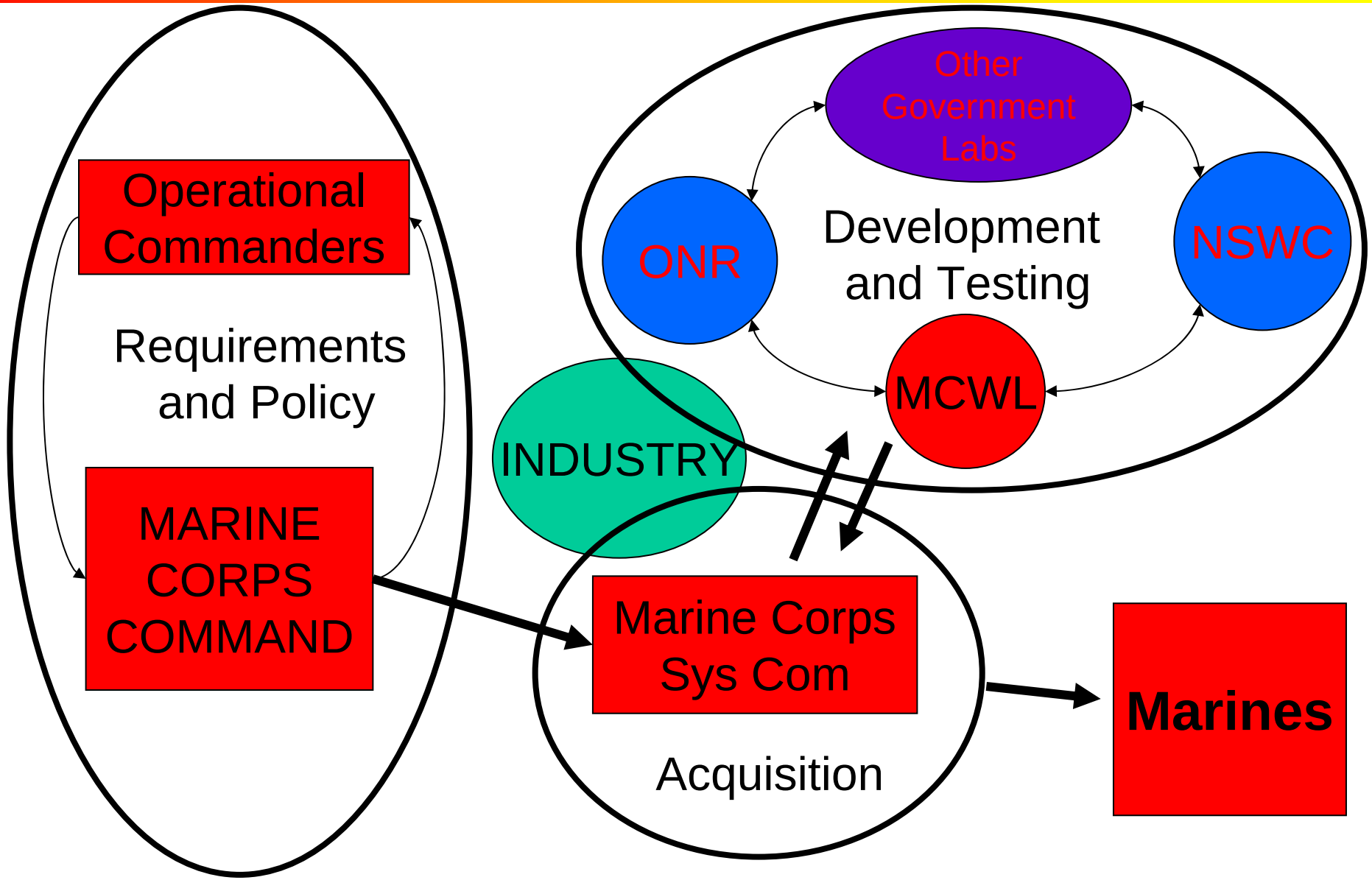
Briefing Topics

- How MARCORSYSCOM works with other organizations
  - Roles and responsibilities
- Current Development Programs
  - Portable Generators
  - Renewable Energy – (SPACES, GREENS, DREAMS)
  - Radio Power Adaptors – (24V RPA Towers, single RPA)
  - SBIR Efforts
  - Tactical Vehicle Battery Replacement
  - Vehicle Mounted Battery Charger Light (VMCB-Light)
  - Rugged Inverters
- Conclusions

The Marine Acquisition Universe



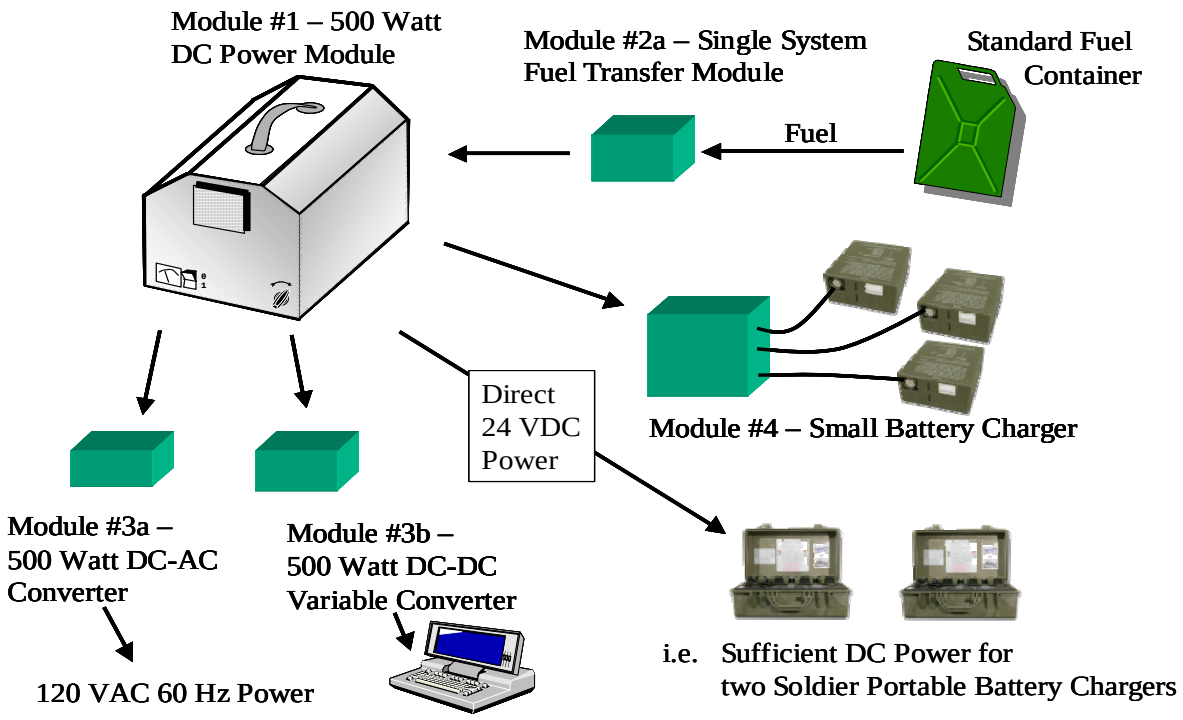
Marine Portable Generator (MPG)

Objective

Develop & demonstrate a single-person portable power unit

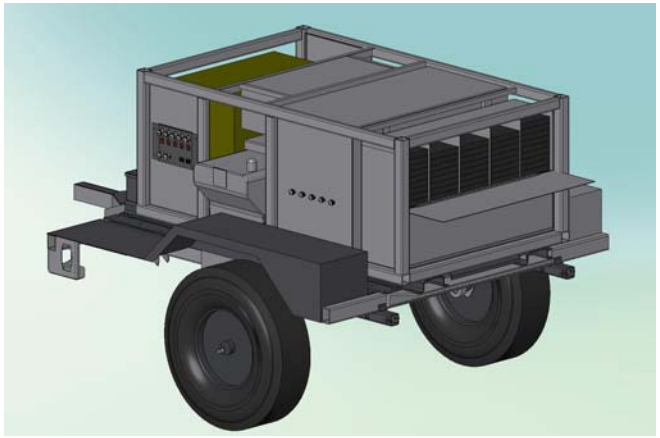
Desired Capabilities

- TQG quality power
- Low cost of ownership
- Weight - <15 lbs
- Volume – lunch box size person portable
- <70 dB at 7 meters
- 500W - 1000W output power
- Field operational
- JP-8 fuel with > 1500 ppm of sulfur
- 1 hr internal fuel
- 600 hours before major maintenance
- Start-up in <10 minutes



Renewable Power System

- DREAMS – Trailer Size
  - 3kW constant, 5kW peak, HMMWV towable hybrid renewable energy systems
    - Solar – panels, batteries, generator



- GREENS – Mid Size
  - 300W renewable energy system
  - Renewable energy tool box
    - Rapid design and deployment of mission specific renewable energy solutions

- SPACES – Man Portable
  - 100W solar battery charger
  - Power radio directly
  - Procurement and testing underway

Multi-Radio Power Adaptors

Current
12V Multi-SINCGARS Power Adapter (MSPA)

- Powers 6 SINCGARS radios
- UPS capable when connected to both AC and DC power
- Power Input: 110VAC or 12VDC, 40-70 Hz
- Weight – 110 lbs with case

New Start
24V Radio Power Adapter Tower

- 24V system with at least 4 radio bays
- Power Input: 110-280VAC or 24VDC, 40 – 400Hz
- < 80 lbs without case
- Currently in Source Selection
- Anticipated fielding start FY10

Individual Radio Power Adaptors

- **RPA for AN/PRC-148 / 152 / 153**
- **Power radios with BB2590/BA5590/BA5390 or 12/24VDC input**
- **Goals**
  - **Reduce overall battery weight**
  - **Increase power flexibility**
  - **Reduce logistical charging burden**
- **Received bid samples**
- **Testing is underway**

6T Battery Replacement

- Looking for new replacement for vehicular batteries
- Goals
  - Lighter weight
  - Longer run time
  - Same form factor
  - Cost competitive over life cycle
- RFI currently on Fed Biz Ops

If you have a technology that would work we are interested in hearing from you!!!

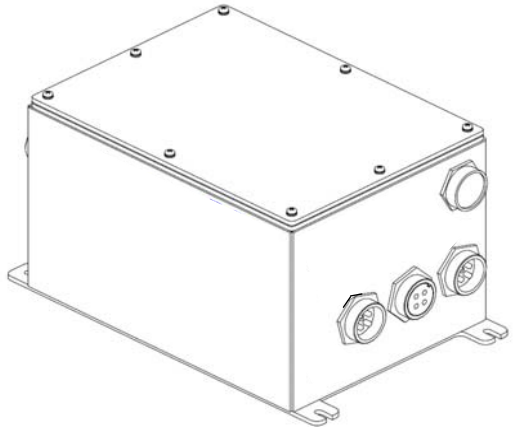
Vehicle Mounted Battery Charger – Light (VMBC-Light)

- Smaller and lighter VMBC
  - 60% Volume Reduction over existing VMCB
- Similar functionality of existing VMCB
- Currently open on Fed Biz Ops
- Multi battery universal adapter
- Bulk charging capability for AA rechargeable batteries
- Recent major changes to solicitation

OBVP - Inverters

- USMC currently fields / centrally manages **QP-1800** Inverter
  - Competitively selected 2006
  - Semi-ruggedized
  - 1800 watts output

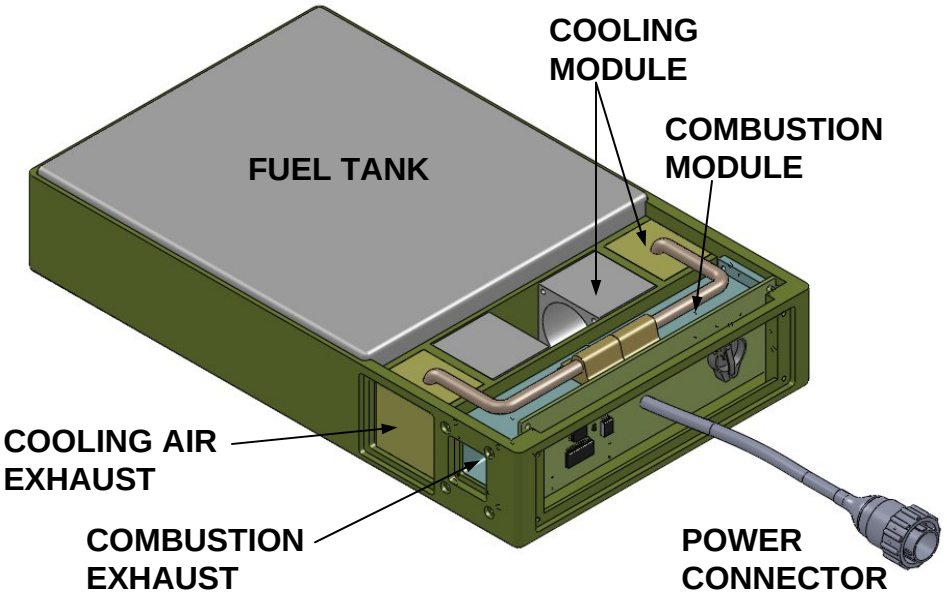
- Other USMC PMs have requested an **enhanced model**
  - Currently in Source Selection
  - Non-Developmental procurement
  - Critical Parameters:
    - 2000 - 2500 watts
    - Fully ruggedized (unprotected environments)
    - AC / DC input and output / battery charging



SBIR's

- Micro Fuel Power Source
- Universal Battery Adaptor
- Electronic Equipment Power Reduction
- Adaptive Power Profiling Suite (APPS)
- State of Charge Indicator for Zn/Air and CFx Batteries
- Wireless Battery Charging
- Man Portable Power System (MPPU) UPS

Micro Fueled Power Source (SBIR)



Micro Fueled Power Source

Size: 12.2 x 7.3cm x 2.4 in^3

(Same form factor as BA8180)

IRVINE SENSORS CORPORATION

Key Features:

- Powered by liquid fuel (Butane, Propane)
- High energy density (500 W-hr/Kg)
- Microcombustion technology
- Thermoelectric power conversion
- Refillable power source
- JP-8 fuel in the future

Program Status:

- Phase I completed – 1st Qrt FY09

Projected Performance:

Power Output:	20W
System Energy:	1220 W-hr
Gravimetric Energy Density:	500 W-hr/Kg
Volumetric Energy Density:	360 W-h/L
Fuel Mass/System Mass:	54%
System Mass:	2.42 Kg
System Volume:	3.44 liter

Universal Battery Adaptor (SBIR)

- Goal – Replace all the adaptors to the right with one universal adaptor
  - Account for connectors of different shapes, sizes and locations
  - Program driven for different charge profiles
  - Uses SMBus protocols
- Phase I Complete

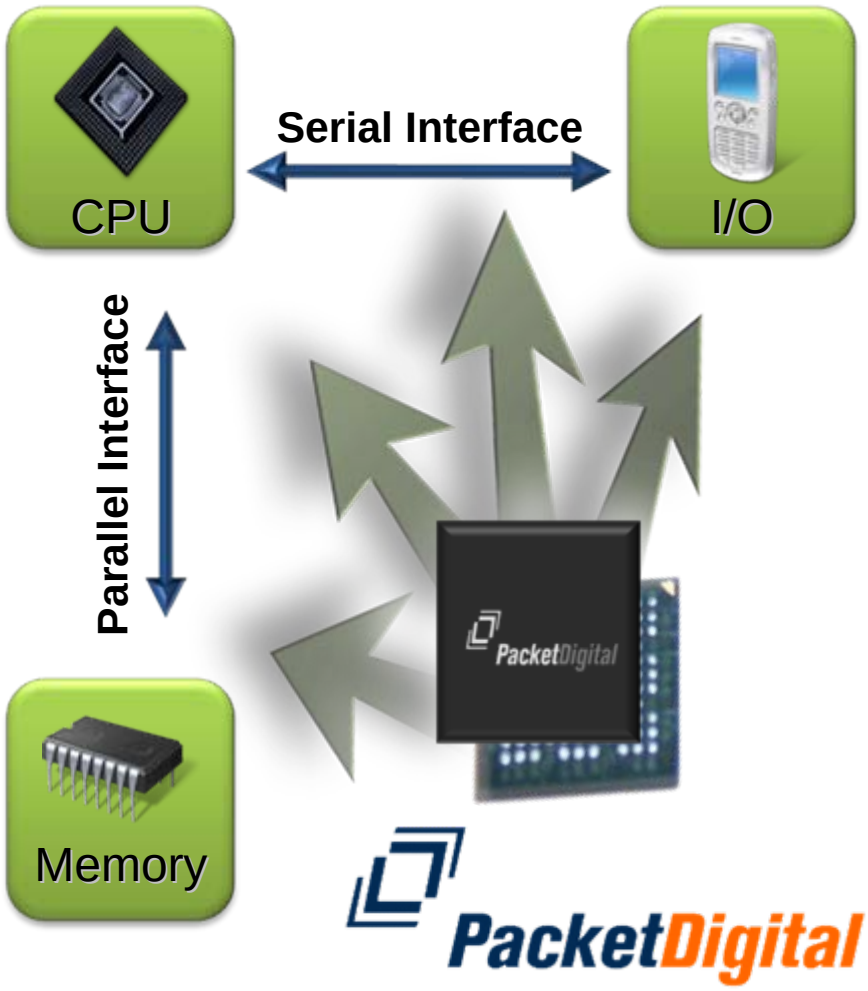
Phase I: Prototype

Solutions Through Advanced Technology™
MAINSTREAM
Engineering Corporation

Electronic Equipment Power Reduction (SBIR)

- Goal
  - Reduce end item power consumption without affecting functionality
- Company: Packet Digital
  - Patented On-Demand Power
  - Patented PowerSage PMICs
- Phase I Accomplishments:
  - 25% energy reduction in hard drives and DVD drives for Panasonic Toughbook
- Planned Phase II Goals:
  - Integrate PowerSage into PRC-117A, PRC-148, and PRC-150.
- Benefits:
  - Extends battery life
  - Improves signal-to-noise ratios
  - Reduces generated heat in electronics

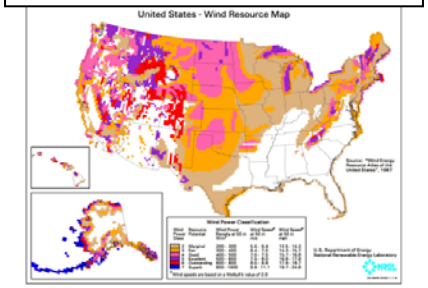
Scans Memory, CPU, I/O and Communication Links To Adjust Supply Voltages and Clocks



Adaptive Power Profiling Suite (APPS)

- Phase I - Develop a reconfigurable kit of power options to optimize energy usage for the Marine Core Distributed Operations squad and their electronic devices
- Phase II – Focus the Phase I develop on renewable energy systems
- Proposed Outcome
  - Tool to identify applicable renewable technologies for a given mission scenario and operating location
  - Provide an easily updated system that allows the input of new technologies

Wind Effectiveness



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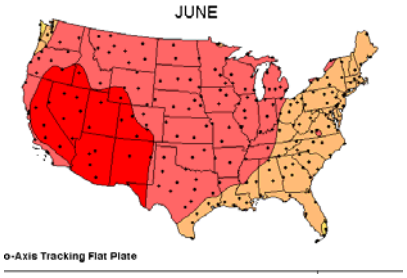
Solar Effectiveness



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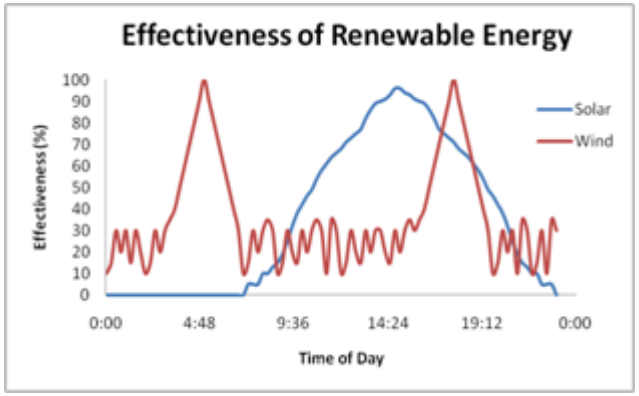


State of Charge Indication (SBIR)

- Objective
  - Develop a State of Charge indicator for battery technology that is highly modifiable
    - Focus on Zn/Air technology and CFx technology
    - Uses common micro-controller based SOC architecture
    - Uses fuzzy neural network based SOC algorithm
  - Phase I demonstrated capability to accurately detect SOC of Zn/Air technology
    - Further modeling needed to account for wide environmental and operational variations
  - Phase II – focused on developing models and adapting SOC technology for CFx batteries.
- Team: Global Technologies, University of Idaho, Rayovac
- Phase II completion end of FY10

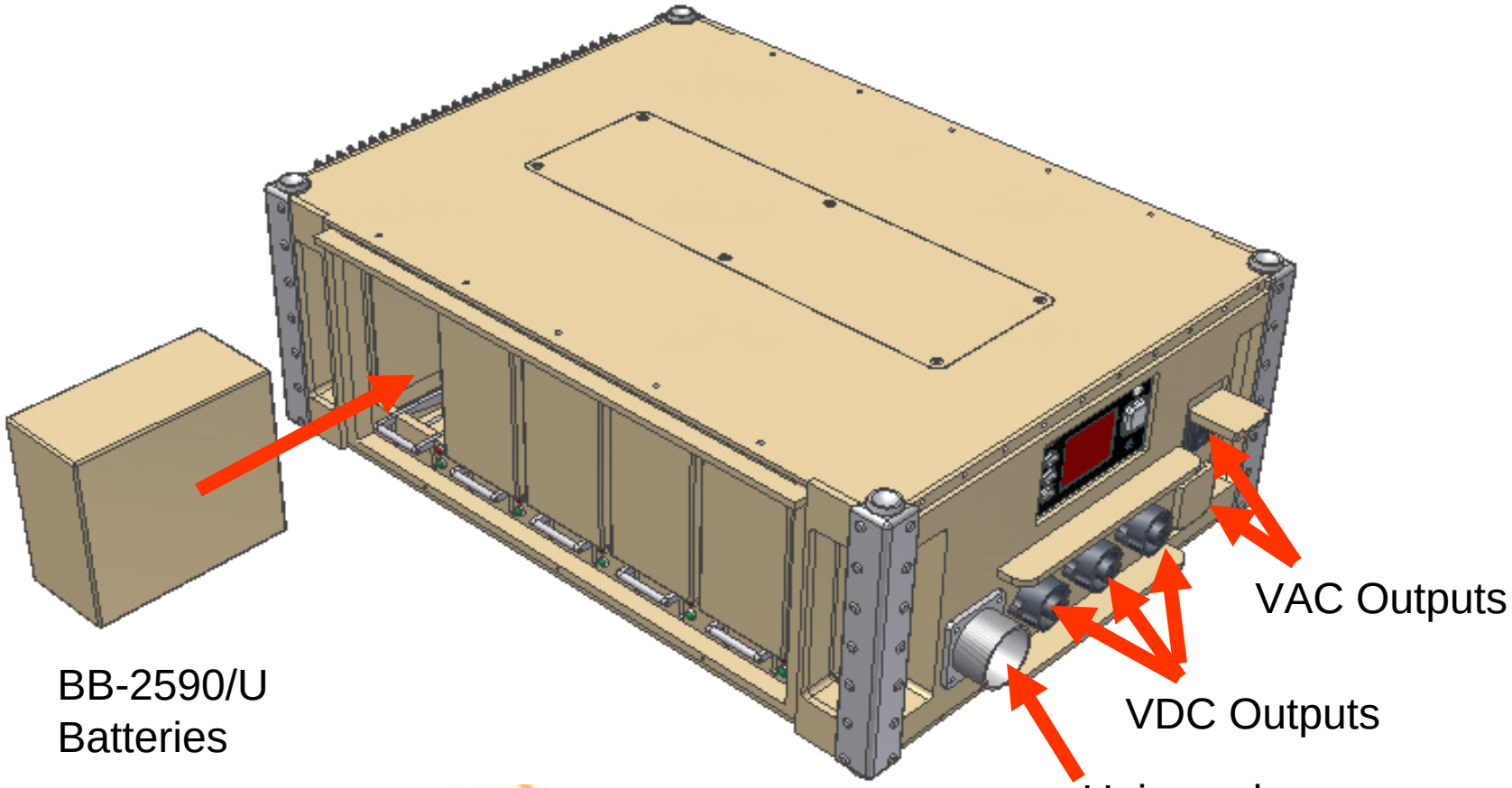
Marine Portable Power Unit (MPPU) SBIR

- Objective - Develop a UPS/Battery charger that:
  - Utilizes BB2590 for 1000Whr of energy storage
  - Batteries are hot-swappable
  - Inputs: 120- 240VAC at 40-440Hz, 24VDC
  - Outputs: 120VAC at 60Hz, 12VDC, 24VDC (regulated)
  - Weight ~ 50 lbs
  - SMBus capable
  - Rugged
- Mid to late FY10 deliverables

Acumentrics

techshot

Marine Portable Power Unit (MPPU)



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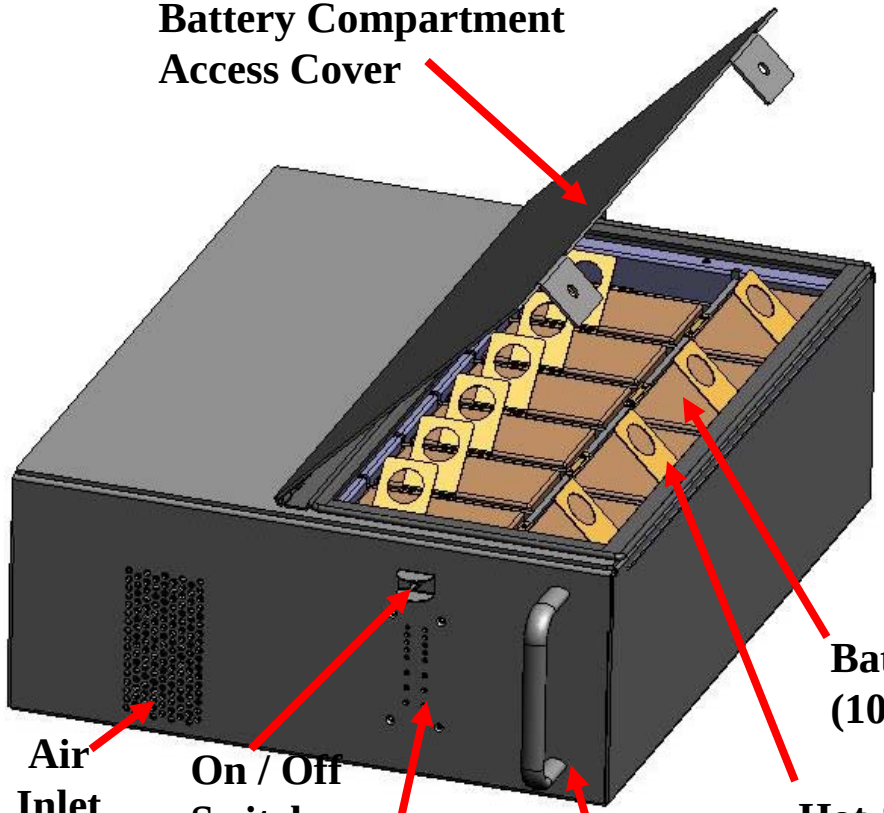
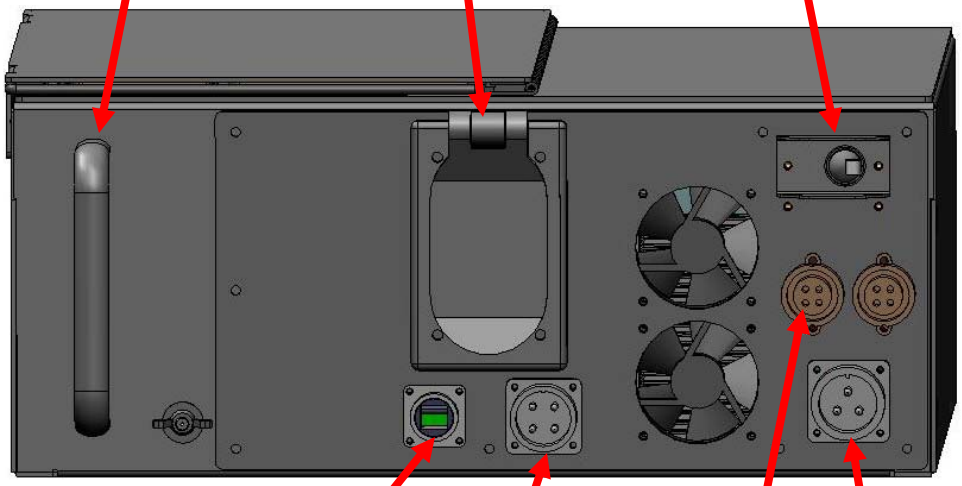
CHARGER-1250-Li





Acumentrics

SBIRs

- Wireless battery charging
  - Currently in Phase I, 4 companies
    - Physical Optics
    - PowerPad
    - Infoscitex
    - Eltron
- Battery maintenance and monitoring during storage
- Ruggedized power supply with world wide operations

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