

Portable & Field Radio Operations

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- This slideshow is available at

tiny.cc/portop

- Links are marked with “”

- If you need a PDF copy click [here](#)



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Portable & Field Operations

- Types of Operations
- Antennas
- Power Sources
- Misc Accessories
- Planning
- Packing
- Setup
- Operating



Portable & Field Operations

- Extremes of Portable Operations



Portable & Field Operations- Types

- Field Day
- OTA (Blank On The Air)
 - POTA (Parks)
 - IOTA (Islands)
 - SOTA (Summits)
- Contesting- Port/Roving
- Emergency Operations
- Hunting (Counties, Grids, etc.)
- DXpedition
- Vacation DX
- Pedestrian Mobile

- HF
- VHF/UHF
- Microwaves
- Satellites
- Mobile
- EmComm
- Tactile
- Video (FSTV)
- WiFi
- DF (Direction Finding, Fox Hunting, Hidden Tx, etc.)

Types of Operations- Bands

- VHF (6 & 2 Meter + 440)

- Mode
 - SSB & CW
 - FM
- Propagation Modes
 - Line of Sight (LOS)
 - eSkip
 - Tropo ducting
 - Repeater Use

- Microwave- SSB/CW/WiFi

- HF

- Modes
 - SSB
 - CW
 - Digital
- Propagation Goals
 - Local (10M, 80M & 160M)
 - Distant (20M to 10M)
 - Intermediate (40M)

Types of Operations- Transit

- **Foot** (often a premium placed on lightweight & small size)
 - Hike In
 - Final Lug (from parking lot to site)
 - Mobile (Pedestrian Mobile)
- **Cycle**
 - Bicycle
 - Motorized (Motorcycle, Scooter, eBike, etc.)
- **Mobile (Car/Truck)**
 - Mobile (in motion)
 - Mobile (parked)
 - Stationary with possible addition of extra antennas



Portable & Field Operations Conundrum

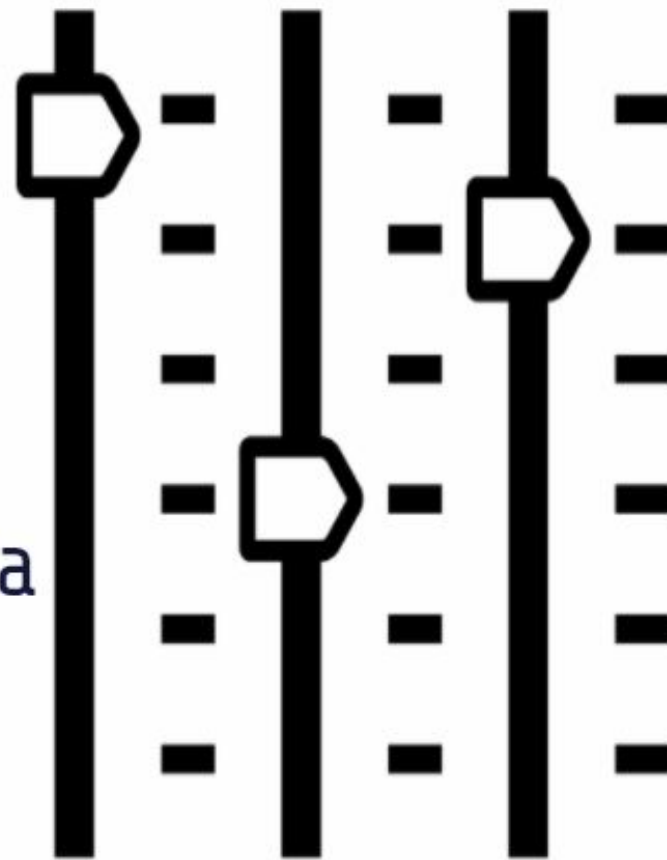
Operating	Power	Weight	Antenna	Antenna Type	Radio	Deployment Time	Ease for Newbie	Physical Exertion
From Vehicle Mobile	Vehicle	No Concern	Inefficient	Mobile Mount	Unlimited	Instantaneous	Requires lots of prep	Minimal
From Vehicle Stationary	Vehicle	No Concern	Mobile or Temporary	Mobile, Vert, Beam, Wire	Unlimited	Few Minutes	Easiest	Very Little
From Near Vehicle	Multiple Options	No Concern	Lots of Possibilities	Vert, Beam, Wire	Unlimited	15 to 45 Minutes	Easy	More
Short Distance from Parking Lot	Multiple Options	Moderate Concern	Lots of Possibilities	Vertical, Wire	Unlimited	15 to 45 Minutes	Easy	More
Hiked In	Portable Battery	Big Concern	Size/Weight Limitations	Vertical, Wire	Portable	15 to 45 Minutes	Harder	Most
Predesterian Mobile	Portable Battery	Big Concern	Needs to be Small enough to carry	Whips, Buddipole, Rubber Duck	Portable	Instantaneous	Moderate	Moderate

	Predesterian Mobile	SOTA	POTA	Vacation (Holiday) Operation	Field Day	DXpedition	Mobile	State QSO Party Rover
Transport	Foot	Foot	Vehicle, Last Mile maybe foot	Mixed often includes Air	Vehicle	Mixed often includes Air	Vehicle	Vehicle
Primary Considerations	Light Weight, Ability to operate while carrying everything	Light Weight, Small Size, Include Antenna Support	Flexibility, Minimum # of QSOs	Packable for travel, Flexibility	Group Activity, Multi-station interoperability, Bonus Activities, Ed & PR	Activation of Rare location, high volume, Worldwide Prop.	Ability to operate in motion, Antenna optimization	Ability to operate in motion, Activation of specific locations
Radio	Low Power	Low Power	Depends on Last Mile/Vehicle situation	Depends on Power Sources Available	100 Watt, Multiband	Include Amps	100 Watt, Multiband	100 Watt, Multiband
Antennas	Vertical Whips, Pole held Dipole/Beam	Portable, Multiband	Portable, Multiband	Often need for Stealth & Flexibility	Multibands, Varies by Geo-location	Gain/Directional is very useful	Vertical Whips, durable	Vertical Whips, durable
Power Sources	Battery	Battery/Solar	Battery/Vehicle	Commercial	Generator	Generator/ Commercial	Vehicle	Vehicle
Misc Access.	Voice recorder for logging	Climbing equipment, dealing with elements	Public relations materials- banner, handouts, etc.		Computer logging, lighting, educational/public outreach	Computer Logging	Voice recorder for logging, repeater guide	Computer Logging. GPS/Maps, Temporary non-mobile Antennas
Packing	Allows operation while packed	Protection for gear, hands-free carry	Quick deploy Go-Box	Depends a lot on method(s) of travel	Often logistics of multiple sources of equipment & supplies	Depends a lot on method(s) of travel	Installed (permanently or temporarily)	Installed (permanently or temporarily)
Setup	Minimal	Use of nature (trees, rocks, etc.)	Varies greatly	Varies greatly	INTENSIVE! Includes feeding & shelter	INTENSIVE! Logistics/planning critical	Depends on type of installation	Depends on type of installation
Operations	Typically Voice. Public demonstration, limited # of QSOs, local net check in	HF or VHF, fairly short duration due to travel time, Voice or CW. Spotting helpful	HF or VHF, flexible time, Voice or CW. Spotting helpful	Varies considerably depending on location available time, etc.	Contest Style Op, Full 24 Hours, nationwide contacts, modes (CW, SSB & Digi)	Multi Day, Big Pile-ups / High Demand, worldwide contacts,	Casual, mostly Voice, VHF or HF (big differences)	Contest Style Op, 8 to 12 Hours, HF SSB & CW, Travel planning important

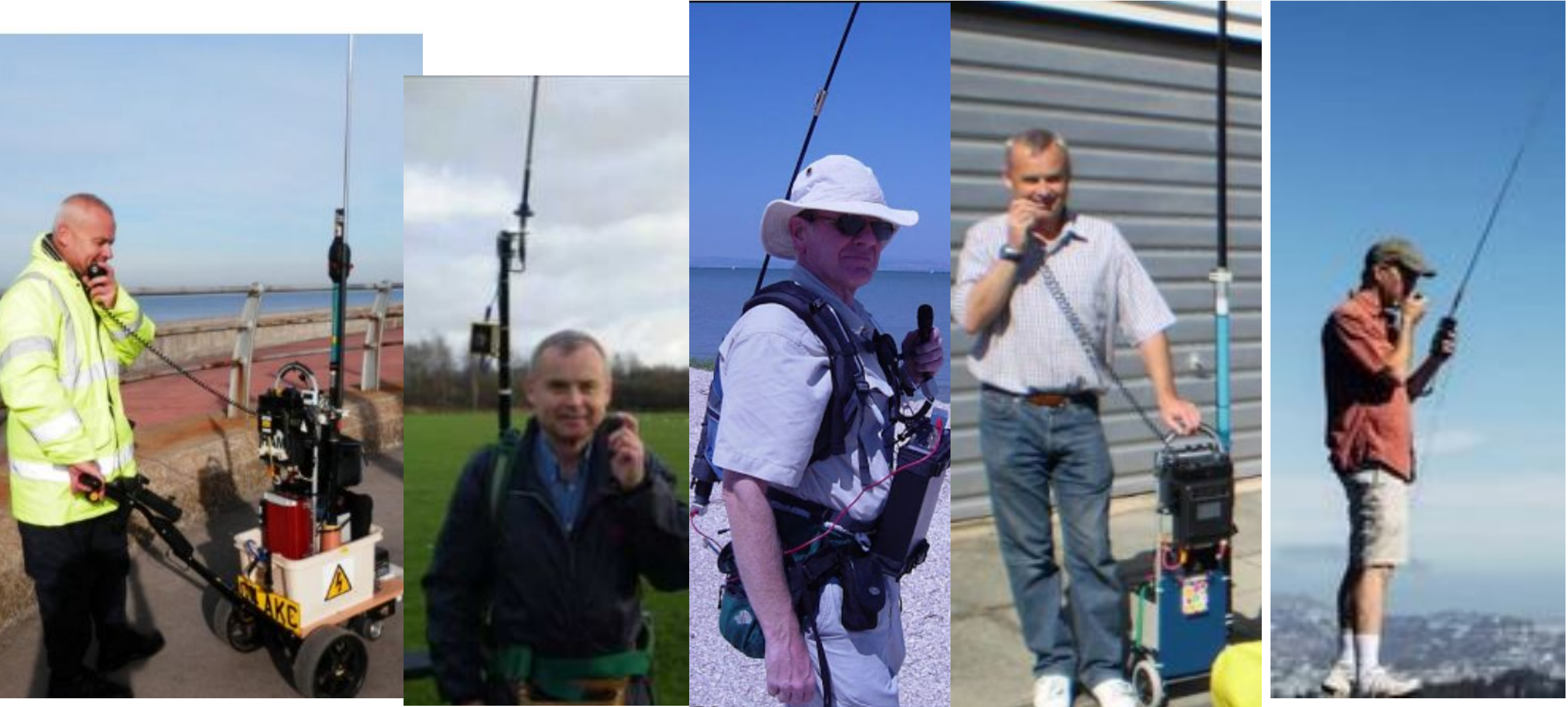
Portable & Field Operations Conundrum

● Trade offs

- Antennas- More Gain \rightarrow Bigger Size \uparrow
- \uparrow Radio Output Power \rightarrow Increased Battery Capacity Needs \uparrow
- \uparrow Battery Power \rightarrow More Weight
- \downarrow Lower Gain Signal \rightarrow \downarrow Power or \downarrow Antenna may require \uparrow efficient modes- FT8 or CW
- \uparrow efficient modes \rightarrow \downarrow Less potential audience for QSOs & \uparrow specialized skills



Types of Operations- Pedestrian Mobile



Types of Operations- Pedestrian Mobile

- Pedestrian Mobile



Types of Operations- Pedestrian Mobile

- Me- PT Glenwood Springs, CO Amtrak platform Oct 2021 with Elecraft KX2 and AX1 Antenna
- Working CAQP



Types of Operations- Pedestrian Mobile

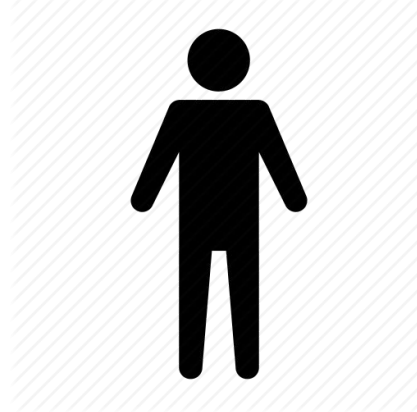
- Fun with HF QRP
Pedestrian Mobile-
VK3YE



Types of Operations- Operators

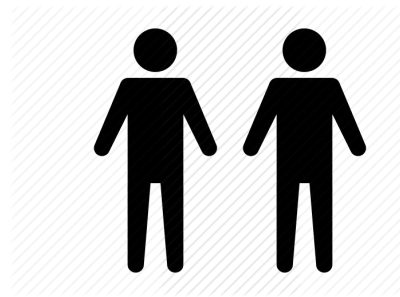
- Solo

- One person does everything



- Pair

- Two people work together
- Shared time on one radio or two radios simultaneously
- Multiple bands and/or modes



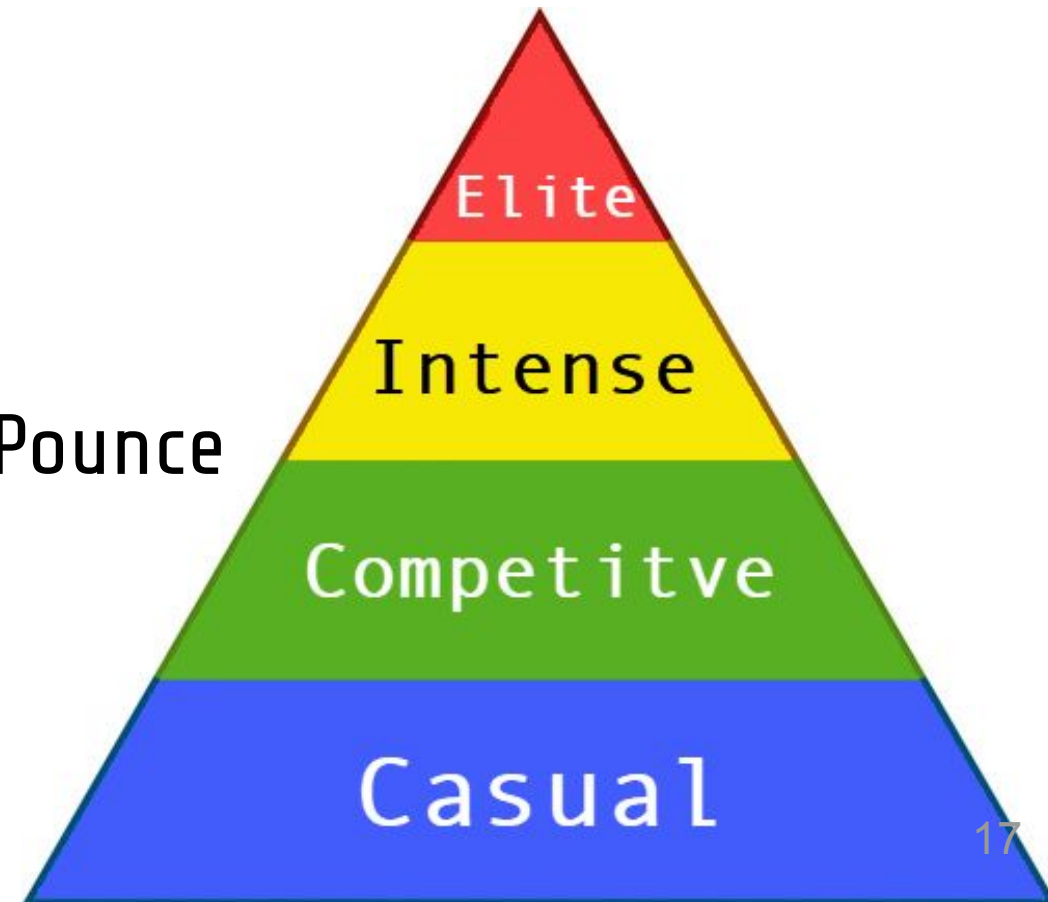
- Group

- Multiple stations
- Work in shifts
- Support crew



Types of Operations- Pace

- Casual
 - Laid back operation
 - Recreational
- Competitive
 - Higher activity
 - Maximize number of contacts
 - Includes mix of calling CQ / Hunt & Pounce
- Intense
 - Running (calling CQ)
 - Operate full time in event



Antennas- For the Field

- Warning Contact of Antenna and/or Mast with any Electrical Wire **CAN KILL YOU!**
- Even nearby is too close!



Antennas

● “Antennas” Information Sheet [link](#)



Antenna Choices Pros & Cons

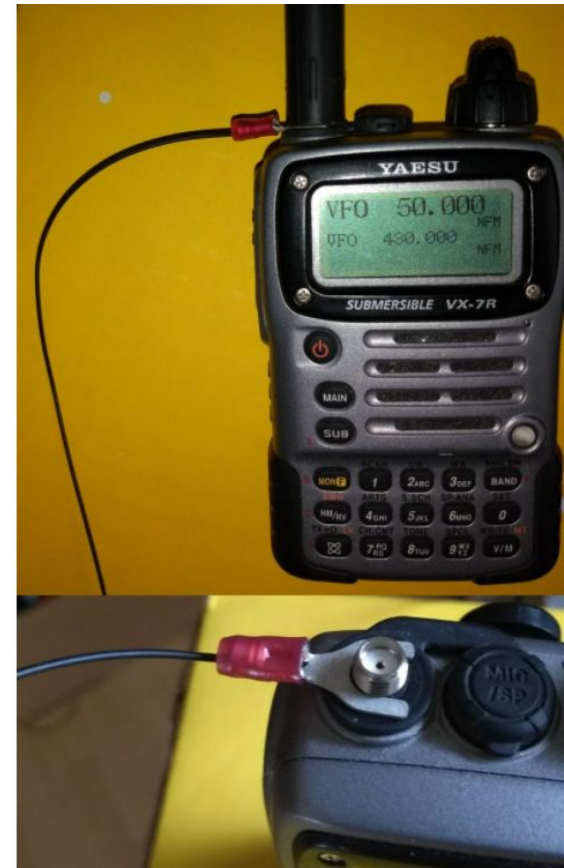
Share this doc- tiny.cc/portant

Wire Antennas	Pros	Cons	Notes
- Dipole (resonant)	<ul style="list-style-type: none"> Inexpensive Easy to build Can be fed with coax 	<ul style="list-style-type: none"> Require 2 supports Single or limited # of bands 	
- Dipole (nonresonant) or offset center	<ul style="list-style-type: none"> Inexpensive Easy to build Multiple bands support Cheaper & lighter Ladder line instead of coax 	<ul style="list-style-type: none"> Require 2 supports Requires Antenna Tuner May require balun 	Often fed with open line or ladder line feeders to allow better multiband performance
- Inverted V	<ul style="list-style-type: none"> Inexpensive Easy to build Require only 1 support 	<ul style="list-style-type: none"> In some cases, it may not work as well as dipoles 	Often have more omnidirectional pattern than dipoles
- End Fed	<ul style="list-style-type: none"> Inexpensive Easy to build Require only 1 support Multiband Operation 	<ul style="list-style-type: none"> May require a special balun May cause RFI 	
Verticals	<ul style="list-style-type: none"> Require no high supports Can be very simple (especially single band) Very easy to transport The only option for most mobile work 	<ul style="list-style-type: none"> Require Radials Often have lossy or problematic traps for multiple bands Low angle of radiation poor for close-in QSOs 	
Beams	<ul style="list-style-type: none"> Good gain Directivity 	<ul style="list-style-type: none"> Require tower or sturdy support Often require lots of assembly Limited to higher frequency bands Expensive 	Smaller size at VHF (6 or 2 M) greatly decreases Cons
Mag Loop	<ul style="list-style-type: none"> Small Easy to transport No supports needed 	<ul style="list-style-type: none"> Limited bandwidth Require frequent retuning when changing freq. 	Works well for fixed freq. modes such as FT8/ET4

DXing with a Handheld

Better portable operation with an HT

- Article- *“DXing with a Handheld: What You Need to Know”*
 - Add a *“Tiger Tail”* to your HT
 - Use a longer flexible or collapsible antenna
 - J-Pole (*Slim Jim*) or *Flower Pot Antenna*
pole raised or suspended from tree limb
 - Use a small Yagi or Moxon gain antenna
 - Add a small RF Amp



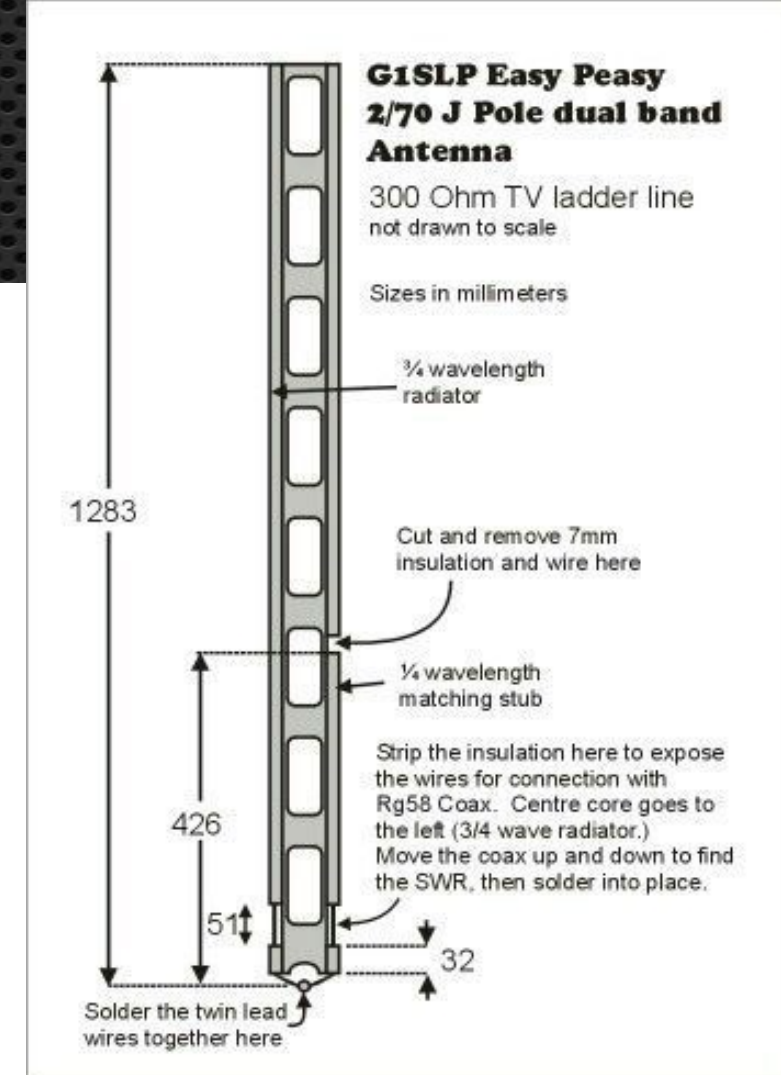
Antennas- Integrated

- Handheld radio with antenna
 - Rubber duck
 - Extended whip
- Base radio
 - Pedestrian mobile HF antenna- SuperAntenna Whip, Buddipole ([homebrew](#))
 - Portable Telescopic Antenna - 1899T, HFJ-350M, Elecraft AX1, SPX-100, etc. and Loops
- Mobile
 - Vehicle mounted antenna(s)
 - Installed mount
 - Mag-mount



Antennas- External

- Handheld radio with antenna
 - J-Pole (Ridged or Foldable)
- Base radio
 - Wire Antenna (Center or End Fed)
 - Vertical
 - Portable Beam
- Mobile
 - Use antennas not suitable for use in motion
 - Bumper mount for mast with vertical or small beam
 - Coax to typical Base antennas or hanging J-Pole



Antennas– Multiband/Method HF Kit

- Michael, KB9VBR's portable antenna kit is a great introduction for new portable operators



Antennas

- Magnetic Loop Antennas are very portable, but...
- Narrow bandwidth requires frequent retuning when QSYing
- This is not as big a problem on fixed frequency operations (nets, tactical comm, etc.) or modes like FT8 & FT4



Antennas- Supports

- Hang from tree branch
- Masts
 - Steel TV Antenna (extendable or stacked)
 - Fiberglass Military Surplus
 - Aluminum Military Surplus
 - Extendable Fiberglass Poles
 - Extendable Painters Poles
 - Fishing Poles
- Self Supporting Antennas
 - Verticals
 - Handheld antennas



Antennas- Masts

- Fiberglass or Aluminum Military Surplus
 - Not really Masts, Camo support poles
 - Specs for Aluminum
 - Each tube 48" long & Weigh 2.7 lbs
 - Outside Diameter- 1.785 inch
 - Inside Diameter 1.57 inch
 - Wall - 0.11 inch
 - Last 3.25 inches is a smaller diameter (1.55" OD, 1.33" ID) that fits into the next mast section. This 1.55" OD piece is 6" long is used as an inner sleeve that forms a strong joint



Antennas- Masts

- Fiberglass vs. Aluminum Military Surplus
 - Aluminum
 - More expensive
 - May be stronger, definitely less bending/flexing
 - Ends easier to damage, preventing insertion in to each other
 - More danger for electrical shock risk
 - For both reducing shock risk and antenna interaction use of one or more fiberglass lengths at top may be useful



Antennas- Masts

- Fiberglass or Carbon Fiber telescopic crappie fishing poles
 - 7.2 M (over 20 ft, but tip is very thin so not all usable)
 - \$12 to \$39
 - Does Carbon Fiber interfere with radio waves?
 - Not really sure
 - I usually use them in more of a sloper type configuration so the wire is not adjacent to full length of the pole



Wisconsin
(WI)

West Virginia
(WV)

Antennas- Masts

- More Fiberglass Extendable Masts

MGS MAX-GAIN
SYSTEMS, INC.

Max-Gain Systems, Inc.
160 Dodd Street SE, Marietta, GA 30060
Phone: (770) 875-8251 | Fax: (770) 491-3000
Website: www.mgsys.com | Email: sales@mgsys.com

Telescoping Push-Up Mast Kits

- Non-Metallic and Electrically Non-Conductive (except adjustment screws)
- RF Transparent
- UV and Corrosion Resistant (in use in deserts, beaches, and the arctic)
- MADE IN THE USA
- Models available from 10 feet extended and ~3 feet collapsed up to 50 feet extended and ~9 feet collapsed



Antennas- Mast Supports

- Tripod
- Lash to stationary object
- Vehicle Bumper Mast Mount
 - Fixed
 - Titlable
 - Two Point



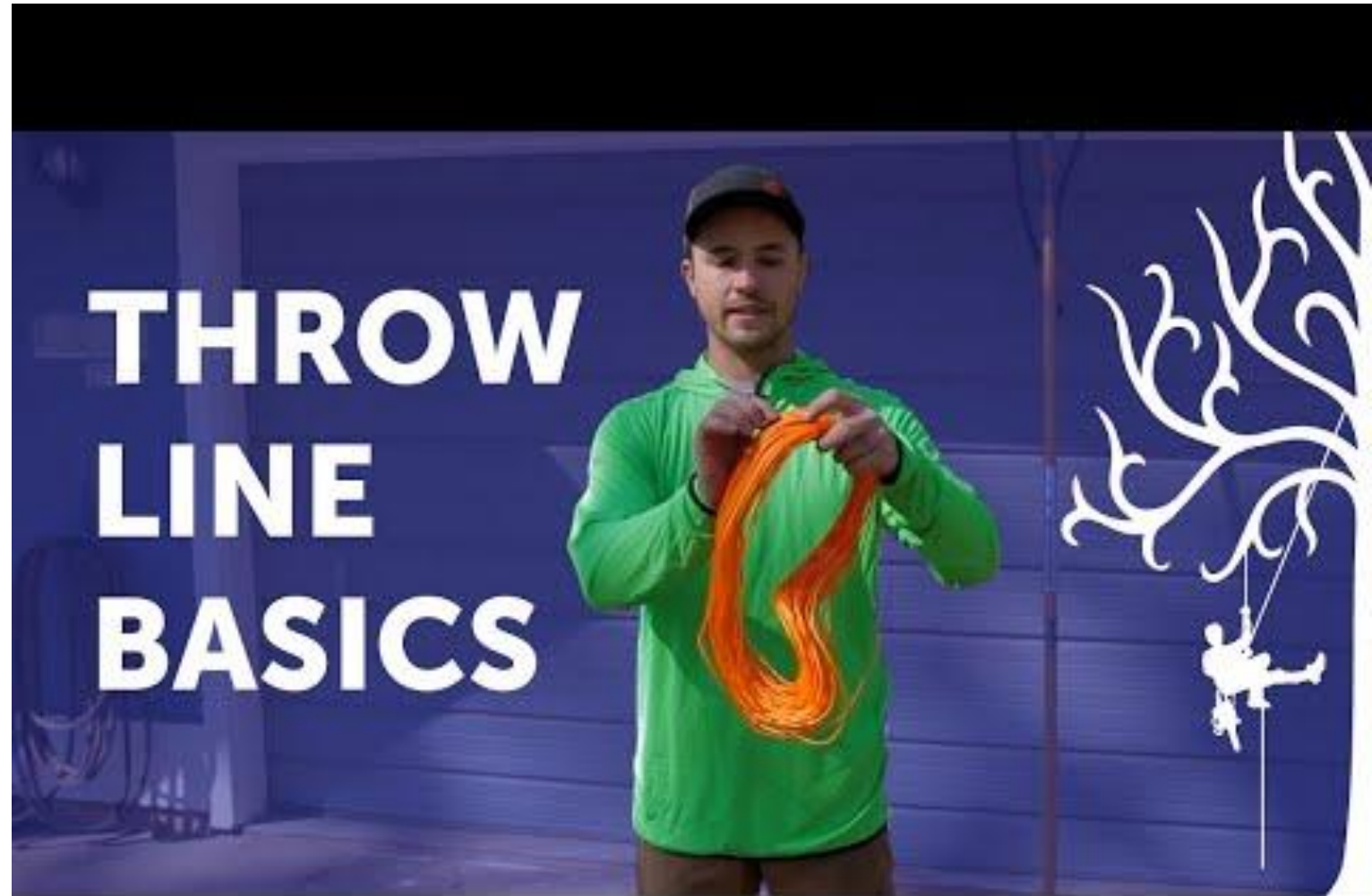
Antennas- Mast Supports

- Anchor with Guy Ropes
 - Fixed (as pictured with [Nite Ize NCJ-01-4R3 CamJam Tie Down Rope Tightener with Carabiner Clip](#))
 - Titlable - [link](#)



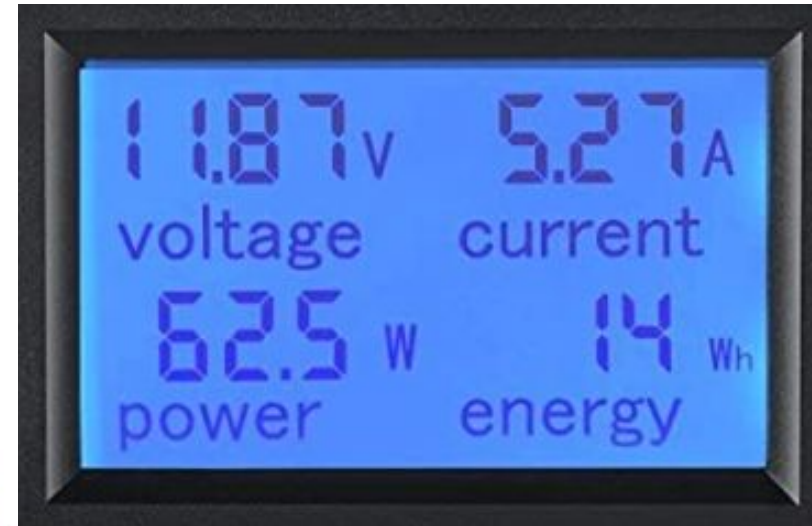
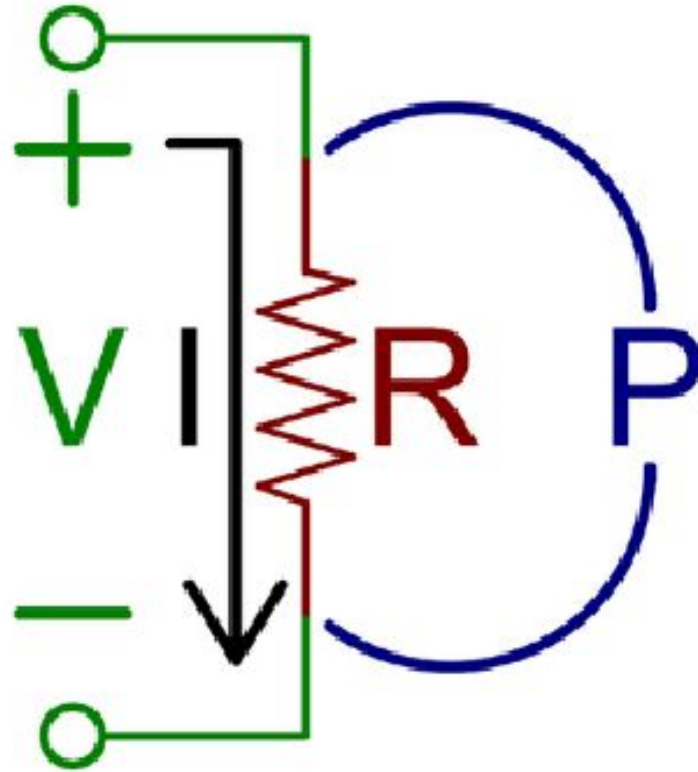
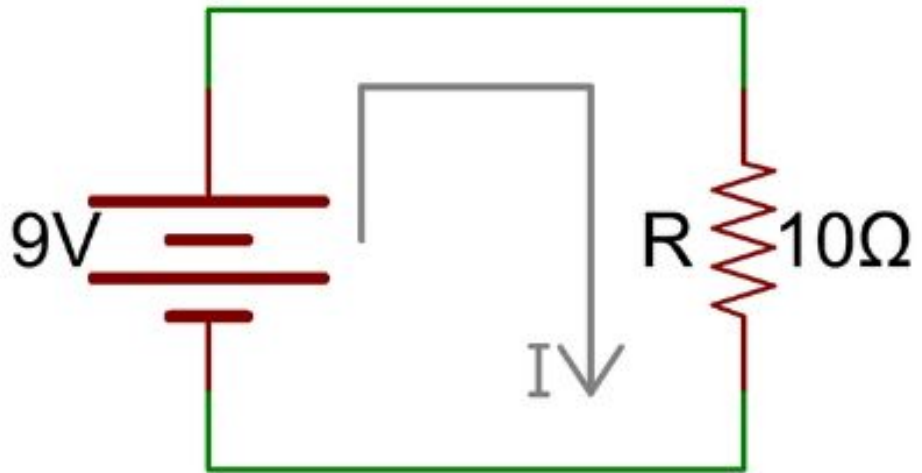
Antennas- Raising

- Throw Lines
 - “Big Shot”
- Extendable Mast
- Ladder
- Fishing Pole (Casting)
- Bow & Arrow
- Slingshot
- Air Gun (compressed)
- Drone
- Balloon or Kite



Power Sources

What is Electric Power?



Power- Internal

- Handheld
 - HT Battery (a spare may be useful)
- Base radio
 - Some, mainly QRP, have internal battery options
- Mobile
 - Use vehicle battery
 - Extra battery in vehicle
- Full Listing of HF & VHF/UHF Radios- tiny.cc/buyar-ss



Power- Internal

- Most VHF/UHF HTs have integrated batteries
- Only a few HF radios have integrated batteries and most of them are QRP (low power)



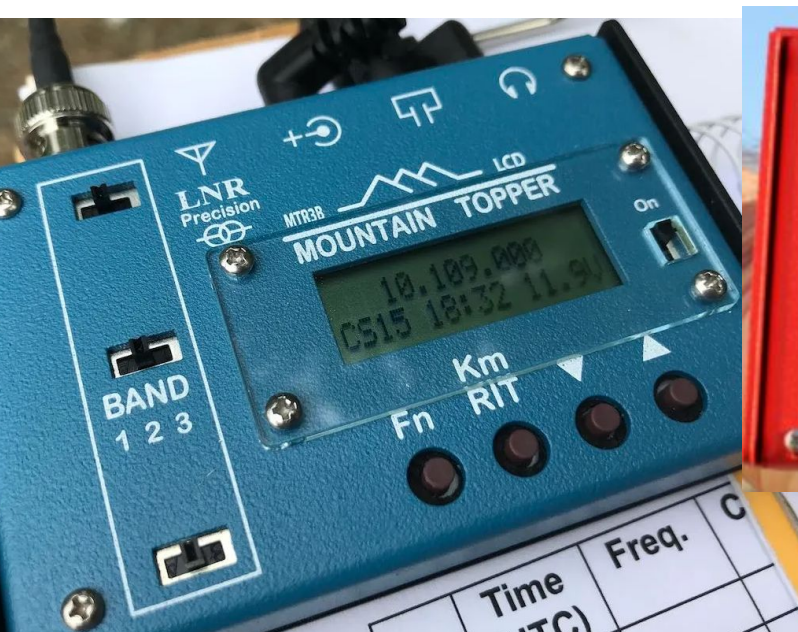
Power- Internal

- HF+ Radios with built in batteries (Full Listing of HF & VHF/UHF Radios- tiny.cc/buyar-ss)

Brand	Radio	Battery Included	Battery Type	Output Watts with Battery	Output Watts with 12V	6M	HF (160-10M)	2M	70 cm (440 MHz)	Internal Ant. Tuner	Internal Sound card	CW Decode
ICOM	IC-705	Yes	P	5	10	✓	✓	✓	✓		✓	
Yaesu	FT-818	No	C or P	5	5	✓	✓	✓	✓			
Elecraft	KX2	No	P	5	12		✓			✓		✓
Elecraft	KX3	No	C	5	12	✓	✓			✓		✓
Xeigu	X5105	Yes	Not removable	5	5	✓	✓			✓		✓
Yaesu	FT-897*	No	P	40	100	✓	✓	✓	✓			
* Discontinued			P= Battery Pack, C= Cells									

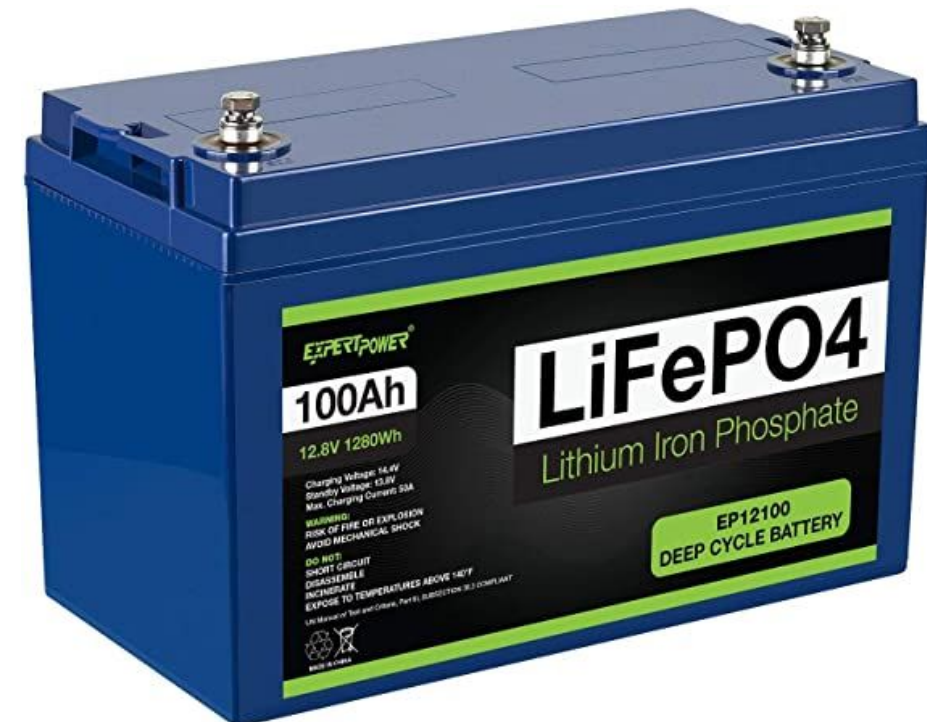
Compact Low Power HF Rigs

- For more information on available rigs visit my spreadsheet tiny.cc/buyar-ss
- For ultra-portability single or limited band radios
 - QRP Lab's - QCX, QCX+ [QCX-Mini](#)
 - LNR Mountain Toppers- [link](#)



Power- External

- Handheld
 - Mobile adapter with external battery or vehicle
 - A few models have ability to be fed DC directly to operate
- Base radio
 - External Batteries
 - Generator
 - AC at site
- Mobile
 - Battery pack
 - Generator



Power- Battery Lead Acid Types

- Lead/Acid Batteries
 - Flooded Lead Acid- Car Batteries (High Momentary Max Current, Low Depth of Discharge)
 - Sealed Lead Acid
 - Absorbed Glass Matt (AGM)
 - Gel Sealed
 - Deep Cycle
 - Absorbed Glass Matt (AGM)
 - Gel Sealed



Power- Rechargeable Battery Types

- NiCd (Nickel-Cadmium)
 - Older technology, these batteries are fairly cheap but they suffer "memory" problems.
 - Must completely discharge them every time before charging them again, that way they will always be at their best performance.
 - NiCd can be "cycled" around 1000 times, or charged once a day for around 3 years before they die.
 - NiCd batteries has a lower voltage than its standard counterparts

Power- Rechargeable Battery Types

- NiMH (Nickel-Metal Hydride)
 - More expensive, but throughout their life they can be partially discharged and charged as many times as you like (up to around 1000 times) and they will always have full capacity.
 - Much larger capacity than NiCd's, which they've replaced
 - Very common, so it's easy to find both batteries and chargers

Power- Rechargeable Battery Types

- Li-ion (Lithium Ion)
 - Li-Ion batteries solve both the problem associated with with the other two types of batteries (full voltage and suffer no memory problems)
 - Not available in standard voltage, except for 9V size
 - AAA, AA, C & D-size Li-ion put out 3.7V instead of 1.5V (LiFePO₄ versions: 3.2V)
 - Requires a special charger

Power- Rechargeable Battery Types

- Li-ion (Lithium Ion)
 - 18650 Battery is a lithium-ion rechargeable battery. The first 4 digits of the designation
 - “18650” indicate the physical dimensions while the 5th digit indicates it is a cylinder cell- The standard 18650 battery is 18mm around by 65mm long.
 - Very common in applications such as laptop battery packs, flashlights, electric vehicles, cordless tools and various other devices that require portable power

Power- Battery Lithium Types

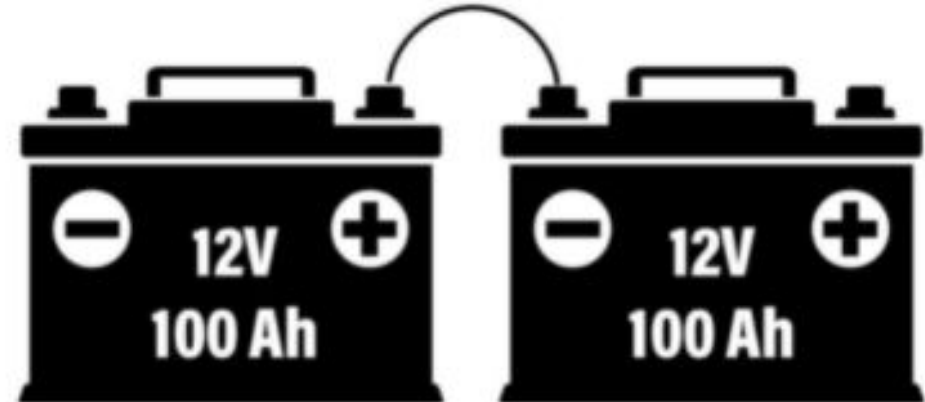
Lithium-ion battery Types	Specific Power	Specific Energy	Safety	Lifespan	Cost	Performance
Lithium Cobalt Oxide	Low	High	Low	Low	Low	Medium
Lithium Manganese Oxide	Medium	Medium	Medium	Low	Low	Low
Lithium Nickel Manganese Cobalt Oxide	Medium	High	Medium	Medium	Low	Medium
Lithium Iron Phosphate	High	Low	High	High	Low	Medium
Lithium Nickel Cobalt Aluminum Oxide	Medium	High	Low	Medium	Medium	Medium
Lithium Titanate	Medium	Low	High	High	High	High

Specific Energy: battery capacity in weight (Wh/kg). The capacity relates to the runtime. Products requiring long runtimes at moderate load are optimized for high specific energy.

Specific power: Ability to deliver high current and indicates loading capability. Batteries for power tools are made for high specific power and come with reduced specific energy.

Li Battery Series & Parallel Connections

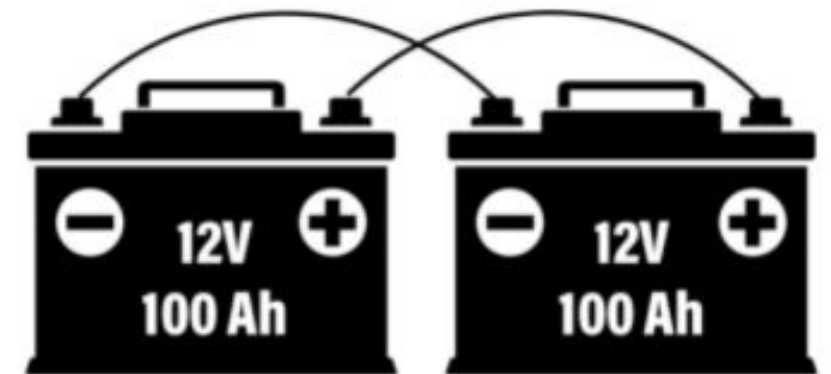
- Series connections involve connecting 2 or more batteries together to increase the voltage of the battery system, but keeps the same amp-hour rating.
- In series connections each battery needs to have the same voltage and capacity rating, or you can end up damaging the battery.



12V 100Ah + 12V 100Ah = 24V 100Ah

Li Battery Series & Parallel Connections

- Parallel connections- 2 or more batteries together to increase the amp-hour capacity of the battery bank, but your voltage stays the same.
- Increases the duration battery powers equipment. It's important to note that when charging batteries that are connected in parallel, the increased amp-hour capacity may require a longer charge time.



12V 100Ah + 12V 100Ah = 12V 200Ah

Li Battery Series & Parallel Connections

- LiFePO₄ cells have voltage of 3.2 V, if we have a cell rated at 1000mAh resulting pack configurations

- **2S2P = 6.4v 10 Ah**
- **1S3P = 3.2v 15 Ah**
- **3S1P = 9.6v 5 Ah**
- **4S2P = 12.8v 10 Ah**
- **4S4P = 12.8v 20 Ah**

	3.2 V			5000 mAh	
S (SERIES)	VOLTAGE		P (PARALLEL)	CURRENT	
1	3.2	V	1	5000	mAh
2	6.4	V	2	10000	mAh
3	9.6	V	3	15000	mAh
4	12.8	V	4	20000	mAh
5	16	V	5	25000	mAh
6	19.2	V	6	30000	mAh
7	22.4	V	7	35000	mAh
8	25.6	V	8	40000	mAh
9	28.8	V	9	45000	mAh
10	32	V	10	50000	mAh

HAM RADIO Q&A

PORTABLE POWER FOR HAM RADIO



Choosing a Battery for Ham Radio



Solar Generator– Beaudens aka SUPA

- I have one of these
 - 384Wh/120000mAh LiFePO4
 - LiFePO4 rated 2000 recharges
 - 300W Pure Sine Wave AC Outlet
 - Solar charge or via AC adapter
 - Output Power
 - 12VDC output (32 Ah)
 - 5VDC USB output (77Ah)
 - 120 VAC (3.2 Ah – Inverter inefficiency) – so using 12V, 20A DC power supply would run 20 A rig for around 2 to 4 hours, running same radio on 12V output ~3 to 5 hours



Solar Generator-

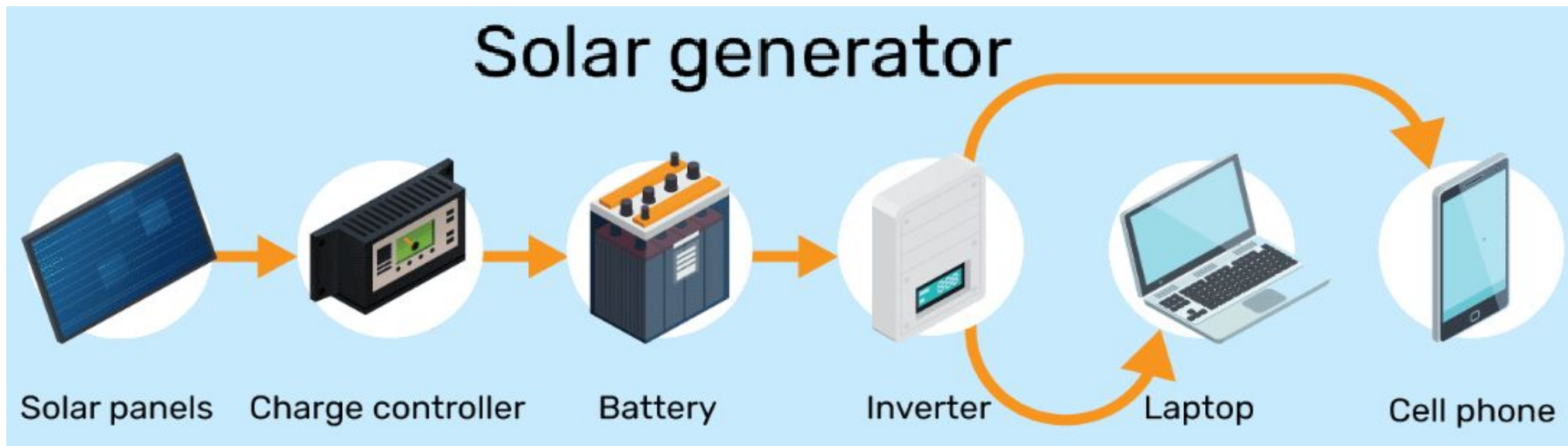
- Two other units with **LiFePO4** batteries, 12 VDC (10A max), ~6.5 lb, both have PD* USB-C.
 - GOLABS (\$130) - 204Wh LiFePO4 Battery, PD 60W USB, 110V/160W (not pure sine wave)
 - Gearlist (\$205)- 296Wh Generators Router Battery Backup Power Supply Pure Sine Wave Peak 600 with 2 AC Outlet Type-C QC3.0 PD18W Output

** Power Delivery (PD) is a specification for handling higher power, allows quicker charging in some devices and is configurable from 5V up to 20V quickly over a USB connection.*



“Solar Generators” & Power Banks

- Power Bank– system with battery charged by solar panels and includes an AC inverter
- Energy stored in the battery can be used as AC current via the inverter or as DC current directly via the battery
- Can also be charged via AC adapter or vehicles power



Power Banks

- Portable unit to recharge or operate your electronic devices when you're on the move. Ranging in size from slim, pocket-sized devices up to larger, higher-capacity
- Most inexpensive models are 5 VDC only designed for products charged via USB cables
- Large units may also have 12 to 18 VDC to allow charging/operation of computers



Power Banks

- BEWARE- even if unit has 12-18 VDC its power rating (Watt Hours) is usually based on calculations at 5 volts!
- Advantages over using AC inverters
 - More efficient (no loss going from DC to AC to DC)
 - No heat generation
 - Longer run time
 - Less RF interference generated
- Large units may also have 12 to 18 VDC to allow charging/operation of computers

Power Banks

- BEWARE- even if unit has 12-18 VDC its power rating (Watt Hours) is usually based on calculations at 5 volts!
- For example depending on Voltage TalentCell Rechargeable Lithium ion Battery Pack- DC Output
 - 5V / 26400mAh / 132 wH
 - 9V / 14500mAh / 131 wH
 - 12V / 11000mAh / 132 wH



Power Banks- USB-C Power Delivery (PD)

- Modern USB-C ports are complicated beasts & support several levels of charging DC Output
- Power Delivery (PD) is a specification for handling higher power and allows a range of devices to charge quickly over a USB connection.
- *USB Power Delivery explained: What you need to know about ubiquitous charging*
- *Blind SPOT - USB to 12V Adapter Power Cable - Use Any PD USBC Power Bank to Power Any 12V Device*



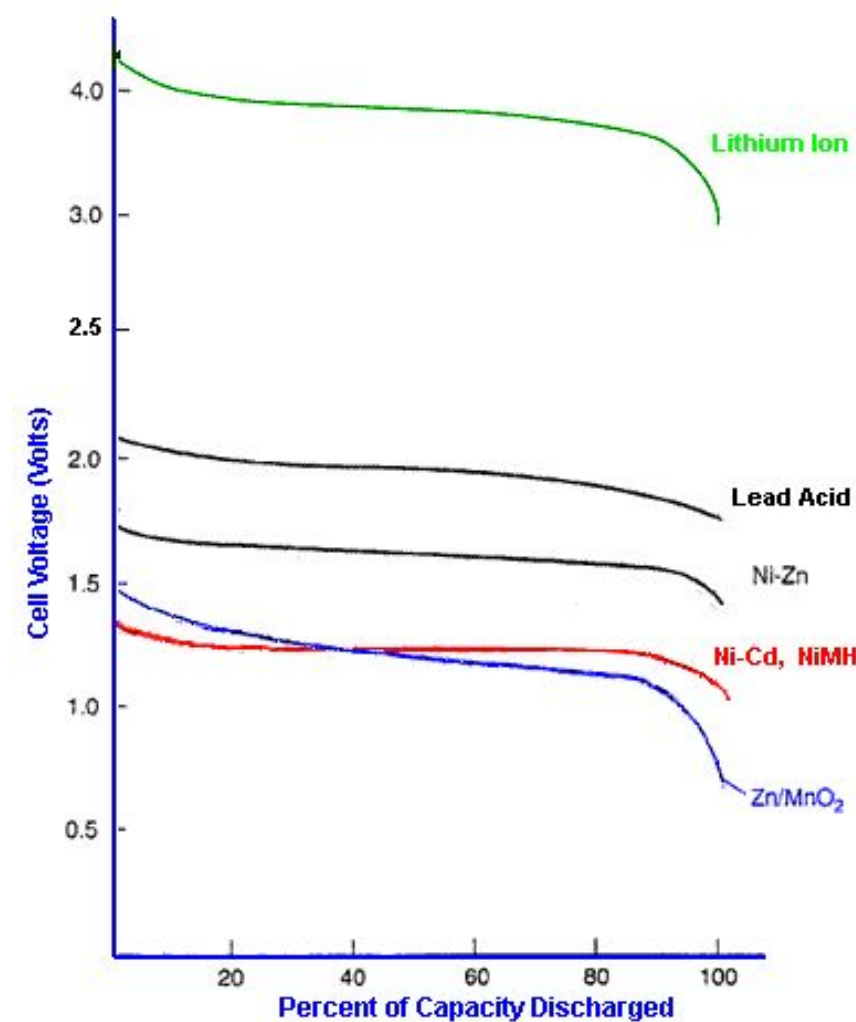
Portable Power Station / Jump Starter

- Older units- larger & with SLA batteries
 - Designed primarily for jump starting
 - Some work well for longer operations of 12V equipment
 - New units have USB output added
 - Available at number of retailers
 - New units much smaller, so use Lithium batteries



Portable Battery Needs

- Factors Affecting Battery Needs–
 - Radio's Amperage Needs RX & TX
 - Transmit Output Power Level
 - Radio's Power Saving Features/Settings
 - Duty Cycle of Different Modes
 - Operating Time
 - Operating Style (Running vs. Hunt Pounce)
 - Voltage Drop of power cables
 - Battery Type– different types can be safely discharged to different levels, have different discharge curves, etc.
 - Cycles needed, need to recharge, recharge rates, recharging methods



Portable Power Station / Gadgets

- Gadgets
 - Buck Converter- DC-to-DC power converter which steps-up or steps-down voltages using this minimal number of components while also offering a lower operating duty cycle and higher efficiency across a wide range of input and output voltages
 - Power Meter/Monitor
 - Battery Chargers (Large variety)
 - By battery type (important!)
 - By charging (Constant Voltage, Constant Current Constant & Combo (CVCC))
 - Other factors- temperature monitoring, balancing, EOD, Fast Charge, Trickle, etc.



Portable Power Station / Generators

- Generation of Power, Not Just Storage
 - Combustion Powered (Gas or Propane)
 - Stand alone
 - In a vehicle
 - Steam (Heat sources– wood, propane, nuclear, solar)
 - Natural Motion (Hydro or Wind powered)
 - Human Driven (Pedaled or Cranked)
 - Solar



Portable Power Calculation

- Calculating Battery Needs

- *How Much Battery Do You Really Need?*
- *Convert mAh to Watt hours*
- *Battery Chart - West Mountain Radio*

How to Calculate Battery Ah = ?

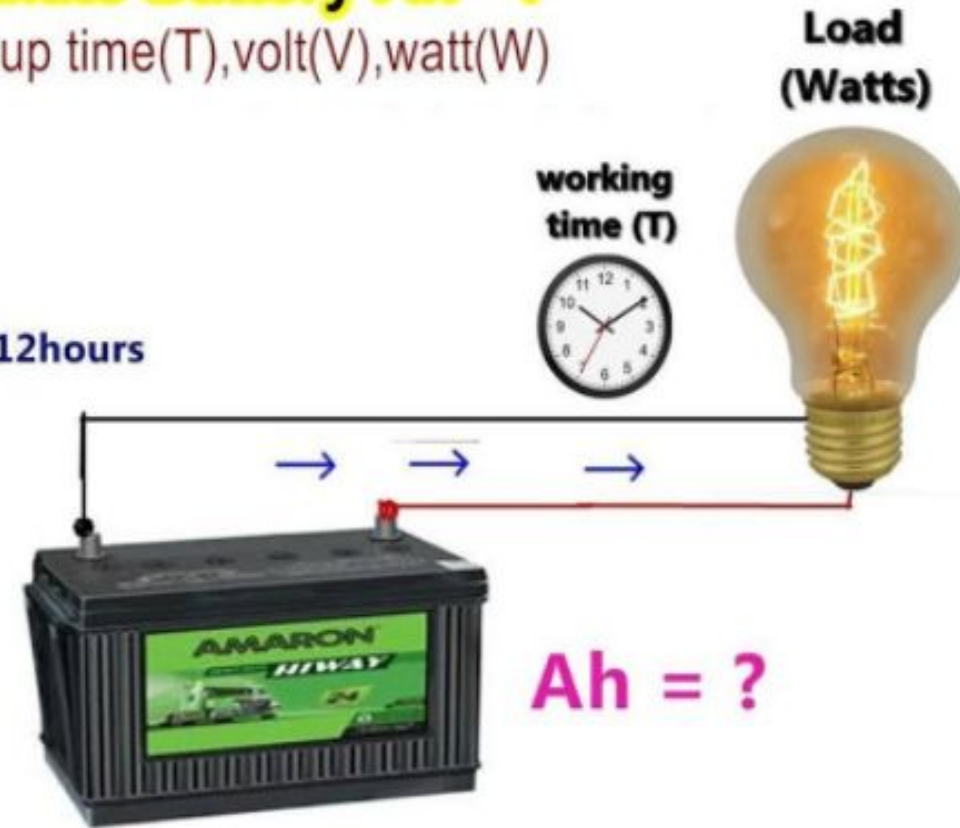
dependent on backup time(T), volt(V), watt(W)

Backup Time(T) = 12hours

voltage (V) = 6v

Watts (W) = 10w

Battery Ah = ?



Minimum Voltage at Radio:

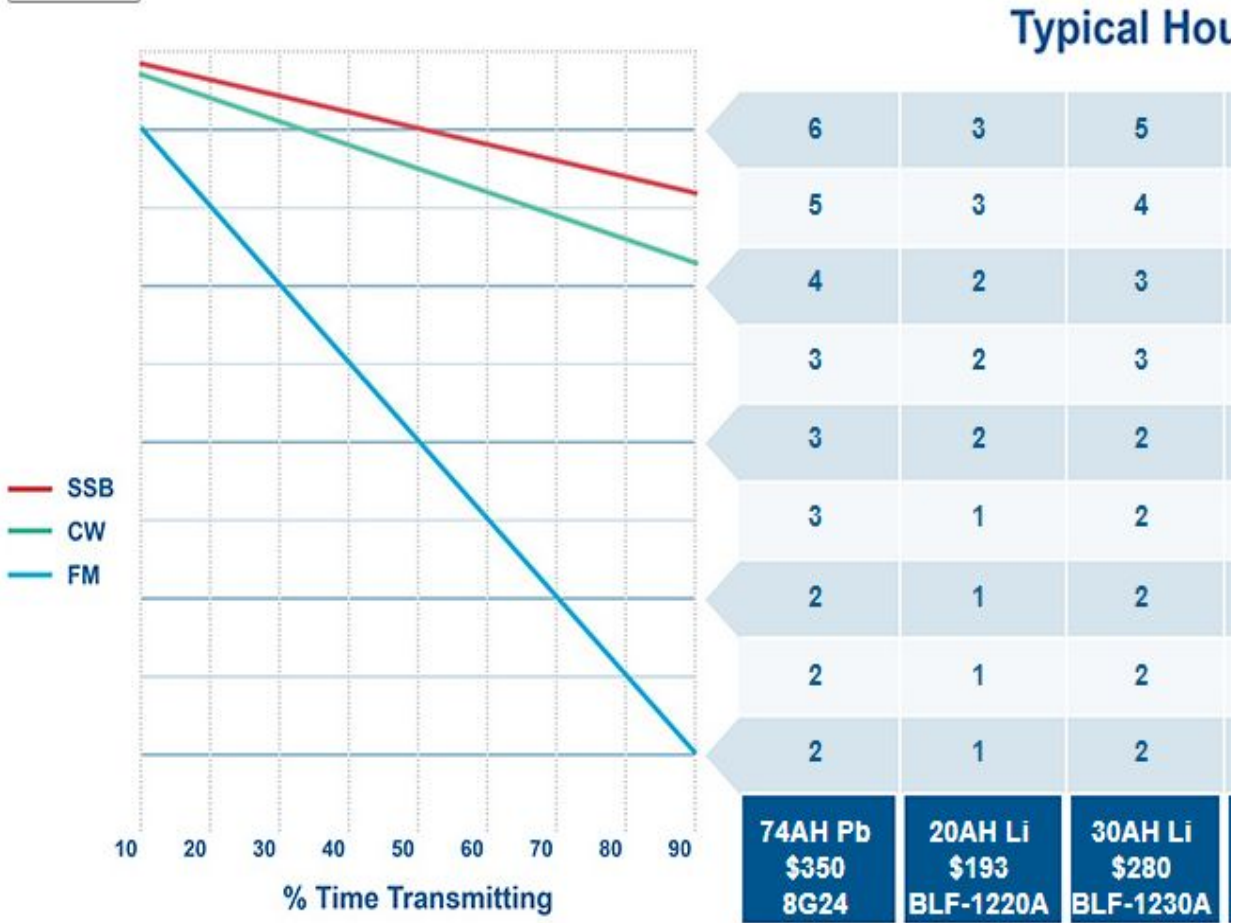
Cable Drop (Volts): [Help](#)

Transmit Amps:

Receive Amps:

- ☐ Two batteries in parallel
- ☒ Show mostly Li
- ☐ Using N8XJK Super Booster

Calculate



Minimum Voltage at Radio:

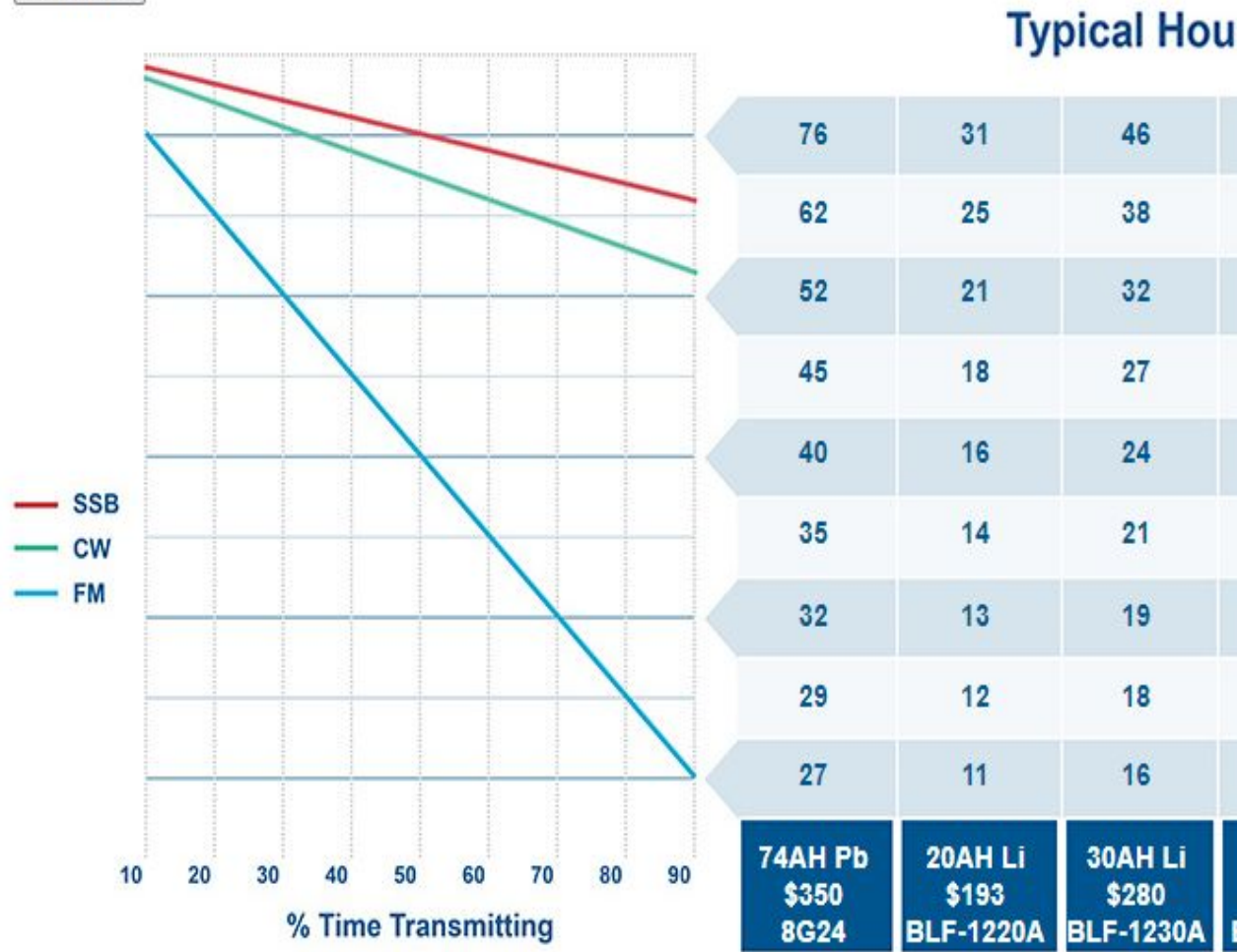
Cable Drop (Volts): [Help](#)

Transmit Amps:

Receive Amps:

- ☐ Two batteries in parallel
- ☒ Show mostly Li
- ☐ Using N8XJK Super Booster

Calculate



Portable Power Resources

- Calculating Battery Needs
 - *How Much Battery Do You Really Need?*
 - *Battery Chart - West Mountain Radio*
 - *Buck-boost vs. buck converter: it's about battery life in portables*
 - *Portable Power Primer: A Beginner'S Guide To Selecting The Best Battery Option For Your Field Radio Kit*
 - *Powering a HF Radio off of a USB PD Battery*



Intermission



Misc Accessories– Radio

- Signal Input
 - Microphone
 - CW Key, Paddles, Keyer and/or Decoder
 - Headphone or Mic/Headset
 - Foot Switch
- Antenna Tuner (if not built-in), BALUN
- Digital (FT8) Interface/Computer
- CAT Interface Cable
- Coax Connector Adapters, Barrel Connectors, etc.
- Radio Operating Instructions (Quick Guides)

Misc Accessories- Logging/Operating

- Logging
 - Paper & Pencil
 - Computer (see presentation “Logging Software-General & Contesting” - tiny.cc/logsw)
 - Phone App
 - Voice Recorder
- Cheat Sheets (Sections, Counties, Zones, Band Plans, Maps, etc.)
- Clock (UTC)

Misc Accessories- Computer

- Updated & Properly configured Software
- Power Supply and/or Backup Batteries
- USB Drive with Software(see later slide)
- Cables (USB [all needed varieties/adaptes])
- Audio cables and/or external soundcard
- USB GPS if time sync for Digi Modes required

Misc Accessories- Shelter/Comfort

- Operating table & chair
 - Folding Chairs & Tables
 - Minimum a ground cloth or foam pad to sit on
- Shelter
 - Tarp
 - Tent
 - Bungee cords
 - Umbrella



Misc Accessories- Shelter/Comfort

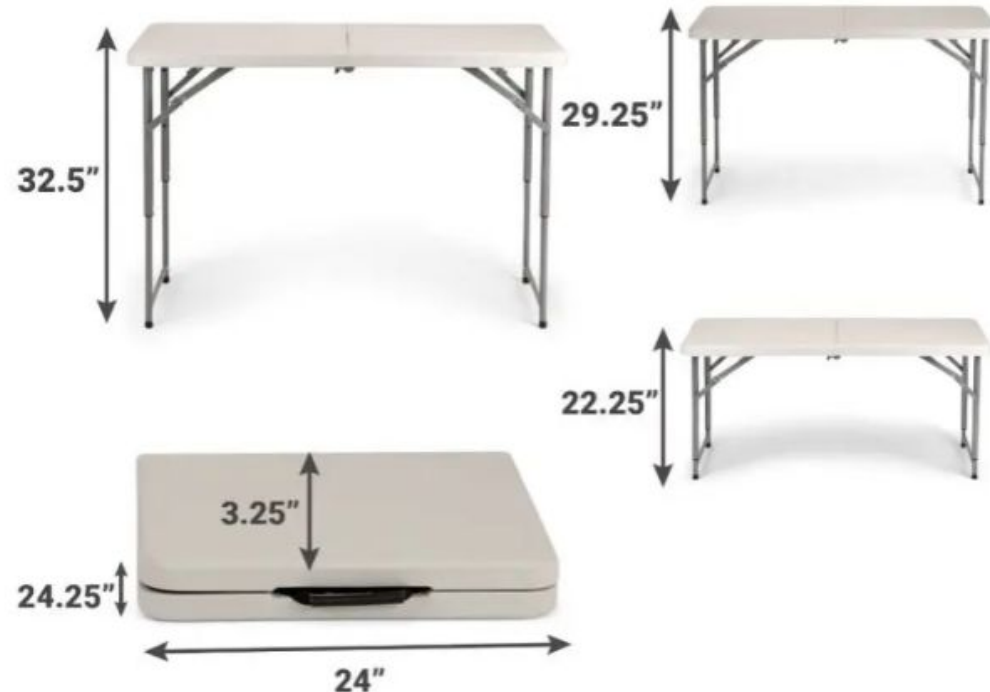
- Tables

- *Coleman Aluminum Camping Table*

- 9 lb, 28 x 28 x 28"

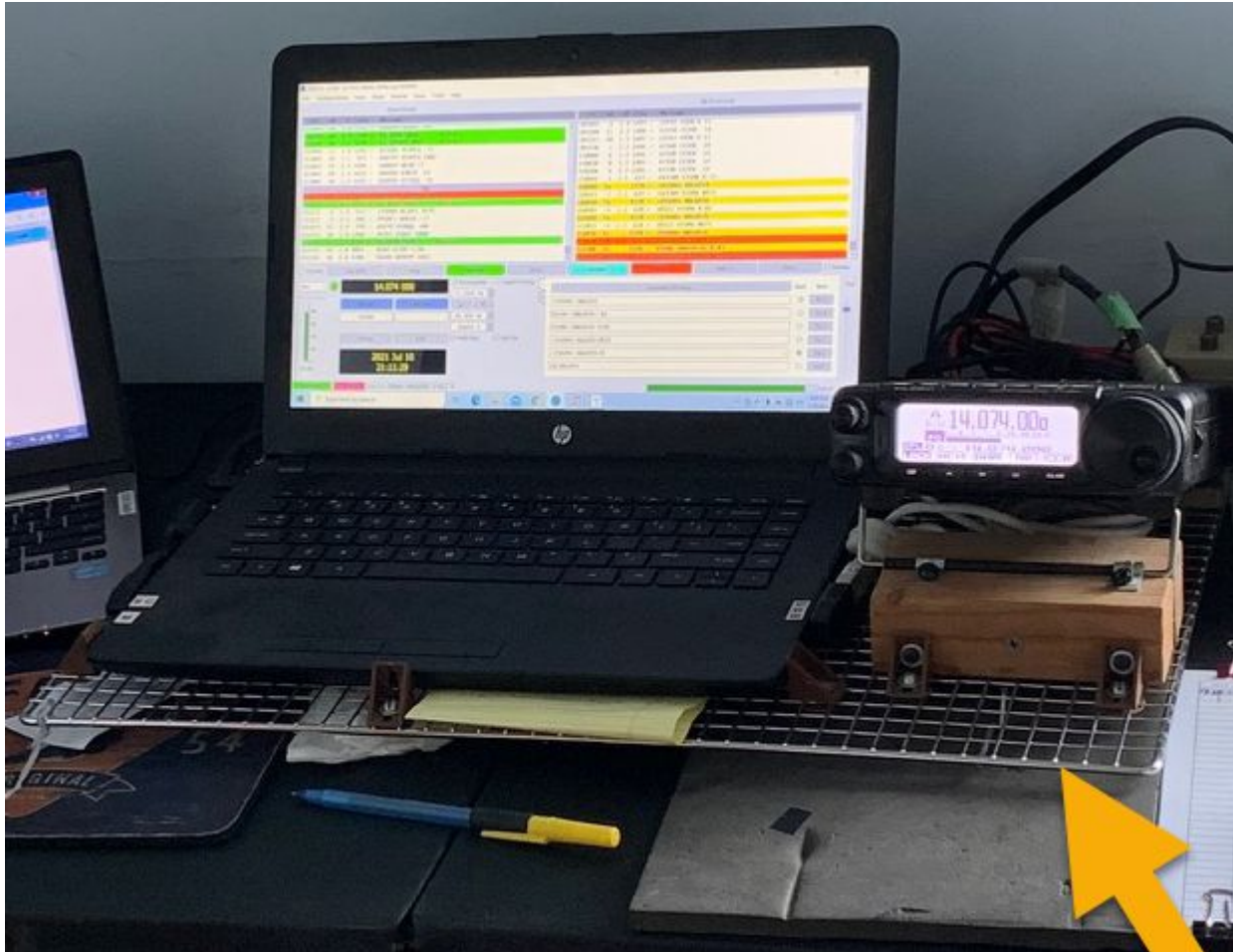
- 24" x 48" Adjustable Height Plastic Bi-Folding Table

- 13 lb



Accessories

- N8LGP/4 Portable Station



Misc- The 10 Essentials

- 10 Essentials for safety in the outdoors
 - *National Park Services*
 - *My Open Country*
 - *American Hiking Association*
 - *Adirondack Mountain Club*
 - *Wilderness Times-Ultimate Guide To The Ten Essentials*



Misc- Beyond The 10 Essentials

- Beyond the 10 Essentials for safety & comfort in the outdoors
 - Insect Repellant
 - Comfortable/Sturdy Shoes
 - Emergency Whistle
 - Cell phone battery bank
 - Gloves (to protect hands)
 - Watch
 - Radio able to receive Wx
 - Hiking Pole(s)
 - Umbrella
 - Hand Sanitizer
 - Small plastic bags
 - T.P. & Trowel

Pre-Trip Planning

- Choosing
 - Activity/Event
 - Type of Operation
 - Location
- Preparation
 - Checklist
 - Docs (Rules, Maps, Operating Manuals, etc.)
- Logistics

Pre-Trip Planning "Two is One and One is None"

- Incorporating a Navy SEALs concept into your planning- "Two is One and One is None"
 - If an item is essential to your portable operation you should bring at least two of them
 - Have a 2nd Rig as backup
 - Two smaller batteries as opposed to one large one
 - Two antennas even if one is a serve compromise
 - Two or more short coax cables with barrel connectors as opposed to one long one



Pre-Trip Planning "Two is One and One is None"

- Incorporating a Navy SEALs concept into your planning- "Two is One and One is None"
 - But a multi pronged approach is better than simply "packing one more"
 1. Redundant Items
 2. Redundant Capabilities
 3. Flexibility
 4. Fool Proofing



Pre-Trip Planning "Two is One and One is None"

- Incorporating a Navy SEALs concept into your planning- "Two is One and One is None"
 - Consider carrying redundant capability, not redundant gear
 - Having items that can serve overlapping functions
 - . Instead of two pairs of wire cutters or pliers add a Swiss Army Knife with these functions built-in as redundancy
 - . A few Alligator Clips can be pressed into service for missing or failed connectors
 - See *MacGyver Presentation* from RATPAC

Pre-Trip Planning "Two is One and One is None"

- Incorporating a Navy SEALs concept into your planning- "Two is One and One is None"
 - Flexibility in operating can provide backup if one mode or band is not effective
 - Being able to work CW, SSB & Digital will increase your chances of making contacts
 - Being able to switch bands can be especially important when propagation throws you a curveball

Pre-Trip Planning "Two is One and One is None"

- Incorporating a Navy SEALs concept into your planning- "Two is One and One is None"
 - Consider "Fool Proofing" things as much as possible to limit failure, losing items, etc. gear
 - Minimize field assembly of station components
 - Pre-measure and clearly mark items- lengths/settings
 - Consider brightly colored or painted items to avoid loss
 - Have both paper & electronic versions of all manuals
 - K.I.S.S.- Keep It Simple Stupid

Pre-Trip Planning

- Activities with often determine location, date/time, etc.
 - Contest
 - Special Event
 - OTA- POTA, SOTA, etc.
 - Test of Equipment- Rig, Antenna, etc.
- Type of Operation will dictate much of other planning

Pre-Trip Planning

- Location
 - Based on Multiplier in Contest– Grid Sq., Park, Summit, County or Counties, State, DXCC, etc.
 - No matter location, **always know your 6 digit Grid Square & County**, even if not a Multiplier being used, in case others want to know it
 - Choosing specific location based geography, topology, road access, property restrictions, etc.

Pre-Trip Planning- Grid Squares

- Find your Maidenhead Locator Grid Square

- Websites-

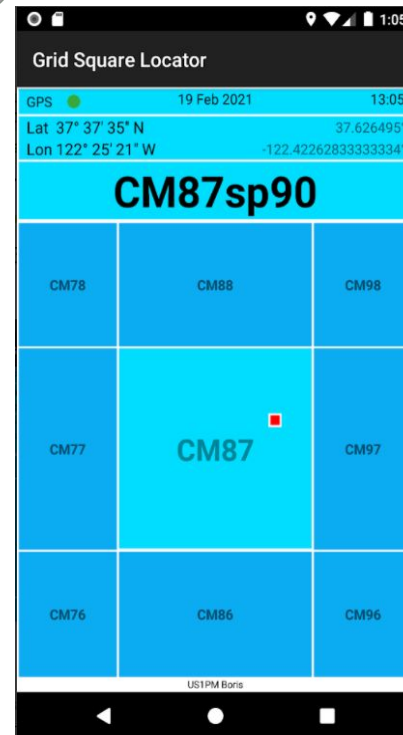
- [*AR Ham Radio Maidenhead Grid Square Locator Map*](#)
 - [*QRZ.com Grid Mapper*](#)

- Maps-

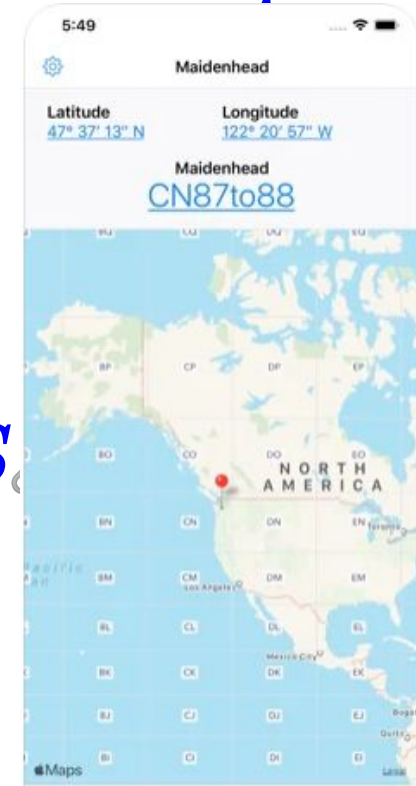
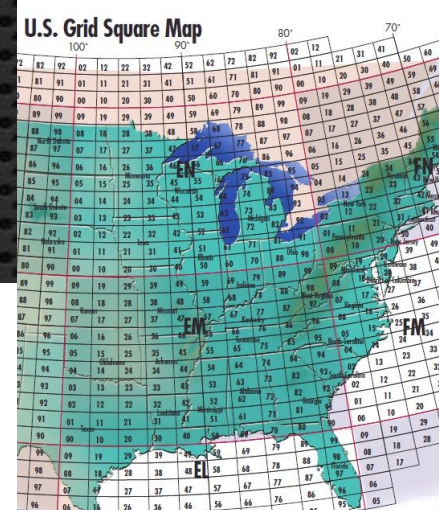
- [*SOTA Maps*](#)
 - [*DX Cluster GeoCoding*](#)

- Phone Apps-*Android*

- Some GPSs



& *Apple iOS*



Pre-Trip Planning

- Find your County/Counties

- Websites-

- *Find your county - Map Developers*

- *What County am I in?*

- *Find your county - GPS Coordinates*

- Maps-

- *US Census- State-based County Outline Maps*

- *CQ/X NO5W- County Overlays*

- Phone Apps- *Android*

- Some GPSs

Packing- Go Kits

Rapid Deployment KX3 Go-Box

Anthony
Luscre,
K8ZT



- Two of my Other Presentations
 - Grab & Go Amateur Radio Go Kits tiny.cc/to-go
 - Rapid Deploy KX3 Go Box tiny.cc/rapidkx3
- Types of Go Boxes
 - Assemble on site- Transport safely, but not ready to operate
 - Rapid Deploy-
 - Transport safely & in a ready to operate arrangement
 - Transport in a ready to operate arrangement, but not very safely
 - Operate in motion (Ped, Auto, Van, Bike)

Packing- Go Kits



Packing- Go Kits



Packing

- Backpacks
 - Rig Specific Backpacks
 - Computer/Camera Backpacks
 - Backpack Frames for Manpacks
 - “Fanny”/Belt Packs
- *Modular HF Manpack-Yaesu FT-818ND*
- *Creating a Backpack QRP Station*



HF how it should be: Compact and Portable!

Designed by hams, for hams! Take your hobby with you into the great outdoors with the LC-156, Icom's Multi-bag '703 carrier. The LC-156 offers plenty of room to store and protect the gear you'll want to bring along for hours of fun operating the bands. It's the perfect way to combine a ham's love for both the hobby and the great outdoors!



The recommended way to pack your IC-703



The rain cover is included in the multi-bag.



Protect your multi-bag and gear with the rain cover.

Use the loops to secure your portable antenna for safe travel.



Great for portable use, the handy controller case can be easily removed from the multi-bag and attached to your belt.



Pouches for stowing controller and hand mic when not in use.



Microphone hanger

Cable exit for separation and coaxial cables, when connected to the IC-703 in the bag.

Pouch for stowing coaxial cables



Controller pouch secured on multi-bag

DC power cables

Stowage area for the optional BP-228 battery pack

Storage area for IC-703

Pouch for stowing the microphone

Stowage area for the optional separate cable, OPC-581/OPC-587

Repositionable protection pad, allowing you to customize the size of the stowage space

Carry your log book here

Exterior loops securely hold an antenna to the backpack



Shoulder Strap
A handheld radio or microphone can be attached.

Side Plate
For an antenna installation

Antenna Port

Accessory Pockets
Holds 3 battery packs.

Backside Pocket
For up to A4 size paper

Cable Port

Cable Port

Protection Cushion

Accessory Pocket

Cable Port



Call Sign Holder



Side Pocket
Water bottle or tripod can be stored.



Partition Boards
Can be used to prevent falling.



Packing



**Beschoi Waterproof
Camera Bag**



Packing for Rough Handling

- Watertight, dust-tight, impact resistant protective case, Padded Cases- “Pelican Type” Cases with Pick & Pull Foam



Packing for Rough Handling

- Cases with Wheels– bigger heavier items
 - “Pelican Type” Hard-sided
 - Cheap garage sale softsided luggage can be easily converted by adding rigid interior structure & padding



Packing for Rough Handling

- You can also “add” Wheels to variety containers with “add on wheels” or hand carts
- Go for larger wheels for use on grass and gravel



Packing for Rough Handling

- Wagons can be useful, but can be difficult to transport in a car; collapsible ones can get around this but check weight limits!



Packing for Rough Handling

- Buy it for your spouse as holiday gift. Tell them “you will use it for bringing snacks for *On the Lawn* at your local music center”.



Body Harness – Chest Platform/“Desk”



Body Harness – Chest Platform/“Desk”



Build A Wearable Walking Desk

- Uses Bass Drum Harness- [link](#)



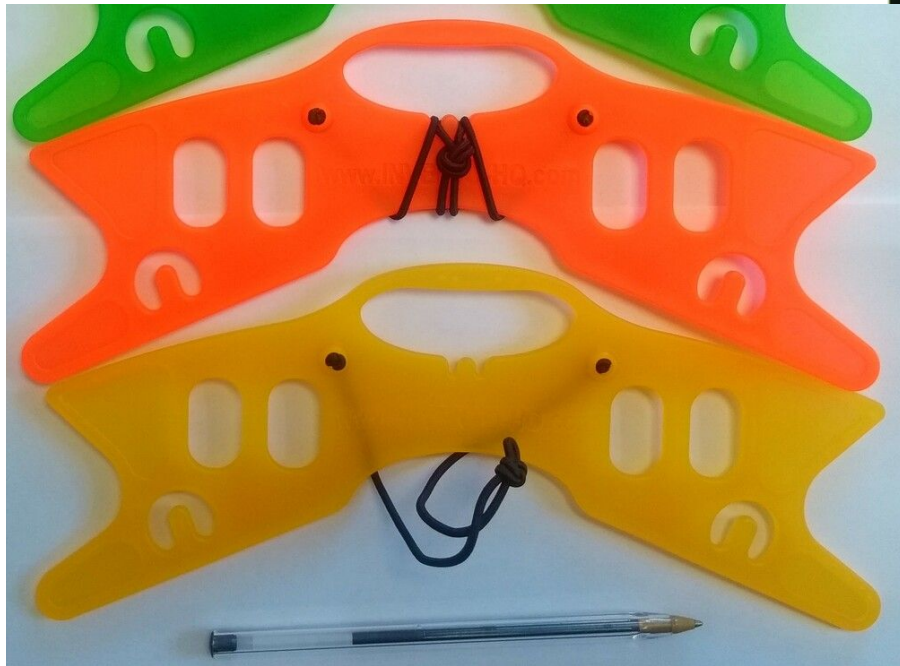
Build A Wearable Walking Desk

- Chest Packs with KX2 & IC705 – [link1](#) & [link2](#)



Packing

- Wire & Cables
 - Thin antenna or counterpoise wires—camping laundry reel
 - SOTA Beams Style Antenna Wire Winders
 - Pill Bottles for wrapping thin wire, storing small accessories, earbuds, etc.



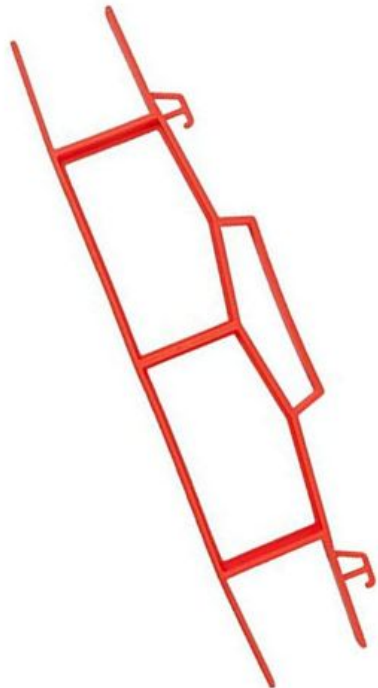
Packing

- Wire & Cables
 - Hand Winding (Goat Wind) & Over-Under Method



Packing

- Wires & Cables
 - Coax, Power Cables & Heavy Rope
 - Extension Cord/Hose Reels & Winders



Packing

- Small Accessories, Adapters, Fuses, connectors, etc.
 - Tackle Boxes & clear storage cases



Portable Operation Tips– Packing

- To Pack
 - Set up **complete portable station**, rig, power supply, computer, interface cables, accessories, etc. in fully operating condition on a table away from normal operating location (preferable with portable antennas & coax)
 - Test everything
 - Pack everything

Portable Operation Tips- USB Drive

- Download onto USB Drive following, just-in-case
 - If using Logging Software
 - Full Installation file for current version
 - Latest Update file
 - Program Documentation as a PDF file
 - Don't count updating or accessing live help via Internet



Portable Operation Tips- USB Drive

- Download onto USB Drive following, just-in-case
 - For Your Radio
 - Rig Driver Software
 - Memory & Utility Software (i.e. Elecraft KX3 Utility)
 - Radio Operating Manual as a PDF & with Paper Quick Guides (shown here in top of *go-box*.)



Portable Operation Tips– USB Drive

- Download onto USB Drive following, just-in-case
 - Contest
 - Rules for Contest as PDF
 - Multiplier Maps or Lists (i.e. Counties, Sections, States, Zones, etc.) as PDF and/or Printed on Paper (“Amateur Radio Charts & Maps– tiny.cc/chart-maps”)
 - Accessories
 - Winkey software
 - USB GPS (for Time Sync) & its software
 - Other accessory software and/or instructions

Set up

- Getting Wire Antennas in the Air
 - Bring your own support– mast, fishing pole, etc.
 - Suspend it from trees
 - Arborist throw line & throw weight
 - Slingshot type devices
 - Arborist Sling
 - Wrist Rocket
 - Bow & Arrow
 - Air “Spud” Guns (Compressed Air)
 - Fishing rod casting
 - Drone

Set up

- Antenna Support Accessories
 - Rope
 - Clips
 - Bungee cords
 - “Claw” Clamps for verticals
 - Stakes
 - Stake Puller



Operations- Efficiency = Results/Effort

- Operations **Efficiency** = **Results** / **Effort**

- Results can be based on number of different factors

- # of contacts
- Activation of a rare location
- Standings in a contest or award
- Meeting/Exceeding personal goals
- Fun had

- Efforts can involve a number of factors

- Time spent
- # of people involved
- \$ Cost of equipment, supplies, travel, etc.



Operations– Operating Links

● PORTABLE OPS LINKS

- *POTA (Parks on the Air)*
- *World Wide Flora & Fauna*
- *US Islands*
- *IOTA, Islands On The Air*
- *Beaches on the Air*
- *Mines on the Air*
- *Castles on the Air*
- *Lighthouse On The Air*
- *Amateur Radio Lighthouse Society*

● SOTA LINKS

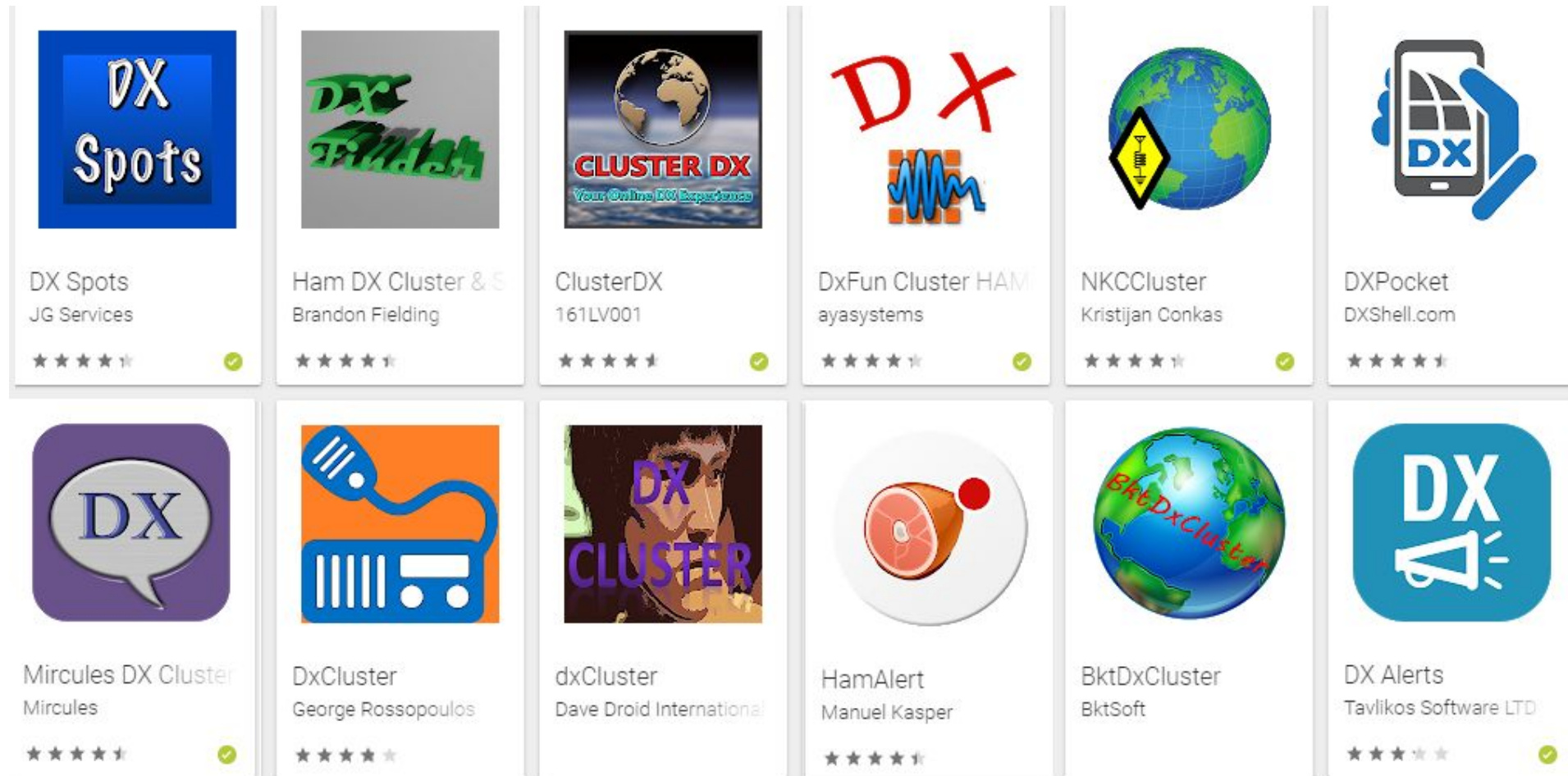
- *Summits on the Air*
- *SOTA Maps*
- *SOTA Atlas*
- *SOTA Live Spots*
- *SOTA Spotter App (Android)*
- *SOTA Finder App (Android)*
- *SOTAGoat App (iOS)*
- *SOTA SMS Spotting*

Operations– Notifying Others

- A little effort in sharing operations info can greatly increase your PO activities' total contacts
 - Announcement sites– general & activity specific
 - Social Media Posts & Alerts– Twitter, email lists, etc.
 - Spotting Networks (DX Clusters)
 - RBN (Reverse Beacon Network)
 - Websites
 - On air announcements, directed CQs, etc.

Operations- Spotting

- Spotting Operations DX Clusters



Operations- Spotting

- Spotting Operations Specialty Operations
 - POTA-
pota.app



Parks on the Air Search for Callsigns & Parks SPOTS ACTIVATIONS SIGN UP SIGN IN

Active Spots Data will refresh in 46 seconds.

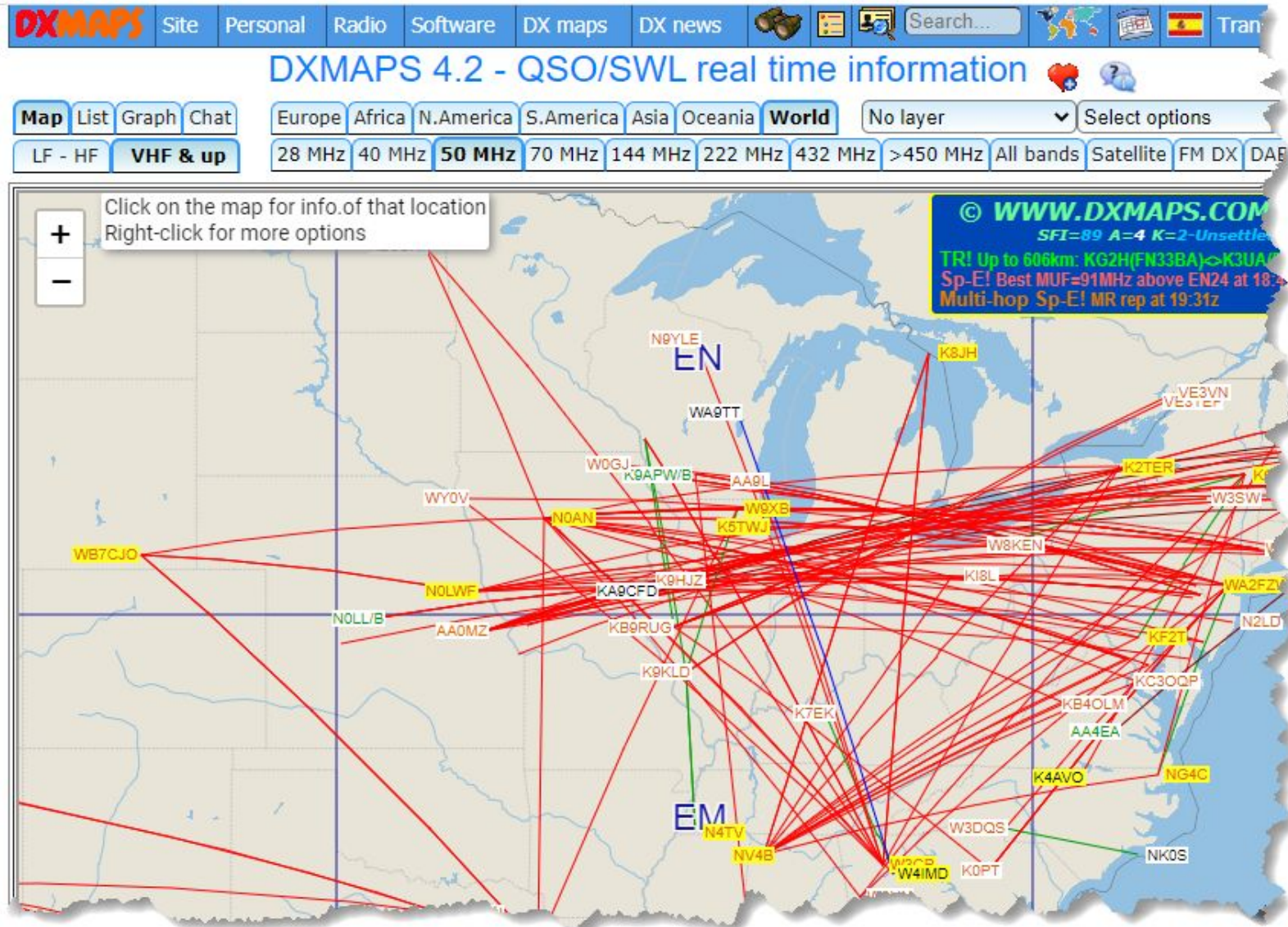
Band: All 15 Mode: All 15 Program: All 15 QRT: Show 15 Hunted: Show 15 Sort: Time

<p>K4NYM @ K-1893</p> <p>K-1893, Lake Louisa State Park</p> <p>US-FL</p> <p>14043.9 kHz (CW)</p> <p>K9LC</p> <p>RBN 8 dB 19 WPM via K9LC-#</p> <p>Last heard 0 mins ago at 19:31 UTC</p> <p>RE-SPOT HISTORY</p>	<p>NA9M @ K-4339</p> <p>K-4339, Waunakee Marsh State Wildlife Area</p> <p>US-WI</p> <p>14065.0 kHz (CW)</p> <p>VE6JY</p> <p>RBN 20 dB 18 WPM via VE6JY-#</p> <p>Last heard 0 mins ago at 19:31 UTC</p> <p>RE-SPOT HISTORY</p>	<p>N4GF @ K-2743</p> <p>K-2743, Mayo River State Park</p> <p>US-NC</p> <p>14053.0 kHz (CW)</p> <p>WE9V</p> <p>RBN 10 dB 16 WPM via WE9V-#</p> <p>Last heard 0 mins ago at 19:31 UTC</p> <p>RE-SPOT HISTORY</p>
<p>KB3WAV @ K-0735</p> <p>K-0735, Harpers Ferry National Historical Park</p> <p>US-WV, + 2</p> <p>7244 kHz</p> <p>N4CWB</p> <p></p> <p></p>	<p>K8YE @ K-1503</p> <p>K-1503, Hartwick Pines State Park</p> <p>US-MI</p> <p>14041.0 kHz (CW)</p> <p>VE2WU</p> <p></p> <p></p>	<p>VA7SGY @ VE-5082</p> <p>VE-5082, The Great Trail of Canada (th</p> <p>CA-NB, + 12</p> <p>14320 kHz</p> <p>VA7SGY</p> <p></p> <p></p>

Operations- Spotting

- Spotting Operations Specialty Operations


- VHF- ***DX Maps***



Operations- Spotting

- Spotting Operations Specialty Operations
 - GridMaster HeatMap on Twitter

← **GridMasterHeatMap**
2,558 Tweets



GridMasterHeatMap

GridMasterHeatMap
@GridMasterHeat

A heat map of sat grids. Go to the website (ke0pbr.wordpress.com) for how to submit data. Use KE0PBRs email on QRZ.

ke0pbr.wordpress.com/2019/10/28/sub... Joined August 2019

More Resources- Portable Operating

- QRPer.com from Thomas Witherspoon, K4SWL is source for POTA a great & other portable operations
- VE3TWM's [Outdoors On The Air](#) YouTube Channel
- Julian, [OH8STN Ham Radio](#) YouTube Channel

QRPer.com








More Resources– Pedestrian Mobile

- WØRW
 - “210 Countries on a 10 Foot Whip”– [eHam Story Link](#)
 - [Website](#)
- [HFPack](#)
- [VK3YE: HF AR Pedestrian Mobile](#)
- [Boschveldt QRP Club Library- Pedestrian Mobile Section](#)
- KB1HQS Portable– [Newsletter](#) & [Book](#)
 - VE3TWM's



Vehicle Mobile- Resources



- KØBG- *Website for Mobile Amateur Radio Operators* 
- ARRL- *Mobile Radio Articles* 
- HamRadioSchool.com- *Ham Radio Mobile Installation* 
- Ham Nation, Gordon West- HF Mobile Antennas *Youtube Video* 
- *Basics of Mobile and Portable Antennas for Ham Radio* by H. Ward Silver, NØAX 
- Mobile HF Installation, K2CJB *Youtube Video* 
- Planning for Safe, Effective Vehicle Based Operations- Marty Woll, N6VI *RATPAC* 



Operations– Spotting

- Spotting Operations Specialty Operations
 - Group.io Mailing Lists
 - *Summit Metro Parks On The Air* 
 - *smpota@groups.io* 

Questions / Comments ?

View this slideshow and access
all resources links at

*tiny.cc/
portop* 

If you need a PDF copy click [here](#)



Contact Information

- Email- k8zt@arrrl.net
- Website- www.k8zt.com

K8ZT



K8ZT



Presentations

- If your club is interested in a online presentation I am currently offering multiple options, for a list visit

tiny.cc/k8zt-p

- Email me if interested
k8zt@arrrl.net

This list- tiny.cc/k8zt-p	Slideshow	Video
Amateur Radio Logging- ARRL Webinar	tiny.cc/arrrl-log	https://www.youtube.com/watch?v=...
Choosing Your Ideal Callsign- QSO Today Expo 2021	TBA	TBA
Dx Engineering Interview by K3LR- K8ZT		https://www.youtube.com/watch?v=...
Field Day in Social Distancing	tiny.cc/fdsd	https://www.youtube.com/watch?v=...
FT8/FT4 Digital Modes	tiny.cc/ft8ft4	
Fun with Morse	tiny.cc/fwm	https://www.youtube.com/watch?v=...
Intro to AR Contesting	TBA	TBA
N1MM Contesting Software- Elmering Day	y.cc/n1mm-elmering	https://www.youtube.com/watch?v=...
Pandemic Ham Radio Activities An Opportunity to Grow- RATPAC	ny.cc/clubcovid	Jan 27, 2020
QRP Amateur Radio	tiny.cc/qar	
QSLing In Digital World	tiny.cc/qx3	https://www.youtube.com/watch?v=...
Radio, Radio, Radio- 100 yrs of Commercial Broadcasting	tiny.cc/rrradio	https://www.youtube.com/watch?v=...
RATPAC Programs Listings	ny.cc/ratpac-list	
RATPAC- Ham Radio- Online Meeting Resources	tiny.cc/hromr	https://www.vimeo.com/watch?v=...
Software & Web Resources for Contesting	ny.cc/gl-contest	
State QSO Party Challenge	tiny.cc/stqspc	https://www.youtube.com/watch?v=...
Technicians, Life Beyond Repeaters	tiny.cc/btech	
Top Secret Techniques to WAS & DXCC	tiny.cc/ham50	
Youth in Amateur Radio	tiny.cc/yiar	