

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?)



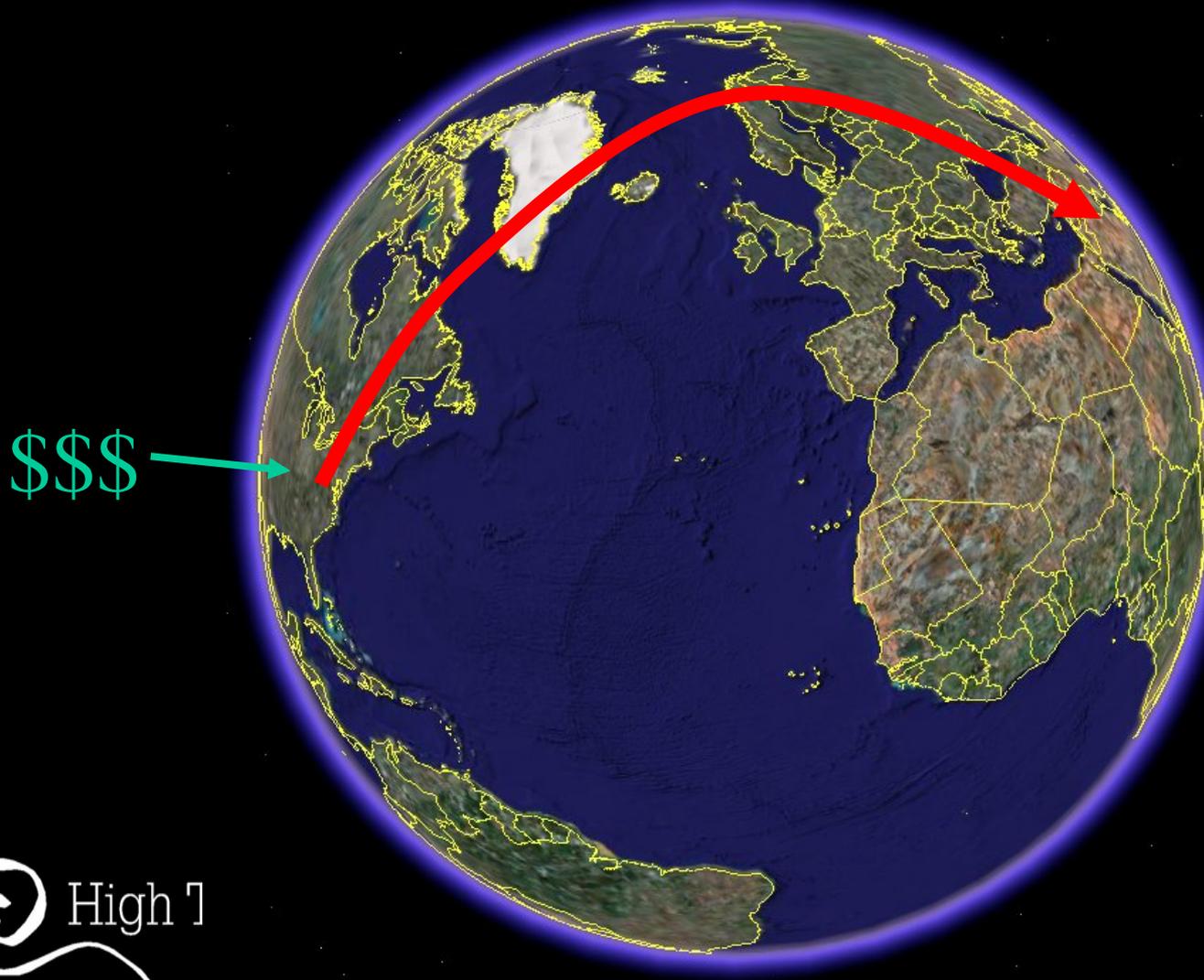
0 1 5 10 30 100
Watts

Chemical Batteries

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

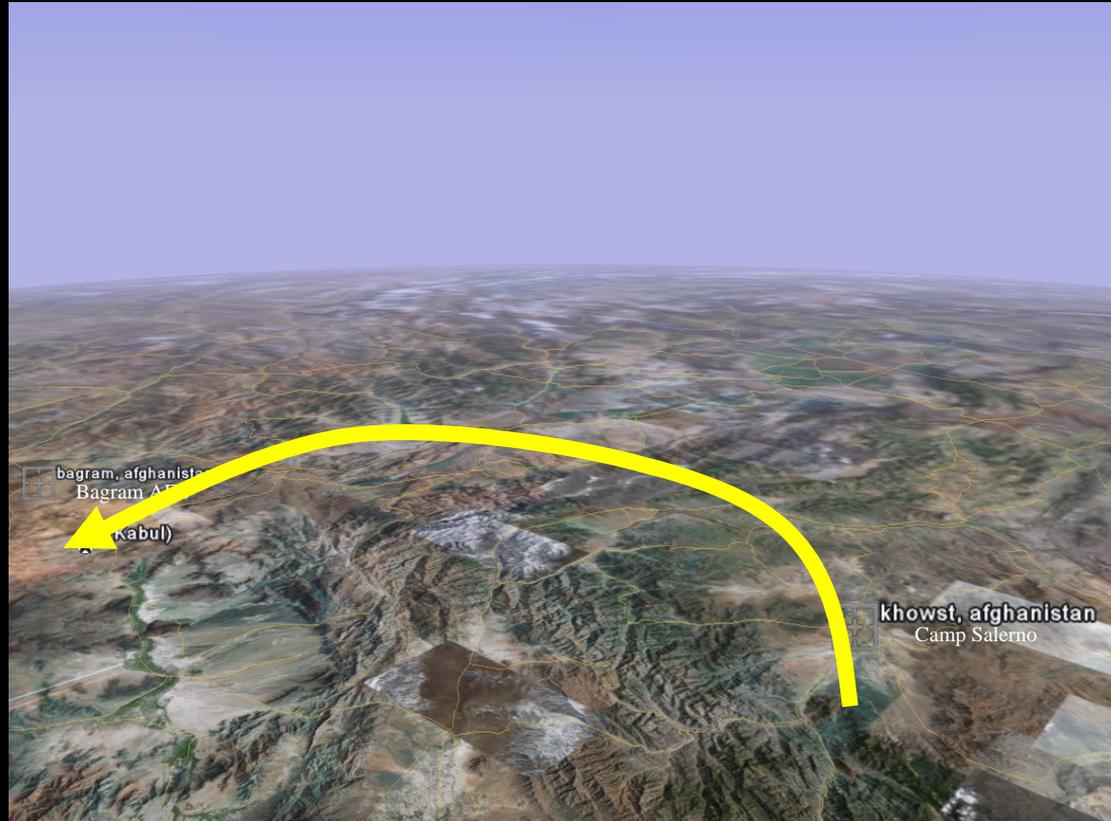
Primary Batteries Procurement

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
- Log
- Red



atts
y chain
smaller



How Much Should You Pack?

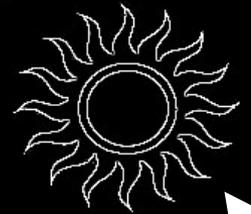
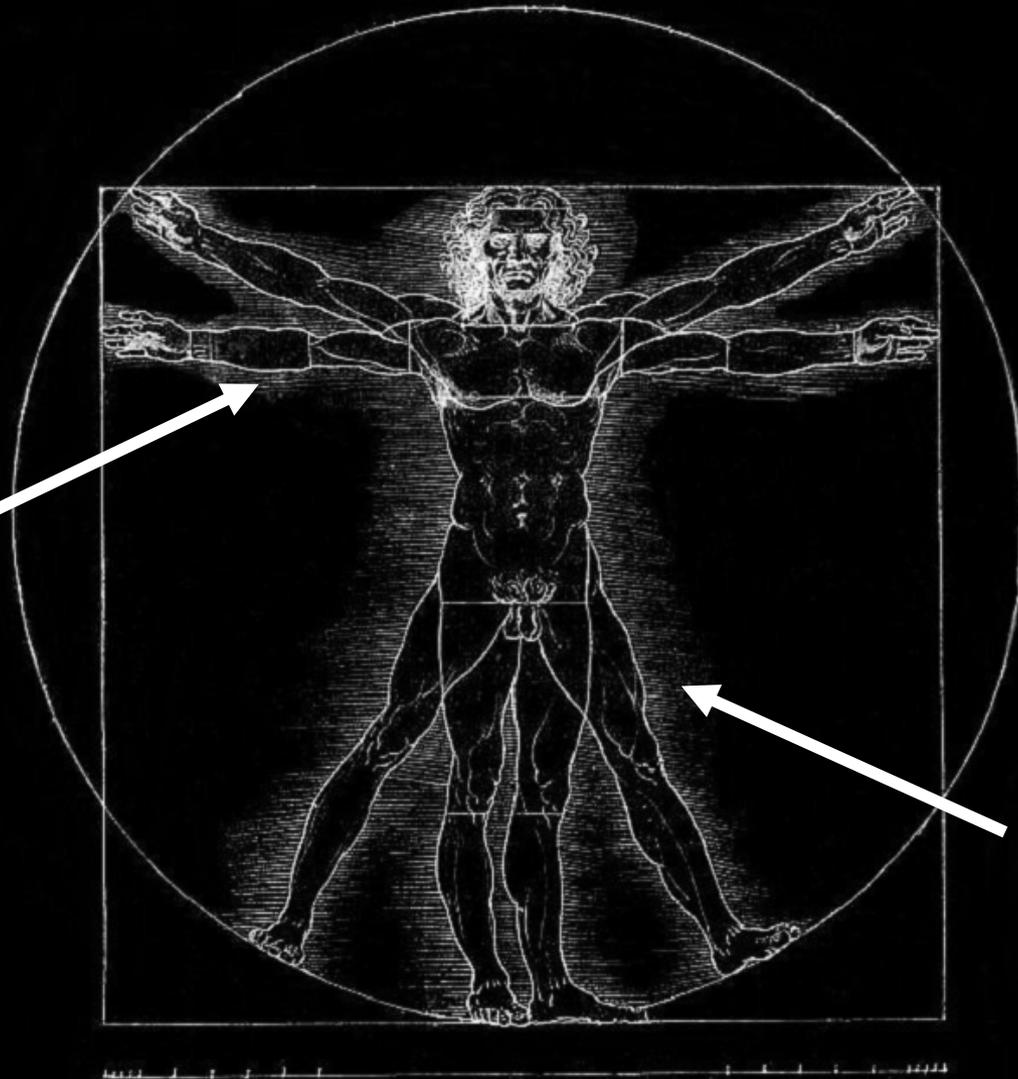


Energy is Everywhere

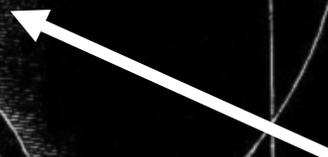


- Can Find a Fresh AA every 5-10 mins

10 - 30W



30-50 W



40 - 200W

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 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



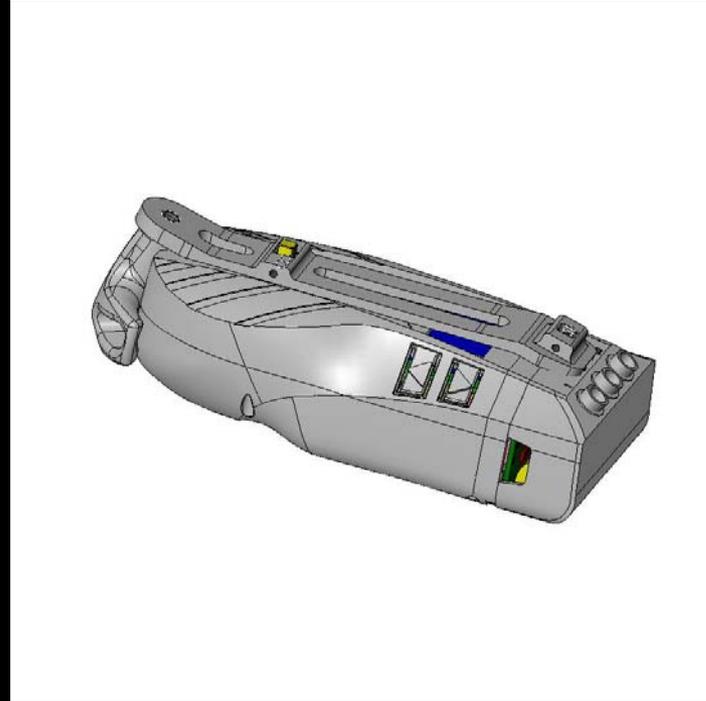
Stuff We Found Out (cont.)

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

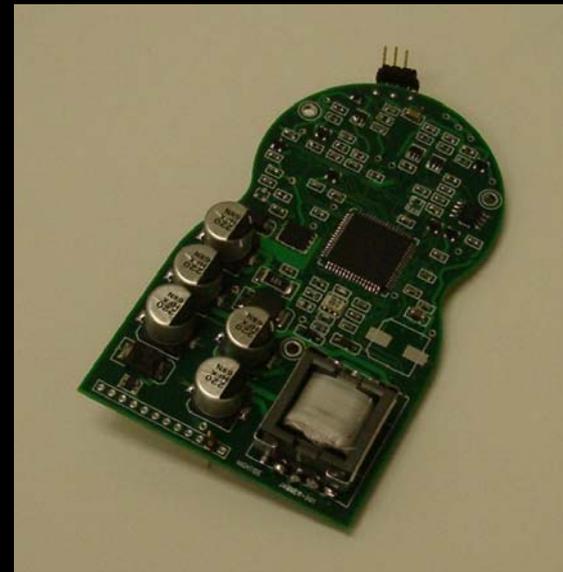
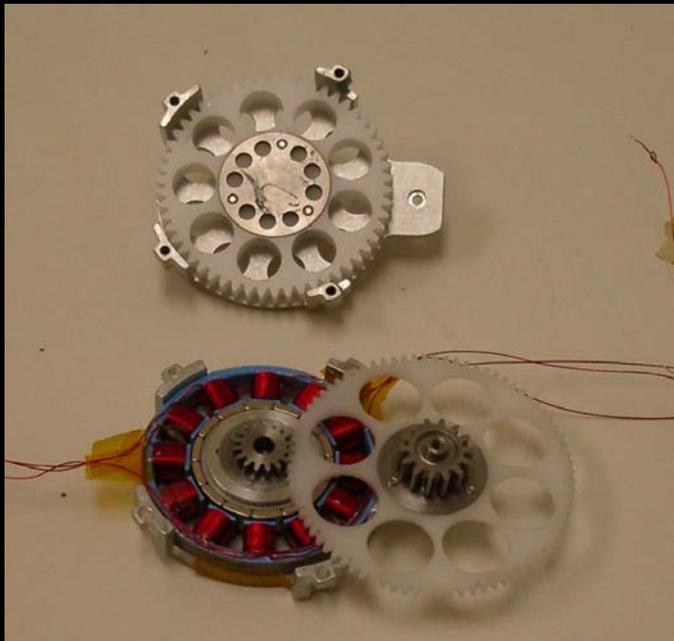


- Connectors: many MIL, use COTS, cig lighter, USB

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

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