

# Portable Power - Batteries & Solar

How Much Power Do You Need?

- How much power are you using?
- How much energy does a battery hold?
- Battery sizing & battery life
- Improving battery life
- How much solar power do you need?

# How much power are you using?

## Calculate Average Current Draw

$$I_{Avg} = (I_T \times T_{P\%} \times T_{T\%}) + \{I_R \times (1 - T_{T\%})\} + I_{Acc}$$

$I_{Avg}$  – Average Current Draw

$I_T$  – Maximum Transmit Current Draw (Key Down)

$T_{P\%}$  - Transmit Power % (FM & RTTY = 100%, SSB & CW = 50%)

$T_{T\%}$  - Transmit Time % (10% for Public Service, 30% for Contests)

$I_R$  – Receive Current Draw

$I_{Acc}$  – Accessory Current Draw (Laptops, Lights, Speakers, etc.)

# How much energy does a battery hold?

- Lead Acid Batteries
  - 50% Usable Energy
  - Lower Cost
  - Heavy & Bulky
  - Shorter Life Span (hundreds of charge-discharge cycles)
  - Steeper Output Voltage Curve
- Lithium Iron Phosphate Batteries
  - 90+% Usable Energy
  - Higher Cost (3 to 4X)
  - Lighter & Smaller (1/6 the weight, 1/4 the size)
  - Longer Life Span (thousands of charge-discharge cycles)
  - Near Flat Output Voltage Curve

# Battery Sizing & Battery Life

- Battery Size Estimate

$$Battery_{Ah} = \frac{I_{Avg} \times Time}{Battery_{P\%}}$$

- Battery Life Estimate

$$Time = \frac{Battery_{Ah} \times Battery_{P\%}}{I_{Avg}}$$

# Improving Battery Life

- Reduce or Eliminate Accessory Current Draw
  - Use a 12V adapter for powering laptops instead of an inverter
  - Use other supplemental battery packs to power laptops
  - Newer laptops are generally more efficient than older ones (check CPU specs)
- Reduce Transmit Current (Turn Down the Power)
- Use a different radio with lower receive current draw
  - Yaesu FT-450 = 950mA
  - Yaesu FT-817 = 450mA
  - uBITX = 250mA
  - Elecraft KX3 = 180mA

# How Much Solar Power Do You Need?

- Match or Exceed your Average Current Draw
  - Keeps battery charged during day
  - Leaves you with fully charged battery for night operations
  - 50 Watt panel outputs ~3 Amps
  - 100 Watt panel outputs ~6 Amps