Go-Kit Building

Design Considerations

VE6LK / AI7LK

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First, some definitions:

1. **What's a Go-Kit?**

2. **What is it used for?**

Presentation Overview

1. **Who's Vince?**

2. **Go-Kit Types**

3. **What's in a Go-Kit?**

4. **What's your Purpose?**

5. **What's in my Kit?**

- Amateur Radio – interested at age 7, licensed at 40

- Public Service – my very first event was, for me,
  a ~~train wreck~~ ***tremendously fulfilling learning experience***

- ICS level 300 certified

- ARES/AuxComm, Alberta Foothills area

- Ham Radio Workbench podcast team member

- I help out with repeaters and projects in my club

- I build stuff for my radios to make my hobby more enjoyable

- PADI AOW and EAN certified. Self-certified musician since '69

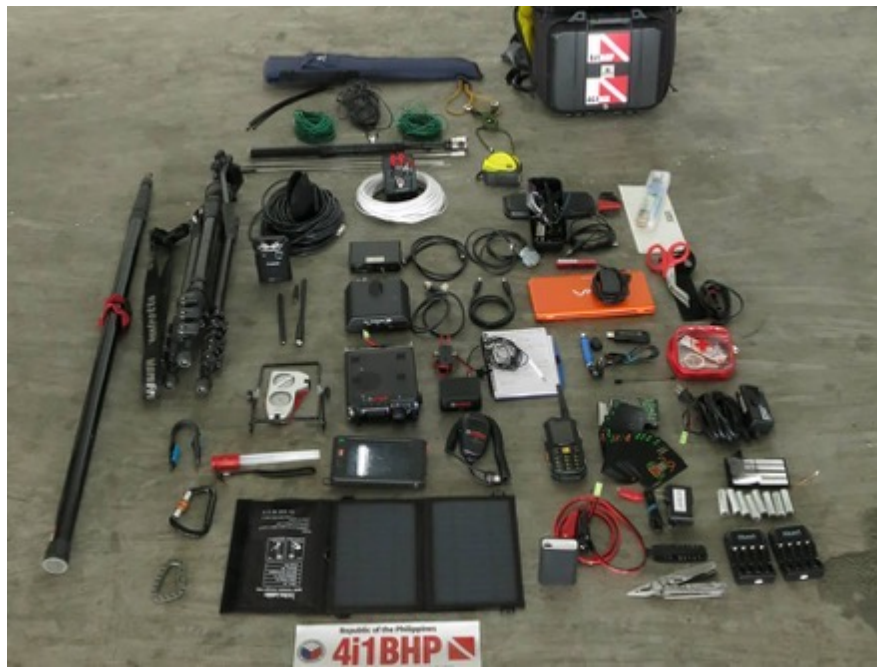# Who's Vince?

Go-Kit types

Ham Radio Go Bag

Go-Kits fall into two main categories
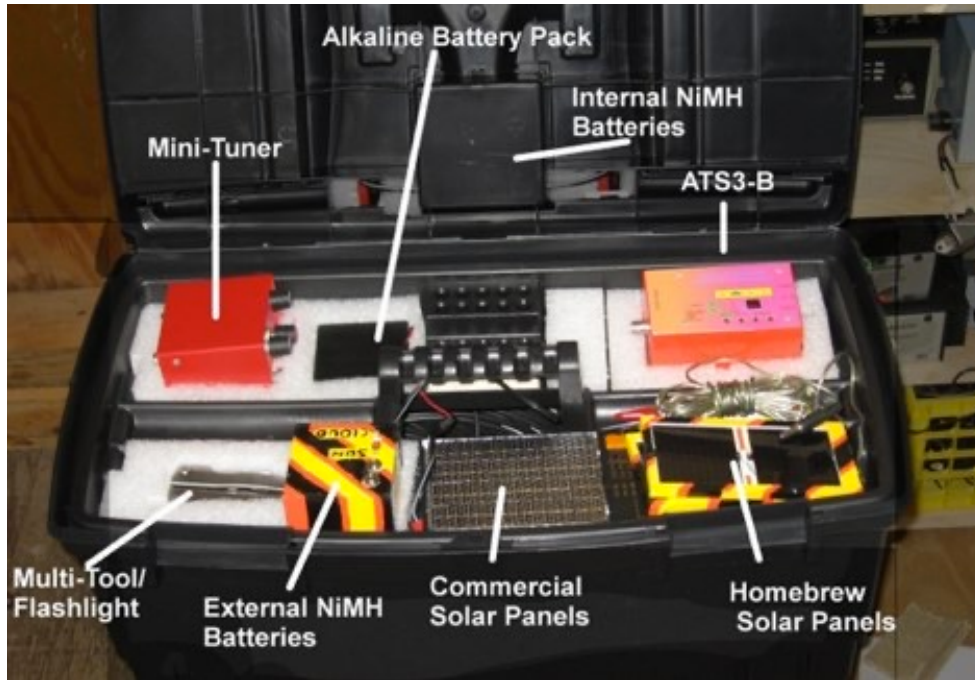
1. Those that fit in a bag of some sort
   - Backpack
   - Camera
   - Laptop
2. Those that fit in a box of some sort
   - 19" Rackmount case eg. "Gator" and others
   - Plastic suitcase
   - Built to suit

And two sub-categories

1. Battery powered
2. Grid powered

What's in a kit?

All kits have at least these items:

- Radio
- Power distribution

Beyond the box or the bag you need

- Antennas
  - And antenna supports
- Feedline
- Power cables
- <u>Manuals for your gear</u>

Some kits have these things too:

- More than one radio
- Microphone. CW Key. Digital interface. Computer.
- Power meter
- Antenna Tuner
- External speaker(s)
- Battery. Charger. Solar panel.

And stuff to make your life easier:

- Paper/pencil/pen/Sharpie/clipboard/notebook/highlighter/tape
- Coffee mug/Water bottle. Fuel Bar. First Aid Kit.
- Fresh clothing. Adequate food. Lighting. Poncho.

What's your Purpose?

Define your purpose

- Why: Camping/POTA? Events? EmComm/AuxComm support?

- Where used: Picnic table? Indoor? Mountaintop?

- Frequencies: HF? V/UHF?

- Operating modes: CW? Voice? Digital?

- Operating power level: 5W? 100W?

- Purpose for QSOs: Casual? Contest? EmComm?

Define your electrical requirements

- Source of power: commercial mains, generator, battery, solar

- Operating TX power level: 5W? 25W? 100W?

- Length of operating time: a few hours? Unlimited?

- Location of power: close by or distant?

Sidebar - - Let's do the math for a battery:

- Assumption: FT-8900 FM rig on 2M at 50W

- Assumption: Busy Event Net Control station 40% Talk 60% Listen

- Assumption: 8h duration

- FT-8900 manual says TX Current = 8.0A and RX Current = 0.8A

- Transmit: 8h X 40% X 8A = 25.6Ah *add* Receive: 8h X 60% X 0.8A = 3.84Ah

- = 25.6Ah + 3.84Ah = <u>29.44Ah of battery required</u>
  - *Add battery (or charging) to allow for overtime or cold weather or voltage sag*

- Add up power consumption of **all** devices in your kit

- Power consumption duty cycle varies by mode (TX/RX)
  - Vince's rules for a TX busy station: FM 40/60 -- Digi 40/60 -- CW 40/60 -- SSB 25/75

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Define your mechanical requirements

- Size: Tiny? One-hander? Luggable? Needs a crew of roadies?

- Weight: 3 lb? 10 lb? 50 lb?

- Form factor: Small bag? Backpack? Suitcase? Dedicated vehicle?

- Setup location: Table needed? Sits on the ground? Body-worn?
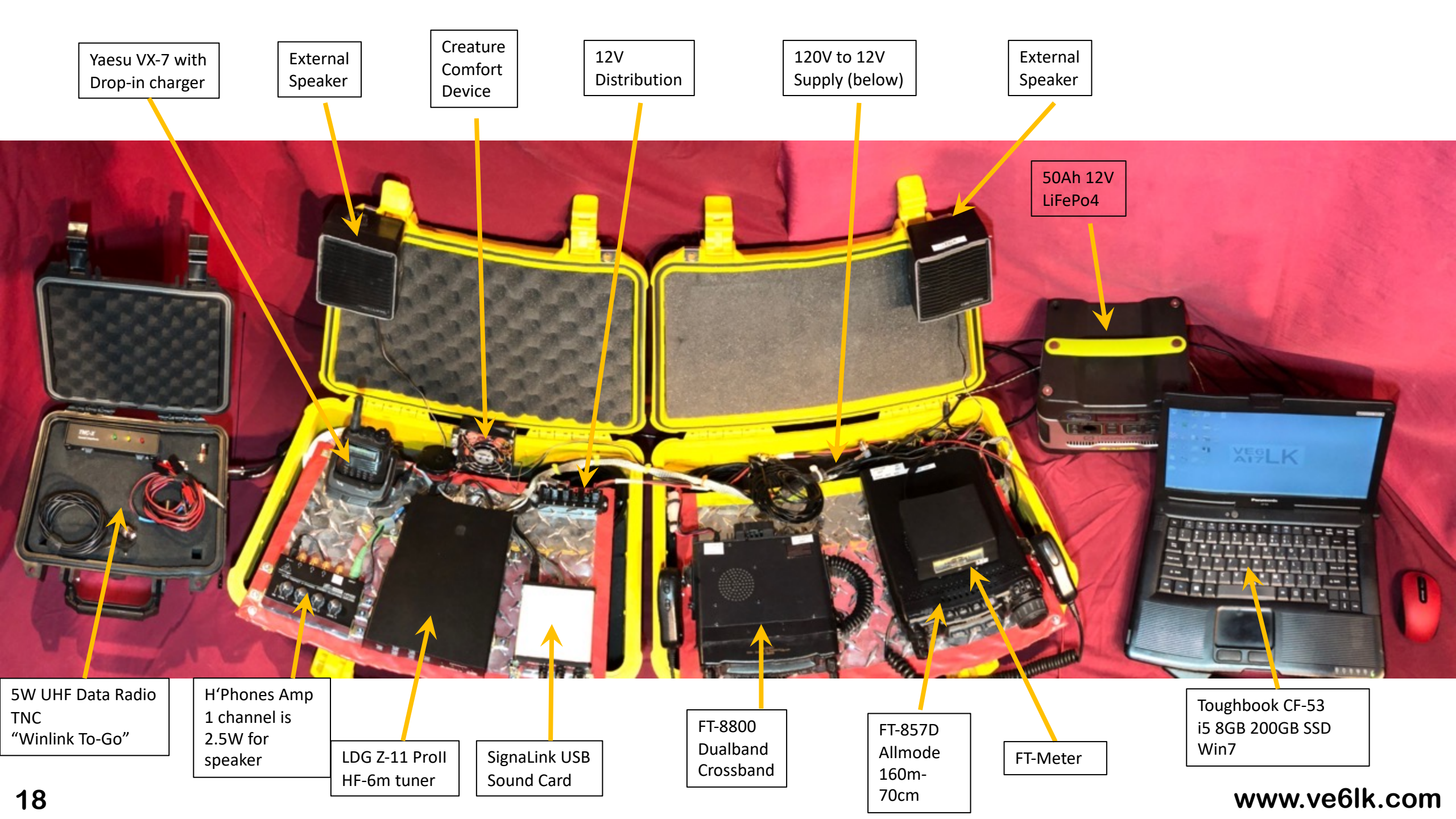
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What's in my kit?

My design requirements

- Where: Indoors – EOC, Logistics/Net Control, or glamping
- Power: 120VAC Mains, 12VDC optional "just in case"
- Frequencies: Coverage from 80m to 70cm
- Operating modes: Phone, CW, Digital
- Operating Power Level: up to 100W
- Purpose: Event Support, Disaster/AuxComm support, glamping

Must have items

- Multiple concurrent V/UHF VFOs (Two is one, one is none)
- External amplified speaker, headphone distribution amp
- Each piece must be one-arm carryable and rugged for transport

Operator point of view

Yaesu VX-7 with Drop-in charger

External Speaker

Creature Comfort Device

12V Distribution

120V to 12V Supply (below)

External Speaker

50Ah 12V LiFePo4

5W UHF Data Radio TNC "Winlink To-Go"

H'Phones Amp 1 channel is 2.5W for speaker
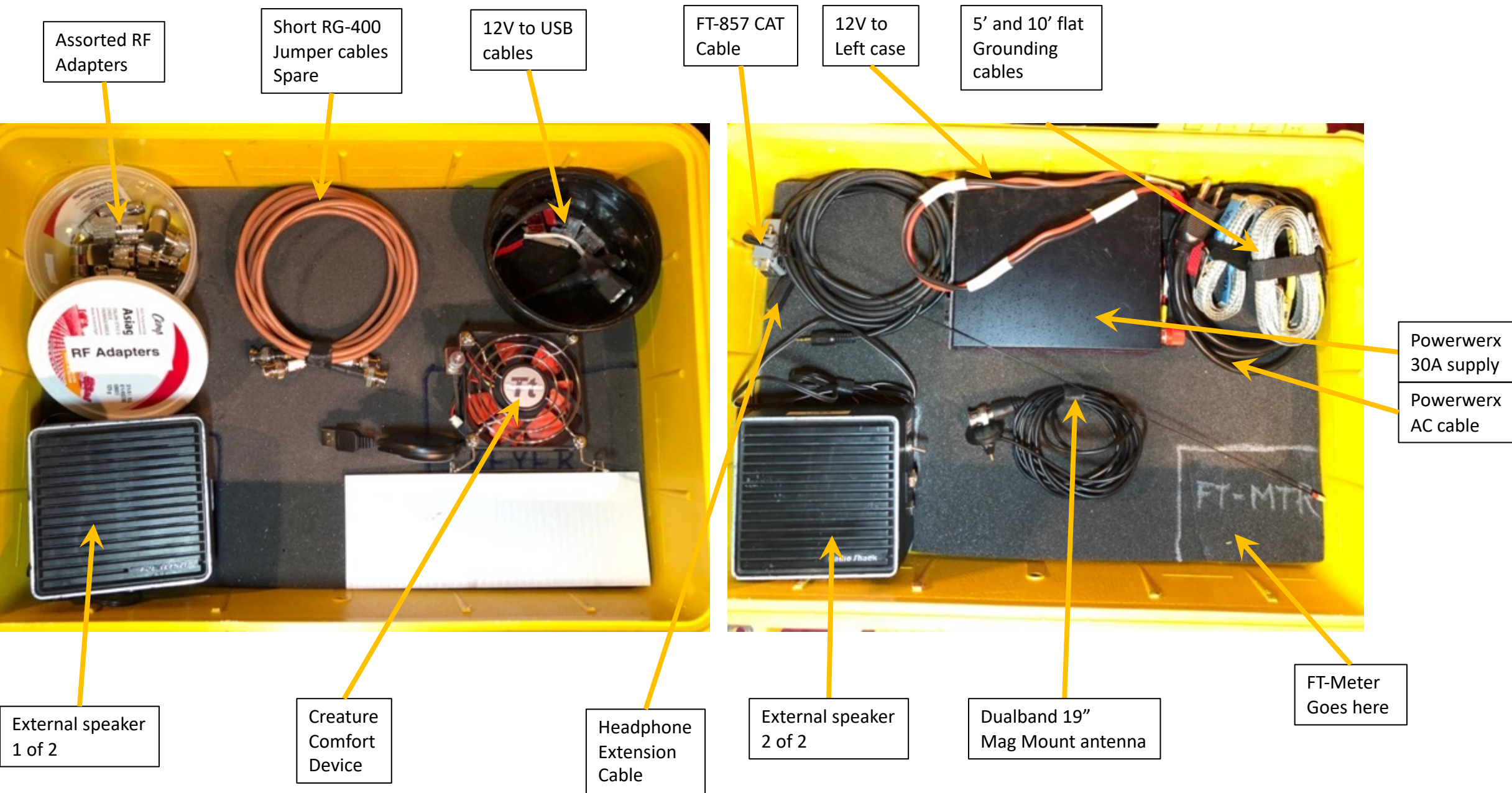
LDG Z-11 ProII HF-6m tuner

SignaLink USB Sound Card

FT-8800 Dualband Crossband

FT-857D Allmode 160m-70cm

FT-Meter

Toughbook CF-53 i5 8GB 200GB SSD Win7

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Assorted RF Adapters

Short RG-400 Jumper cables Spare

12V to USB cables

FT-857 CAT Cable

12V to Left case

5' and 10' flat Grounding cables

Powerwerx 30A supply

Powerwerx AC cable

External speaker 1 of 2

Creature Comfort Device

Headphone Extension Cable

External speaker 2 of 2

Dualband 19" Mag Mount antenna

FT-Meter Goes here

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Other gear

- 3x 50' RG-400 feedline + spares
- 80/40/20m fan dipole
- Comet HFJ-350m vertical + tripod
- Diamond X50 V/UHF antenna
- 30' push-up mast, guy ropes, stakes

- 120VAC extension cables
- Headphones (Heil Pro 7, Sony)
- CW Key

- Panasonic CF-53 Toughbook

Problem solvers

- 3M Blue painter's tape
- Assorted Sharpie Markers
- Paper/Pen/Pencil/Clipboards

- Dollar store carabiners
- Lee Valley Tools rare earth magnet hooks

- Set of hand and soldering tools

- Extra feedline (100' RG8X)
- Extra V/UHF mag mount whips
- Antenna Analyzer

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What is the computer?

- Panasonic Toughbook CF-53 MK4

- Magnesium alloy case

- Long battery life

- i5-4310U processor (not a speed demon)

- 8GB RAM, 200GB Solid State Disk

- 14" Daylight viewable screen, 1366x768

- 5.9 pounds and integrated carrying handle

- All the I/O ports you can imagine, it has. And then some.

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What's on the computer?

Needs change over time

- Adapt to the changing needs

- Remember ergonomics and usability is key

- *Experiment and Try Things!*

What it was

What it has become
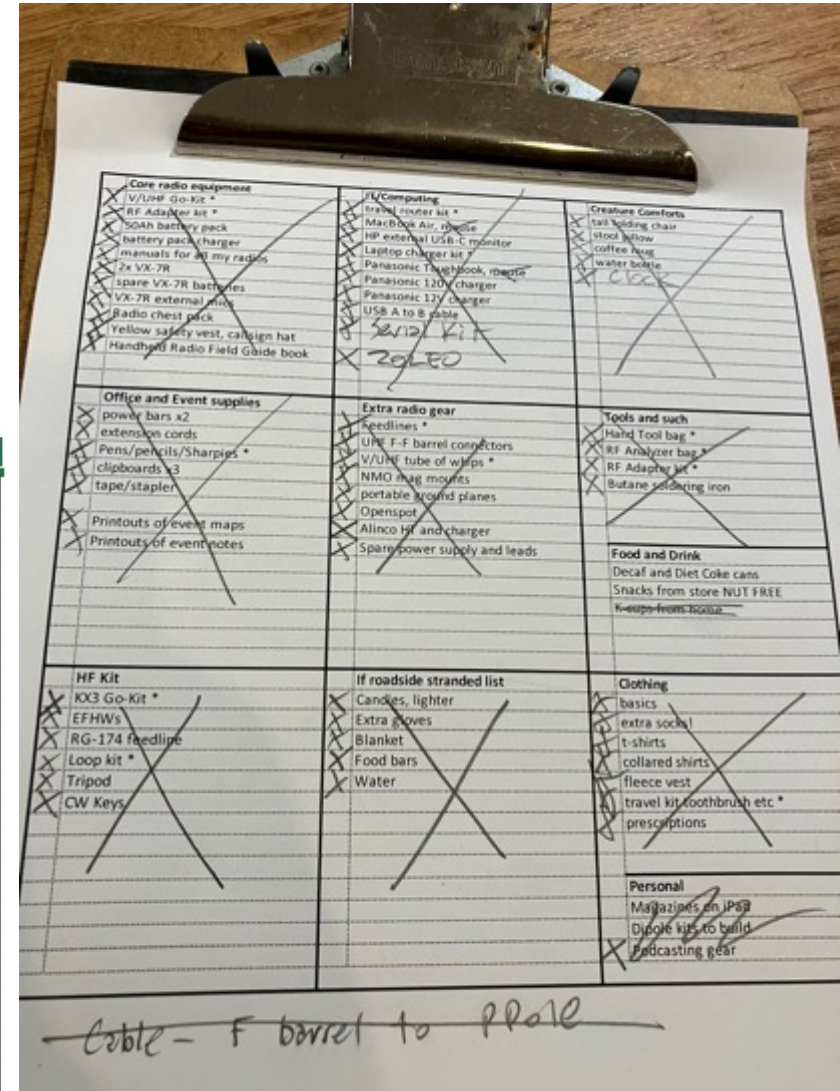
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A new family member

Don't forget your kit lists!

Core radio equipment	IT/Computing
V/UHF Go-Kit *	travel router kit *
RF Adapters	MacBook Air, mouse
50Ah battery pack	HP external USB-C monitor
battery pack charger	Laptop charger kit *
manuals for all my radios	Panasonic Toughbook, mouse
2x VX-7R	Panasonic 120V charger
spare VX-7R batteries	Panasonic 12V charger
VX-7R external mics	USB A to B cable
Radio chest pack	
Yellow safety vest, callsign hat	
Handheld Radio Field Guide book	
Alinco DJ-MD5 HT and charger	

Office and Event supplies	Extra radio gear
power bars x2	Feedlines *
10' and 6' extension cords	UHF F-F barrel connectors
Pens/pencils/Sharpies	V/UHF tube of whips *
Scissors	Mag Mounts for tube of whip
clipboards x3	Spare power supply and lead
tape/stapler	
Rare Earth Magnet hooks	
Carabiners	
3M Blue painters tape	
Printouts of event notes	
Printouts of event maps	

HF Kit	If roadside stranded list
KX3 Go-Kit *	Candles, lighter
EFHWs	Extra gloves
RG-174 feedline	Blanket
Loop kit *	Food bars
Tripod	Water
CW Keys	T.P.

Personal
Magazines on iPa
Dipole kits to bui
Podcasting gear
Openspot

One Pelican 1500, containing
FT-8800, Mic
TM-732A, Mic
Headphone amplifier
External speaker
VX-7R charger
Powerwerx SS-30 power supply
BNC to UHF adapters
USB to powerpole adapters
USB fan
two rare earth magmount 19" antennas

One tool bag containing
Rigexpert AA-650 Zoom
Adapters for the AA-650
Spare charged batteries for AA-650
TinySA spectrum analyzer
Crimping tool and dies kit
Pre-cut shrink wrap variety
8P8C, 6P6C, 4P4C connectors
Crimp tool for RJ connectors
DXE Cable prep tools
Dymo RhinoPRO 3000 labeler
UNI-T UT210E clamp-on meter

Feedlines drawn from stock on hand:
2x 50' RG-400 UHF to UHF cables
1x 75' RG-8X UHF to UHF cable
1x 50' RG-8X " " cable
1x 25' RG-8X " " cable
1x 25' RG-174 BNC to BNC cable

One drawing tube, containing
2x 5/8 wave 2m whips with NMO base
2x portable ground plane kits, constructed
from Ikea p/n 000-757-93 and joined at
the middle...
X or...

One Pelican 1500, containing
Elecraft KX3
Elecraft PX3
15Ah battery pack
External powered speaker
Elecraft hand mic
25W BNC dummy load
Bill Cady KX3 book
EFHW antenna
CW Keys
25' RG-174 BNC to BNC feedline

Summary

- Use the Kepner-Tregoe method
  - determine your *must have* and *nice to have* items
- Evaluate Purpose, Locations for use and Mechanical considerations

Purpose, Electrical, and Mechanical design elements
determine functionality and kit building points

Narrow focus = light weight

however

Highly Flexible <> light weight

Q&A / Contact

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