

Small Rechargeable Batteries for the Ham

Orange Park Amateur Radio Club – March 2007 – Dick Bennett K2LJZ

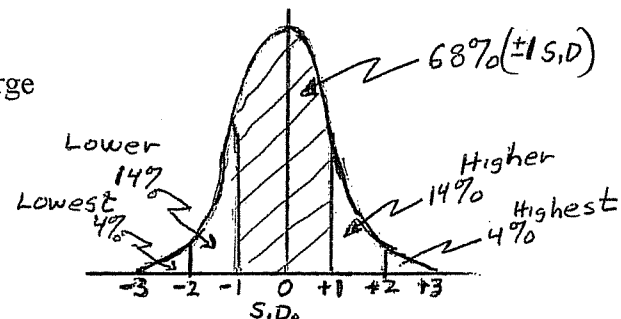
I. AA Batteries - Alkaline, Ni-Cad, Nickel Metal Hydride, Lithium

1)

AA Batteries	Volts	mHr	watt/Hrs	# Uses's
Alkaline	1.5	775	0.97	1
Ni-Cad	1.2	800	0.88	200-500
NiMh	1.2	2500	2.70	300-1,000
Lithium	3.7	750	2.78	Up to 1,000

2) Manufacturing Variations

- Rechargeable batteries are measured and sorted by charge capacity, internal resistance, and charge acceptance rate.
- Batteries are matched for making up packs.
- High capacity batteries are sold at a premium.
- Low capacity are sold "off brand" or Flea markets.



Normal Distribution Curve

II. Battery Characteristics

- Alkaline - Good** - Low self discharge rate, no charger needed, low purchase cost.
Bad - One time use, low capacity (775 mHr), Poor in high drain loads, High cost per use
- Ni-Cad - Good** - High Discharge Rates OK (6 amps), Low Capacity (800 mHr).
Bad - Memory effect (Needs to discharge before recharging.), High self discharge rate (20% per month), Needs a charger, Can short out with low usage (Can be "Blasted" open).
- NiMh - Good** - High capacity (2500 mAh), No Memory effect, Up to 1000 recharges, Can recharge in 1 hour (or less), low cost per use (1/2 cent). High discharge rates OK.
Bad - Self discharge of up to 20% per month. Freezer storage will cut it to 10% after several months. Newest technology (Sanyo) holds 85% charge at 1 year., After long periods of non use, cells need to be charged and discharged 3 to 4 cycles., Overcharging reduces capacity., Needs a charger.
- Lithium** - Three common Lithium batteries. Lithium-ion is a 3 volt rechargeable.
 Li/MnDioxide is a 3 volt one use battery and Li/FeS₂ is a one use 1.5 volt battery.
Good - High capacity and light weight., No Memory., Low self discharge rate (5% / month).
Bad - Expensive and needs electronic circuit to prevent low voltage discharge damage and to prevent overcharging. Fire danger if short circuited or if opened and water gets on it.