Self-Generated Field Power Sources

2007 Joint Service Power Expo
Albert Hartman
Mobile Electronics

- Power Requirements
- Available Field Sources
- EM Energy-Harvesting Technology
Electrical Power Req’s

1. How Many Watts?
2. Usage Duty Cycle? (intermittent/continuous?)

0 1 5 10 Watts 30 100

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Chemical Batteries

- Enabled mobile electronics
- Industry - 6%/yr, cheap labor/lax laws
- Primaries - use once, dispose. $60B
- Secondaries - $6B
Primary Batteries Procurement

Difficult & Expensive

$$$
Primary Batteries Disposal

Spending Money & Taking Risks

for Trash!
Secondaries

- Economics driving popularity
  - cellphones, computers, ipods, shavers, toothbrush
  - electric car
- Nothing new, Li-ion 6%/yr
- MIL directive to use rechargeables
  - replace only 1/yr
Secondaries - Power

- Huge increase in Wattage
- Logistics: fewer spares in supply chain
- Redesign Devices: portable & smaller

Enabling rapid vertical mobility
How Much Should You Pack?
Energy is Everywhere

- Can Find a Fresh AA every 5-10 mins

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If You Can Walk Up These Stairs ...

So How Much Effort Does it Take?

You Can Charge a AA Battery
How About Us?

- Leverage Hard Disk Drive technology (electro-magnetics, digital switchers, uP)
- All electricity comes from E-M
- Human power is same as as diesel or hydro or nuke or wind, etc.
Early Effort

- Made a modern G-67
Stuff We Found Out

- Power Variability: users, time
- Destructive Power Levels, need buffer
- User Interface: ergonomics (50%), info, effort adjust
- Multiple device sinks
Stuff We Found Out (cont.)

- Unanticipated Uses: PV, UPS, volt conversion (AUX)

- Connectors: many MIL, use COTS, cig lighter, USB
Current System Overview
Jammer P125
Applications

- Emergency kits - crash kits, rubber rafts air/seacraft, w/first aid kits
- Dismounted soldier rucksacks
- Anything low power (single AA apps)
- Looking For Your Ideas Too
We`re Putting A Build Together

- 5 yr history: CECOM Powerbranch, SOCOM
- Add Your Name to the List
- Controls Charger Costs
- Last chance for input before hardtool lockdown
Recap:

- Mobile Electronics - great, modest power
- Plenty of power everywhere
- Portable EM chargers are effective
- Dead batteries? No problem.
Field Energy Harvesting with High Tide

You Are NEVER Without Power
Contact Info:

Albert Hartman
650-245-5424
ahartman@hightidelabs.com