Emergency Ham Radio Portable Go-Kit
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- David

Survival Diva here with exciting news! In light of recent conversations on post-disaster communications, today we have a guest author who is an expert on Ham Radio—Lee Besing. This is a perfect solution for those who want to use HAM radio (or other radios) during a post-collapse scenario, but haven’t figured out how to make them portable. I’m sure you will appreciate the incredible detail Lee has included in his step-by-step instructions on how you can build your own emergency ham radio kit that’s portable and takes alternative power into consideration for times when the power grid may be down.

Emergency Ham Radio Portable Go-Kit, by Lee Besing
Once upon a time, in a department store not so far away, were some lonely Stanley Mobile Work Centers who dreamed of becoming more than just a rolling toolbox when they grew up. Fortunately for one of them, one day a ham radio operator strolled down the aisle and said “this little guy would make a fantastic portable emergency ham radio go-kit!” That ham radio operator bought the Mobile Work Center and took it home to be modified.
This is its story...

Seriously however, this rolling toolbox (Stanley Model #01880) was chosen because of cost and several physical factors. The low cost was a bonus, about $20 at multiple locations including Home Depot and Wal-Mart. I’ve also seen this unit offered on eBay for more than twice that price, plus shipping.

Physical factors include being a one-piece molded heavy duty vinyl, not two separate pieces latched together like some of the other toolboxes were. This means the bottom is not as likely to fall off when you pick it up.

The attached wheels were heavy duty and the axle was a one piece solid steel rod that ran from wheel to wheel. In other words, the wheels were not simply attached to each side, and thus it would hold up better over the life of the project.

Access to the bottom half was via a sliding front door, very convenient to be able to drop in some batteries and other items as we’ll later describe and show photos of, and close when access wasn’t desired. The heavy vinyl construction was easy to drill with my cordless drill, or cut using a heavy box cutter, when installing items in the side that required holes.

The top half can serve as a toolbox including a parts lid or have room to install a radio and other items. I chose to use it as a toolbox with parts lid for storage, and place my radio(s) outside the unit on a folding table for actual operations. Because the handle to lift the unit, or roll the unit was integral to the lid, and thus only connected via the rear hinge and two front clips, I used a metal carbineer clip to act as a safety clip just in case the clips decided to fail and pop the lid when least convenient.

Okay, now on to the project.

Portable radio operation requires power from someplace; like a battery, generator or a really long extension cord. You could use one or more 12 volt marine batteries, car batteries, sealed lead acid batteries, or gas power electric generator (don’t forget to bring extra fuel). There are lots of choices, each with their own advantage or disadvantage.

I knew a local ham operator who had a source of slightly used 28 amp hour 12 volt sealed lead acid batteries that he offering for $25 each. I bought two of them to put into the bottom of my kit hooked in parallel to provide 56 amp hours of 12vdc service. You can find these types of batteries
new from Amazon or other sources because they are used in most UPS (Uninterruptable Power Supply) to supply the power for them. 

That same ham (Bob K5AUW) had designed a home-brew charging circuit that would allow simultaneously charging the batteries while providing power to the radios or other devices, as long as there was an external source of 12vdc power. When the internal 12vdc power supply is turned on, it charges both the batteries and runs the radio, when off, the radios run from the batteries automatically. That’s a topic for a different article, but if you contact me direct (see end of article) I will email you the circuit diagram.

I added a sheet of plastic corrugated board (like you make political yard signs out of) to lay on top of the batteries, thus protecting them from shorting out accidently if something metallic got dropped into the box. I insulated the terminals with electrical tape just in case, but the plastic liner looked good and allowed me to use the extra area for storage of extension cords, etc.

I exclusively used Anderson Power Pole connectors for the majority of my connections, other than the direct connections to the batteries and switches. The cables from the battery all had Anderson Power Pole connectors, then connected to the charging circuit and then to the external 12vdc connector block (described below) and to the internal 12vdc power supply.

To provide my 12vdc power, I bought a Pyramid 30 amp 12vdc power supply from Amazon.com for $69.99 (with free shipping). I had shopped around multiple sources, and chose this unit for three reasons, the small size (flat rectangular that would fit behind the batteries), light weight and reasonable price (plus free shipping). I installed it using double faced mounting tape and stuck it to the inside back of the bottom compartment, behind the batteries and above the axle area. It fit perfectly just as I had hoped it would.
I added a 2-outlet 12vdc power plug to let me use cigarette lighter style power plugs (like the one connected to my DC-AC power converter).

I mounted a 300 watt DC-AC power converter upside down inside the roof of the bottom compartment by drilling 4 mounting screw holes and screwing them in from the top compartment. I used this unit because I already owned it, but if I was going to buy one, I’d get one of the larger capacity units (1000+ watt) on sale from Harbor Freight or other store. Recently another local ham bought a 375 watt unit at a Hamfest for $20, so keep your eyes open for bargains. I use the converter to provide temp AC power in the field to charge my portable radios or run my laptop computer, etc. It can’t handle much of a load, depending upon the size converter installed, so be cautious what you plug into it.

(David’s note: If possible, try to figure out how to power your radios directly from DC sources rather than taking DC power, converting it to AC, and having the power adapter converter adapt it back to DC to run the item. Unless you’re running high end, ultra efficient power adapters in their ideal output range, you could easily be looking at a 20% power loss by switching from DC to AC and back to DC. That 20% power loss equates to 25% more run time if you skip the whole conversion process and just keep things DC.)

Don’t use a surge strip plugged into your converter, because it will cause problems. I promise. Something about the sine wave conversion of power by the converter messes up that surge function. Using a non-surge power strip is okay, but don’t use a surge strip with the converter output.

(David’s note: This is a problem when using a modified sine inverter/converter. To get around the problem, you need to spend more and use a pure sine wave inverter/converter.)

You can use, and should use, a surge strip between your external AC source and the power supply, to protect it and to allow powering other AC
devices without needing to use the internal converter. You can’t run the 12vdc power supply from the converter to charge the batteries and run the radios and run the converter at the same time. **Perpetual energy doesn’t work, I tried it.** You could also set up and connect solar charger panels to trickle charge the batteries during daytime operations, but I didn’t have that option. **Because it was inconvenient to always be reaching under to plug or**

unplug AC cords from the converter, I decided to install external power jacks on the outside of the box, and use a short extension cord to connect from the converter to that box. I went to Home Depot and bought the plastic outlet box, weatherproof lid, and other parts to install. Now I could simply plug into the outside of the toolbox to get power. I added an inline overload fuse (from an old UPS) and an on/off illuminated rocker switch (from Radio Shack #275-013) to turn on the converter when needed.

**I also installed a Red-Dee-2 Power Connector (PS8) from www.DCPWR.com** to provide the ability to plug up to four (4) exterior Anderson Power Pole equipped cords to obtain 12 vdc power from the outside, for about $28 plus shipping. I added some plastic clips to create a sort of strain relief mechanism for the cords, but that adhesive tape isn’t holding up.

Because I wanted to keep an eye on the voltage of my batteries when not using AC power to keep them charged, I found a **battery monitor** from Harbor Freight that only cost $4.95. **I put**
Anderson Power Poles on it and used Velcro to attach it to the outside above the power outlets. **Push the button and the LED’s light up to indicate the state of charge or if it needs recharged.** Yes, there are several other more expensive gadgets from West Mountain Radio or other sources that show you live readings with LED displays, but this was cheap and how often do you need to check it, anyway? When not in use, it gets put back inside the box for storage.

I added an external fan like you would find on a PC computer case because I was concerned about heat inside the lower compartment with 2 batteries, charging circuit, 12 volt DC power supply and DC-AC power converter. Yes, I could leave the door open, but I was concerned about rain. So I installed the fan and then added some flexible plastic that I cut to shape from something I had bought recently, and attached it so that the air could still blow outward, but rain was unlikely to blow in. I don’t plan to operate this unprotected in the rain, but I wanted it to be reasonably rain resistant.

**I added an illuminated on/off rocker switch** ([Radio Shack #275-013](https://www.radioshack.com/p/rockoon-off-switches/dp/275-013)) **to turn the fan on/off from the outside,** and then discovered that it could turn on accidently very easily. So I cut a small 1” piece off a PVC pipe to glue around the switch, so that you had to reach inside the pipe to turn it on or off on purpose.

**Okay, at this stage, I had all the external power outlets on one side of the toolbox, and the fan on the other side.** Everything was mounted semi-permanently inside the box to avoid shifting around during transport by using double face tape or Velcro. Hard Styrofoam was placed between the batteries to keep them from shifting when the unit was being wheeled around.
It was time for the finishing touches. I added an exterior hook to hang a microphone on the front of the box, just in case, and I decided to decorate the exterior with reflective tape for safety purposes, to increase visibility during night operations and to spiff up the looks a bit. I added some decals to identify it as a REACT piece of equipment since I’m a REACT member, and added one of the logos from a mag sign that I use on my van when I’m doing the “turtle” function (bringing up the rear after the last rider / runner) at bike-a-thon or run-a-thon events. I also used my label maker to properly label all the cables inside, and all the connectors outside, so that folks would know what was what, and I’d remember it myself 6 months from now.

I’m using a portable home-brew 2 meter antenna on a tripod mount and a home-brew HF (high frequency) antenna with this kit, both antennas were built based on ideas found at www.w2ik.com. I currently store a 50 watt 2 mtr ham radio in the toolbox at all times, with extra coax for the antenna for faster deployment. I also carry a portable mag mount 2 meter antenna for quick operations. Antennas will be the topic of a different article a bit later on.

(David’s note: As I mentioned earlier this week, two tools that our family has for situations like this are the SPOT satellite transponder/GPS/one way satellite communicator, and the Delorme inReach 2 (TWO!) way satellite communicator that you can connect to your smartphone by bluetooth and send/receive text messages via satellite. They will only work if the grid is up where the person you’re talking to is located. What this means is that these satellite communicators are not an alternative to Ham radio in a complete nationwide disaster situation, but they are a solid alternative for local and regional disasters that don’t require a license that you may want to consider.)

You can visit Lee Besing’s informative blog at sanantoniohams.org/blog or you can email him at lee@besing.com.