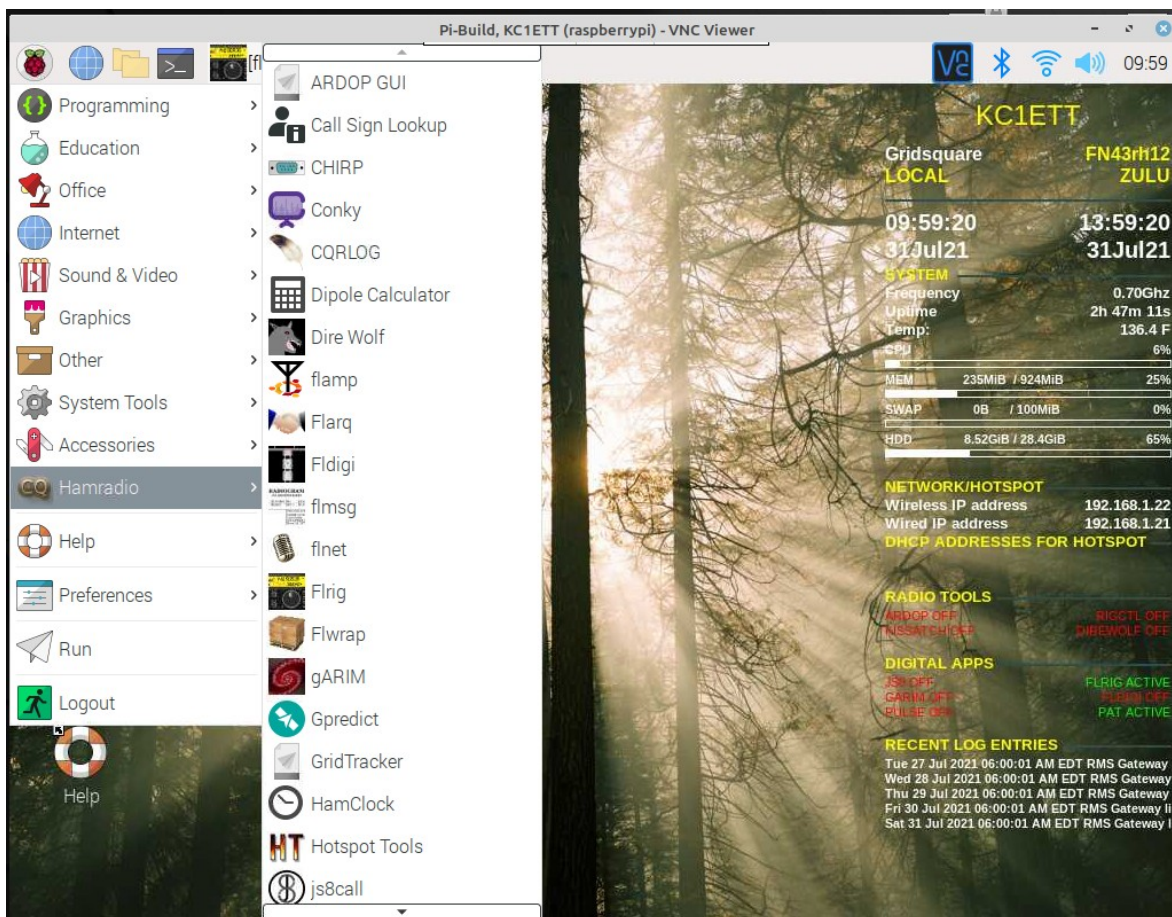


Portable packet (and digital) station for Emcomm and General Use

Over the course of the next several months a portable, self-contained portable/mobile digital station for emergency and general usage will be described. Part 1 (below, describes the concept and purpose of a digital station and why we thought it would be another tool in the Emcomm toolbox. A functional block diagram shows the station building-blocks and their relationship. Part 2 (September) describes the hardware in detail, a complete parts list and a “howto” interconnect the pieces. Part 3 (October) Introduces the KM4ACK package, how to install and configure it. Part 4 (November) Explains how to use several of the more important programs contained in the package.

Jim White, KC1ETT first approached me with task of putting together a portable packet station using a Raspberry Pi some months ago. The project waxed and waned until he introduced me to [Pi-Build](#) by KM4ACK. The variety of digital programs allow the choice of VHF or HF radios for communications compiled for the Raspberry Pi, whether for Emcomm or general portable use. This unit is small and compact enough to fit in the typical “go bag”.

KM4ACK developed a software package (available as an .iso image) encompassing many digital communications features called “Pi-Build for the Raspberry Pi. This software is free to download and in the open domain.



The features are too many to name, but a few are listed here:

HOTSPOT, Hotspot Tools (Allows WiFi device control of the installed operating programs)

GPS (A GPS client)

FLDIGI, FLRIG FLAMP, FLWRAP , FLMSG (**F**ast **L**ight **D**IGital suite of programs)

PAT (Winlink client for Raspberry Pi <https://getpat.io/> w/FORMS!)

ARDOPC, **ARDOPGUI** (A digital modem and GUI for WinLink)

DIREWOLF (A software TNC for AX.25 Packet)

AX.25 (The Packet engine)

HAMLIB (Tool kit and libraries for various programs)

PULSE (Sound Sever system for Linux & Raspberry Pi)

JS8/JS8 Call (Weak Signal keyboard-to-keyboard messaging)

M0IAX (Tools for working with JS8Call)

WSJTX (A suite of Open-Source digital programs designed for weak signal communications)

FT8 & WISPR (Digital programs and modems in software)

CHIRP (Software to program modern radios)

XASTIR (GPS program GUI)

YAAC (Yet Another **APRS** Client)

PYQSO (Logging software)

GPREDICT (Graphical Satellite passage prediction program)

CQRLOG (A logging program)

QSSTV (Slow-scan TV mode)

Gridtracker (Logging tool for tracking Grid Square Contacts)

Propagation (VOACAP)

Emergency Email Server (EES)

As you can see from this abbreviated list, the functionality is extensive. How could a ham capitalize on this suite of software for mobility and Emergency Communications, e.g., ARES/RACES/Emcomm/Public Service at the lowest possible cost?

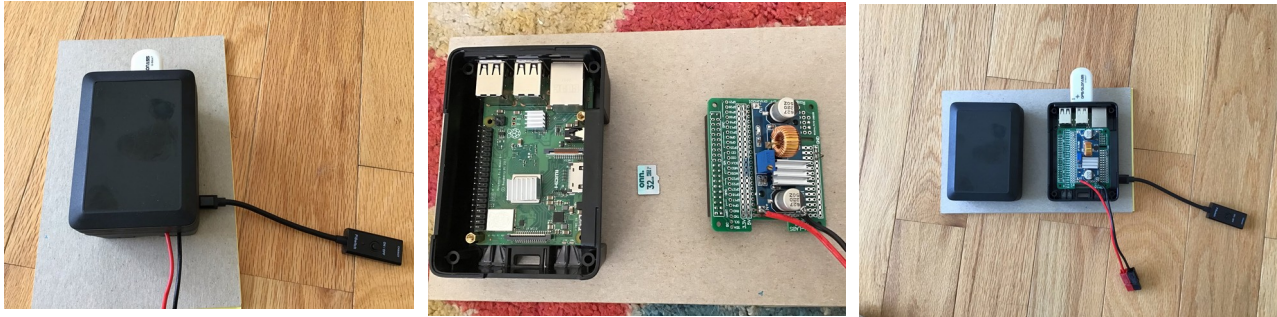
Introducing the Mobile Digital Pi Station.

Together, KC1ETT and I put together a portable station which allows portable or fixed operation using many digital modes. We had mobile VHF and HF radios – what else was needed?

A Raspberry Pi (RPI) is the obvious next answer, OK, but how to power a 5Volt RPi from 12Volts? A sound modem is needed, but Signalinks are expensive if you are trying to stay low-cost. Without a Signalink, how is the PTT keyed? In turn each problem was solved:

1. Power: 12V to 5V conversion uses a \$10 “buck converter” available on Amazon or eBay
2. The Sound modem uses a \$10 USB Sound Modem “dongle” (Same source)
3. PTT keying is accomplished by using a simple circuit triggered by a GPIO pin on the RPi and proper software configuration. Modifying the USB Sound Modem dongle for PTT was not an option for us (Aging eyesight and hand tremors) Although it can be done by some.
4. A neat little box to house everything
5. RPi to Radio Interconnecting cables
6. Keyboard and Monitor – Everyone has a laptop, or an iPad, or a SmartPhone which connects through the HOTSPOT

We wanted a compact installation as possible. Three, four, or five separate pieces of equipment dangling on a multitude of cables is not conducive to mobile or Emcomm operations. We decided to build a “hat” for RPi. This is a circuit board where the buck converter is mounted and the PTT circuit is built. The board has a 2X20 pin connector so it stacks onto the RPi. A short pigtail with Anderson Power Pole connectors supplies 12V to the buck converter. The buck converter’s 5V output is wired to the appropriate pins of the stacking connector for the RPi. A simple PTT circuit is built on the same board. A board mounted 2.5 mm phone jack connects the PTT to the radio. All of this is mounted in an ‘expandable’ box from Pi-Hut which allows for extra height required by the hat.



To make the system as universal as possible, a data-port ready radio is not necessary for packet modes. Various cable assemblies will be presented, with suggestions for others. Over the course of several years, KC1ETT and I have tested many radios connected to the Maine Packet Network. Unfortunately, the inexpensive Chinese radios (Baofeng, *et al.*) are not suitable for VHF packet use. Their modulation/demodulation circuitry is not conducive for AFSK (**A**udio **F**requency **S**hift **K**eying). It is nigh impossible to make these radios work with any Phase shift modes.

Next month, in this series of articles, a complete hardware description, parts list and construction tips shall be provided. This unit is a valuable tool in the Emcomm arsenal, providing instant data communications on VHF or HF.

If there is enough interest in the project, the following may be offered:

1. A micro SD card, completed configuration with your call sign; or,
2. A Power/PTT “Hat” for a Raspberry Pi; or,
3. A complete parts kit (Box, Raspberry Pi, Power/PTT “Hat”, USB Sound Modem, GPS Dongle, and cables - no radio!) with construction instructions; or,
4. A complete built and tested unit configured with your call sign.

Jim, KC1ETT and I are always available for consultation.