

GETTING THE MOST FROM YOUR HT

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HT Applications

An "HT" makes perfectly good sense for:

- ◆ Anyone who doesn't drive
- ◆ Commuters who use public transportation
- ◆ Controlling a mobile radio as a cross-band repeater
- ◆ As a spare, a backup or loaner
- ◆ Ultra-portable field unit

HT Issues

- ◆ Severely compromised antenna systems
- ◆ Limited battery life
- ◆ Limited power
 - ◆ Increasing power to overcome poor antenna systems reduces battery life
- ◆ Poor transmit and receive audio
- ◆ Accessories create cabling mess
- ◆ Small display size

Pick the right radio

- ◆ For emergency use, it needs to be easy to use
 - ◆ During an event is no time to get out the manual
- ◆ Features are cool but master the basics
 - ◆ Change frequency, duplex shift, tone encode, tone decode and program a memory channel
- ◆ Can you operate the buttons and read the display?
- ◆ Good battery life
- ◆ Can you turn off unwanted features (second receiver, scan, priority, weather alert, WIRES, etc.)?

Narrow-band FM

- ◆ FCC currently mandated switch to narrow-band
 - ◆ After January 1, 2011 -
 - ◆ No wide-band commercial radio can be certified
 - ◆ No more wide-band frequency allocations will be issued
 - ◆ This means commercial radios will not interoperate with amateur wide-band gear
 - ◆ Consider narrow-band capability in future radios
 - ◆ Should be easily selectable
 - ◆ Should be storable in memory

Portable APRS

- ◆ Kenwood TH-D72/D74/D75 has TNC with APRS
 - ◆ Internal GPS
 - ◆ USB jack for PC connection
- ◆ Yaesu VX-8R/FT-3DR/5DR includes TNC and APRS software
 - ◆ No PC interface
- ◆ Anytone AT-D878 DMR and APRS support

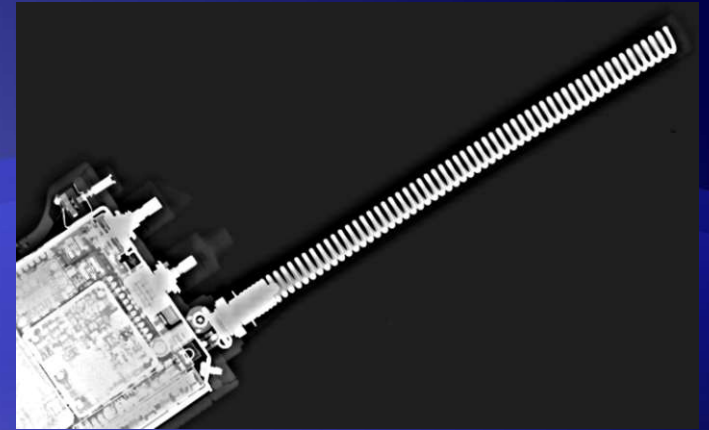
Early Digital Voice Modes

- ◆ D-STAR
 - ◆ Full line of DSTAR HTs and mobiles
 - ◆ All offer backward compatibility to FM
 - ◆ All offer data jack for PC connection
 - ◆ Supports routable voice calls via Internet
- ◆ APCO Project 25 (P25)
 - ◆ Radios available from most manufacturers
 - ◆ Very robust voice
 - ◆ Virtually no data support and cannot route voice

Newer Digital Modes

- ◆ DMR
 - ◆ Radios available from several manufacturers
 - ◆ Two time slot TDMA trunking
 - ◆ Multiple talk groups available via Internet linking
- ◆ Yaesu System Fusion
 - ◆ Yaesu has portables, mobile and base models
 - ◆ Repeaters and radios support dual mode FM/SF
 - ◆ Offers high quality voice or 9600 baud data or combo

“Rubber ducks”



- ◆ Some rubber ducks are as much as -20dBd
 - ◆ That's 100 fold or only 50mW ERP with 5W in
 - ◆ Most are -8dBd to -10dBd – still nearly a 10 fold loss
- ◆ Adding a counterpoise is a simple improvement
 - ◆ A piece of stranded wire (19.5" @ 2m and 6.5" @ 70cm) crimped/soldered to a ring lug slid over the antenna mount. A little heat shrink adds strain relief
 - ◆ Creates vertical dipole
 - ◆ Counterpoise can be pointed to provide directionality

When gain isn't gain

- ◆ Gain is often advertised
- ◆ Gain is expressed in decibels (dB)
 - ◆ Gain must be referenced to something
 - ◆ dBi – Gain vs. isotropic resonator
 - ◆ dBd – Gain vs. reference dipole
 - ◆ dBi is often used because it's larger
 - ◆ dBi is a calculated – not real world figure
 - ◆ Each 3dB is a 2-fold increase, 10dB is a 10-fold increase



Comet SMA- 501
0 dBi at $\frac{1}{4}$ wave -
Not!

HT Antennas

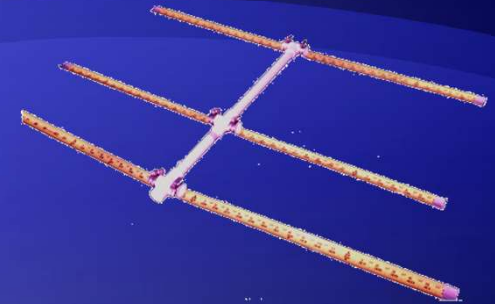
- ◆ Bigger is almost always better
- ◆ Aftermarket 19" whips are full $\frac{1}{4}$ wave on 2m
- ◆ Telescoping $\frac{1}{2}$ wave antennas are VERY effective
 - ◆ $\frac{1}{2}$ wave with no ground plane has similar performance to $\frac{1}{4}$ wave with a ground plane
 - ◆ $\frac{1}{2}$ wave antennas are often used for marine
- ◆ Almost anything OUTSIDE a vehicle is better



Portable Antennas

- ◆ Twin lead J-poles provide gain and can be hung or tacked to a wall or window (NgTAX)
- ◆ Magnetic mount antennas can be used with any metal surface large enough for ground plane
- ◆ Tram makes a base to provide a ground plane and mount for an NMO base antenna
- ◆ Telescoping 2m and dual-band whips are compact and very effective with ground plane

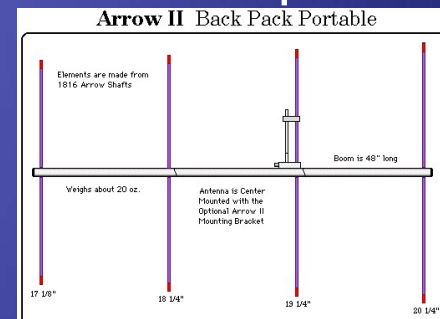
Directional Antennas



- ◆ Tape measure yagi provides portability and gain
 - ◆ http://home.att.net/~jleggio/projects/rdf/tape_bm.htm

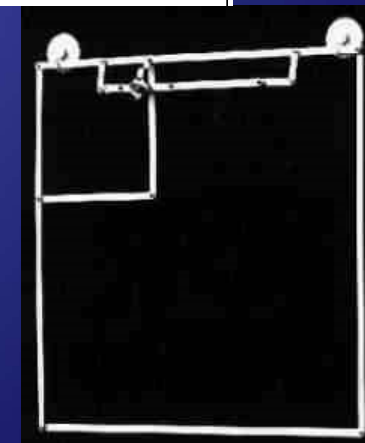
- ◆ Arrow Antennas

- ◆ <http://www.arrowantennas.com/>



- ◆ Window Quad

- ◆ http://www.wimo.com/framesetp_e.html
 - ◆ Wimo offers other portable designs

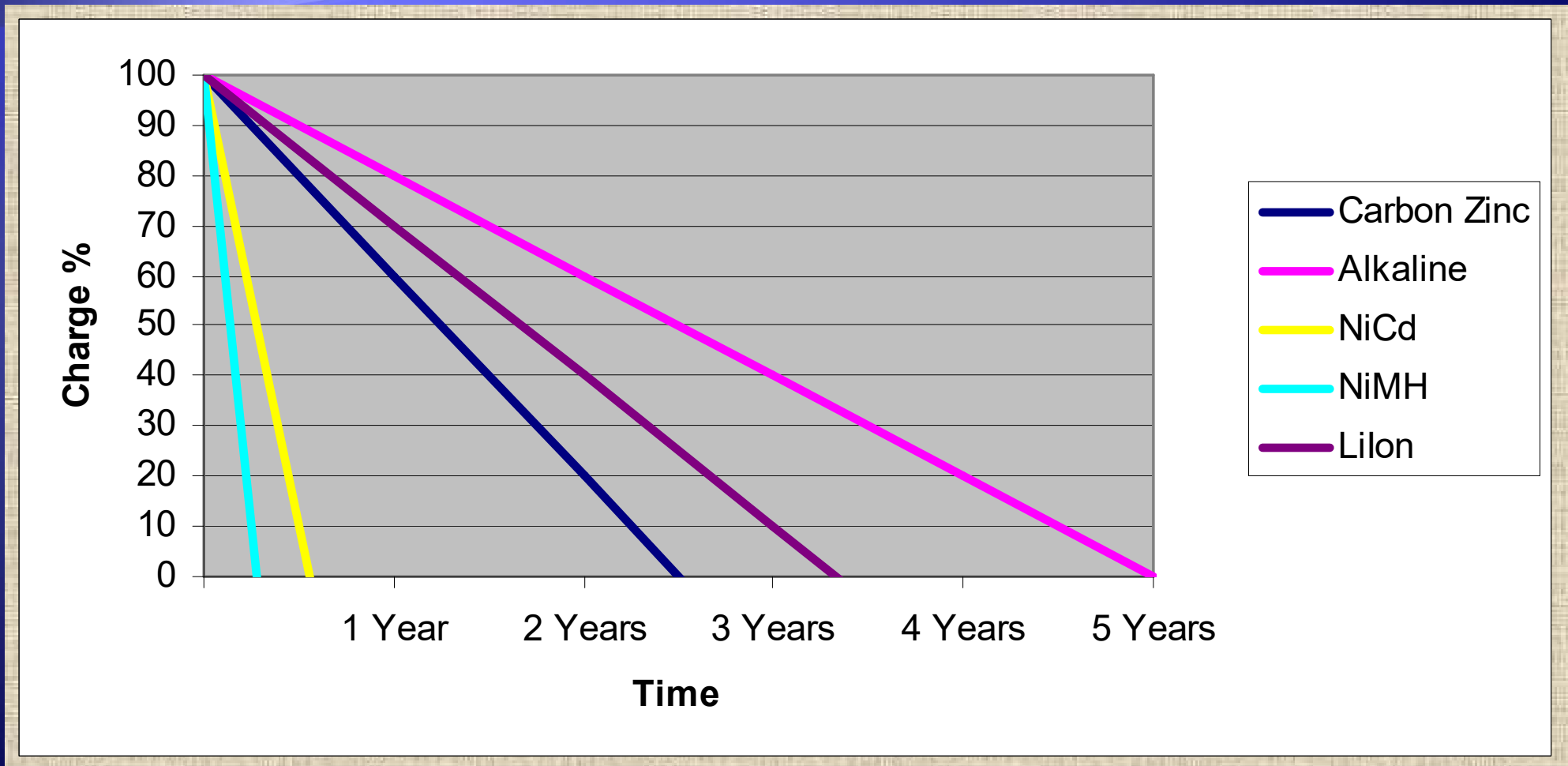


Battery Technologies

Type	Cell Voltage	Recharge Cycles	AA Capacity
Alkaline	1.5	None	2500 mAh
Nickel Cadmium (NiCd)	1.2	1500	900 mAh
Nickel Metal Hydride (NiMH)	1.2	800	1200 mAh
Lithium Ion (LiIon)	3.6	500	2700 mAh*

* Adjusted for difference in voltage

Battery self-discharge rates



Enough is never enough

- ◆ Most NiCd or NiMH packs are 800-1500mAh
- ◆ High transmit power quickly drains power
- ◆ A busy 8 hour shift could drain two packs
- ◆ Newer Lilon batteries run 1200-3500 mAh
- ◆ Keep an extra rechargeable pack and/or AA pack
- ◆ AA alkaline packs generally provide lower output
- ◆ Recharge regularly and store in cool/dry place

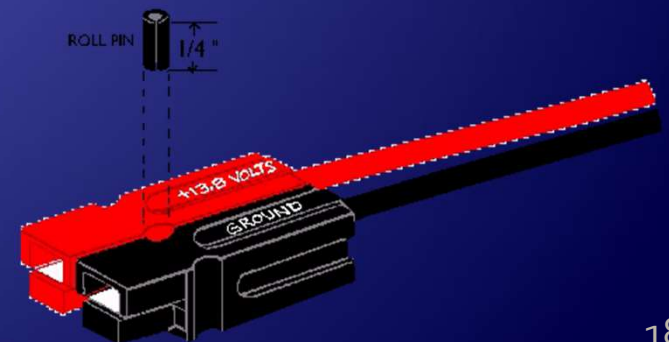
More power!

- ◆ Small sealed lead acid (SLA)/gel cell batteries are easy to find in UPSes, medical equipment, etc.
- ◆ LiFePo batteries are very effective
- ◆ A small case or backpack with a battery, connectors and charging system could provide power for many days
- ◆ A pair of batteries would allow one to be used while the other is charged

Anderson Powerpoles



- ◆ Powerpoles are polarized and genderless
- ◆ They are the ARES/RACES standard connector
- ◆ Run power to the battery in every car and leave the end available under the dash for quick hookup of any radio (don't forget fuses)
- ◆ Easily create adapters for any application



Powerpole adapters



Verify battery integrity

- ◆ Batteries deteriorate over time
- ◆ Verify battery capacity with smart charger or tester
 - ◆ West Mountain Radio offers a Computerized Battery Analyzer (CBA)
 - ◆ Cadex C7400 available with “universal” cups
 - ◆ Operate the radio on receive and record the run time



Maximize battery life

- ◆ Use minimum necessary transmit power
 - ◆ An improved antenna system can help substantially
- ◆ Keep radio squelched
- ◆ Use minimum required volume setting
- ◆ Disable backlighting when not in use
- ◆ Enable any power saver feature
- ◆ Disable scanning and second VFOs

Generate your power



- ◆ The Honda EU1000i is only 30lbs - with fuel!
 - ◆ It does generate some noise on HF SSB but for VHF and FM work, it's fine
- ◆ "Solar Generators" provide multiple types of power and are easily charged
- ◆ Solar panels are easy and silent



Improve audio



- ◆ Speaker mikes place speaker closer to ear
- ◆ HT transmit audio notoriously “boxy”
- ◆ Headsets provide better audio in high noise environments
- ◆ Keep radio safely out of the weather or attached to power and antenna

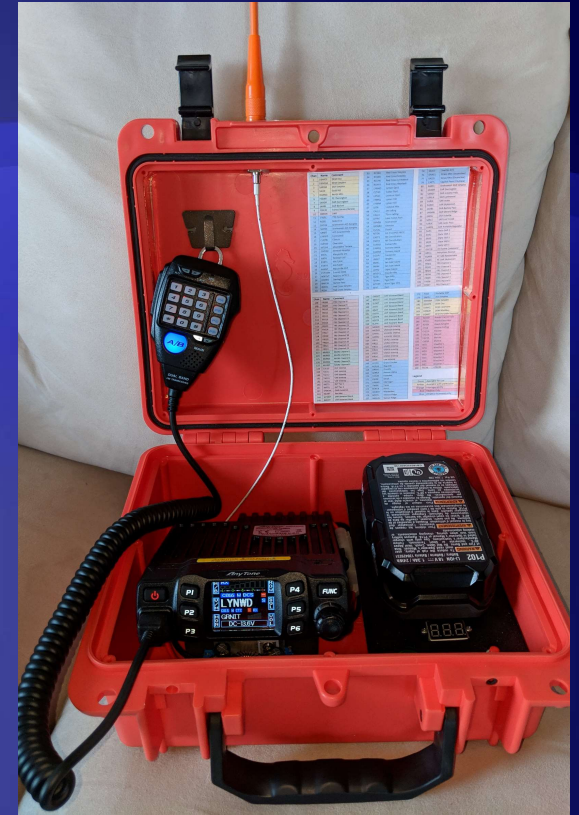


Program and go

- ◆ Get repeater and simplex frequencies
 - ◆ Check <http://www.WWARA.org> list
- ◆ Use alpha memories when possible
- ◆ Don't forget FRS/GMRS, weather, TV, aircraft, marine, itinerant (red dot, blue dot, etc.), public service, etc.
- ◆ Programming software makes this much simpler
- ◆ If the radio can transmit out of band, use odd splits to transmit in ham band when keyed

More power!

- ◆ Mount a mobile in a box with a battery, small charger and portable antenna
- ◆ Pick a model with low standby current drain
- ◆ 15-25 watts can be used (50+w off car battery)
- ◆ Better audio from larger speaker and mike
 - ◆ Front firing speakers are helpful
- ◆ Generally easier to use (big buttons and display)
- ◆ HT with amplifier has limited duty cycle

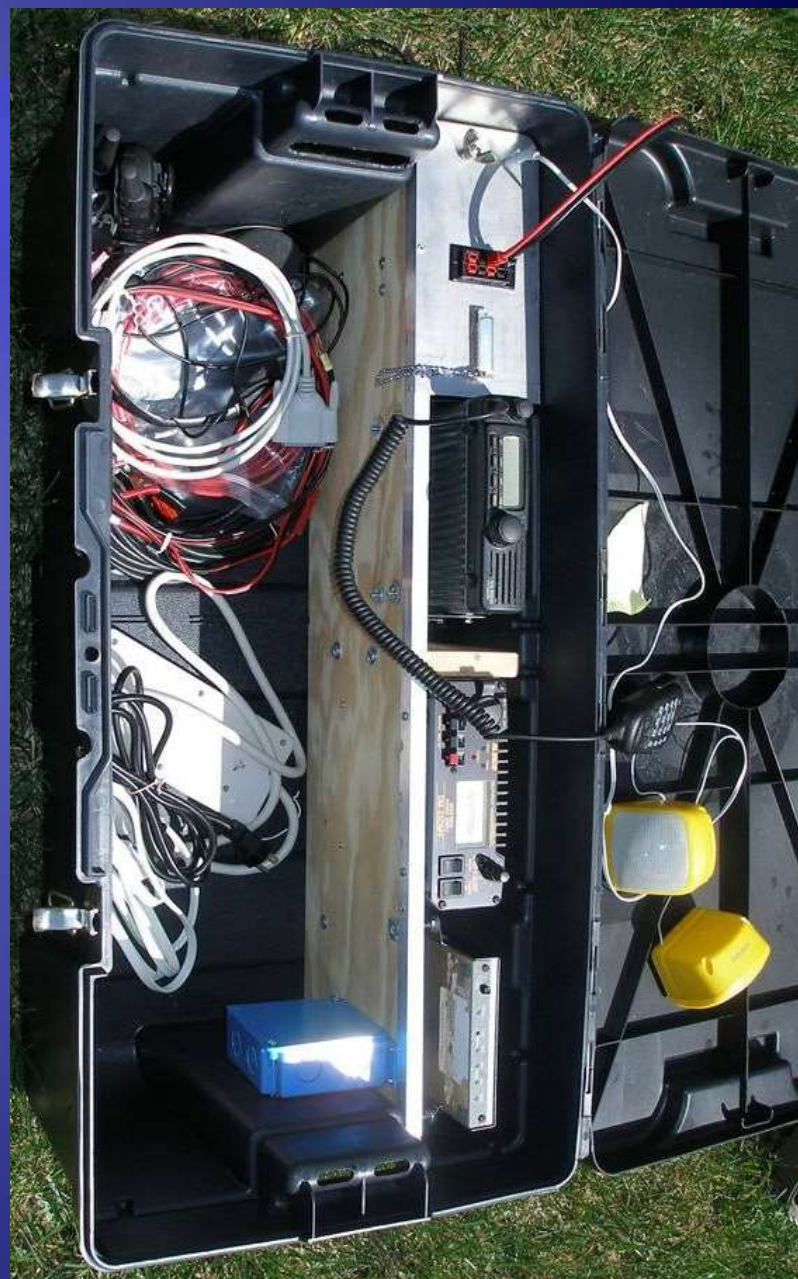


Design your portable station



Don't forget...

- ◆ Pens/pencils
- ◆ Paper
- ◆ Message forms
- ◆ Antenna adapters
- ◆ Extension cords
- ◆ Manuals
- ◆ Etc...



References/Sources

- ◆ <http://www.cometantenna.com>
- ◆ <http://www.mfjenterprises.com>
- ◆ <http://www.pryme.com>
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