

After Exercise Report

Exercise: Power Down Radio Test, 1 March 2024

Op: Joe, KF7MIX

Summary

This was a follow-up to the exercise from 30 January 2024. The goal was to operate JS8Call with no external power for as long as possible. For this round, I started with a Raspberry Pi 3B that I had on-hand, and customized it with the following common "headless" setup:

- **hostapd** - lets the pi act as a wifi access point, so you can connect directly to it from any device, without using any other infrastructure (no router, internet, etc)
- **dnsmasq** - provides devices that connect with an IP address, so they can communicate
- **RealVNC** – built-in to current pi OS as a settings option. lets you remotely connect to a running computer to control it from another device (tablet, phone, laptop, etc)

The plan was to use a Chromebook, and two backup tablets, to access the headless Pi as-needed, but to leave the radio and Pi running throughout the day.

Equipment

- pi 3B off of a 2.5Ah battery 5v USB pack
- uSDX, 2.5w PO, off of a 4Ah 12v lifepo4
- ATU-10-A off of the internal battery and a small 5000mAh 5v pack
- Chromebook, and two old kindle fire tablets, each with RealVNC installed, internal batteries only

Outcome

Operated from 8am to 8pm, 12hrs continuous, at QRP levels with a fair duty cycle (HB on, plus many manual TX), and did not empty any of the batteries that I started with. The two 5v battery packs have lights to indicate charge levels; the tuner battery never dropped from the full 4 lights, the pi3 battery dropped from 5 lights to 2 lights by the end of the day (had just barely dropped from 3 to 2 as I was shutting down). The Chromebook dropped from 100% to 72% by the end of the day.

1. The headless pi3 specs claim ~300-500mA draw at idle; with JS8Call unix "load" was over 1, but it seems to draw very little power. A single consumer 2.5Ah battery pack ran it all day without being depleted.
2. I ran the uSDX from my 4Ah lifepo4, but I don't have anything connected to monitor the charge level, so I'm not sure how much of it was drained. I have a 20Ah battery as well, but didn't need to switch during the 12hr test.
3. The headless setup was great. I didn't have to waste any power running a monitor that I wasn't actively using; when I wasn't watching the radio, I simply closed the chromebook. I had planned two backup tablets, but the chromebook didn't get anywhere close to depleted, though I used it as much as I pleased.
4. QRP on JS8Call is quite effective. With 2.5w, I was able to cover the country pretty well (pskreporter images attached). More power would certainly improve things, I'm sure, but QRP is very usable. My feeling is that in an emergency I would operate QRP and switch to a full-power radio as needed.

Lessons learned

1. Running QRP with the headless pi meant a lot less fighting for me; less swapping things around to charge laptops and switch batteries, etc.
2. I purposefully did not purchase any new hardware since my last battery test day. I wanted to see if I could improve my operating time by using existing hardware differently.
3. My last battery test day (1/30/24) resulted in 10hrs of operation before ALL my batteries were depleted. Yesterday I ran for 12hrs and NONE of my batteries were depleted at the end of the day.
4. I should probably do a "solar charge" test day, as I haven't done that in over a year.

Log & Additional Materials

08:08	Powered on pi3, radio, tuner	11:51	Connected Chromebook VNC
08:10	Connected Chromebook VNC to operate	11:53	Battery check pi3 5/5 bars, tuner 4/4 bars, Chromebook 89%
08:11	First HB sent, 2.3w, responses from 5 stations	11:54	sent HB, resp from N0AAS, NK0Z, W6TAB, AD00A
08:15	Manually sync clock and auto drift	11:55	Disconnected Chromebook VNC
08:18	Sent @HERC SNR?, resp from NC0N, AE0WM, K3DOC, KF0LCJ, KD0YXI, W0BYU	12:23	Connected Chromebook VNC
08:20	Send msg to @HERC, ACK from NC0N, N6CYB, KD0YXI	12:23	Battery check pi3 pack 5/5 bars, tuner pack 4/4 bars, Chromebook 88%
08:25	Disconnected Chromebook VNC	12:25	sent NCOQ SNR?, resp -18dB
08:31	Connected Chromebook VNC	12:26	sent NCOQ HEARING?, resp KC9RGX, WW9Y, WA0R, AE0SC
08:31	Sent N6CYB SNR?, resp -11dB	12:28	sent AE0SC SNR?, resp -10dB
08:32	Sent MSG to N6CYB, recv ACK	12:30	sent MSG to AE0SC, recv ACK
08:34	Disconnected Chromebook VNC	12:34	sent N6CYB SNR?, resp -12dB
08:46	Connected Chromebook VNC	12:35	Disconnected Chromebook VNC
08:47	sent KE0DHO SNR?, no resp	12:43	Connected Chromebook VNC
08:48	sent N0GES SNR?, no resp	12:51	Disconnected Chromebook VNC
08:49	Disconnected Chromebook VNC	13:23	Connected Chromebook VNC
08:51	Battery check pi3 pack 5/5 bars, tuner pack 4/4 bars	13:24	sent @HERC SNR?, resp from W0BYU, K3DOC, N6CYB, NZ10N
08:55	Connected Chromebook VNC	13:25	Battery check pi3 5/5 bars, tuner 4/4 bars, Chromebook 85%
08:57	Disconnected Chromebook VNC	13:30	Disconnected Chromebook VNC
09:14	Connected Chromebook VNC	14:10	Connected Chromebook VNC
09:15	sent HB, resp from W6OEM, KF0DDE	14:12	sent manual HB, resp from W6TAB, W6OEM, N4JSW, N0AA, KB8UVN
09:16	sent N0WKZ SNR?, no resp	14:13	Battery check pi3 5/5 bars, tuner 4/4 bars, Chromebook 82%
09:20	Disconnected Chromebook VNC	14:14	Disconnected Chromebook VNC
09:33	Connected Chromebook VNC	14:41	Connected Chromebook VNC
09:33	sent @HERC SNR?, resp from NC0N, N6CYB, KD0YXI, W0BYU	14:42	Battery check pi3 4/5 bars, tuner 4/4 bars, Chromebook 81%
09:35	sent @ALLCALL QUERY CALL VE6CU? resp from K4BYU, W0BYU, AD00A	14:43	sent HERC SNR?, resp from W0BYU, KD2USM, K3DOC, N6CYB, NZ10N
09:35	Battery check pi3 pack 5/5 bars, tuner pack 4/4 bars	14:50	Disconnected Chromebook VNC
09:37	sent @4SQRP SNR?, resp from AD00A -7dB	15:16	Connected Chromebook VNC
09:38	Disconnected Chromebook VNC	15:25	Disconnected Chromebook VNC
09:52	Connected Chromebook VNC	16:00	Connected Chromebook VNC
09:53	Found MSGs waiting from N6CYB	16:00	Battery check pi3 4/5 bars, tuner 4/4 bars, Chromebook 77%
09:54	sent MSG to N6CYB, no ACK	16:01	sent MSG to @XCOMM group, ACK from NCOQ
09:56	sent N6CYB SNR?, resp -14dB	16:03	Disconnected Chromebook VNC
09:57	re-sent MSG to N6CYB, recv ACK	17:13	Connected Chromebook VNC
09:58	Disconnected Chromebook VNC	17:13	sent @HERC SNR?, resp from W0BYU, KD2USM, K3DOC, N6CYB
10:00	Battery check pi3 5/5 bars, tuner 4/4 bars, Chromebook 96%	17:15	Battery check pi3 4/5 bars, tuner 4/4 bars, Chromebook 75%
10:20	Connected Chromebook VNC	17:15	sent KE0DHO SNR?, no resp
10:22	sent HB, resp from AD00A, KF0LCJ, W6OEM	17:16	sent N0GES SNR?, no resp
10:23	sent N0GES SNR?, no resp	17:16	Disconnected Chromebook VNC
10:25	sent KE0DHO SNR?, no resp	19:35	Connected Chromebook VNC
10:26	Disconnected Chromebook VNC	19:35	Battery check pi3 3/5 bars, tuner 4/4 bars, Chromebook 74%
10:41	Connected Chromebook VNC	19:35	sent HB, resp from AD00A, KD2USM, KD5UFQ, KB8UVN, W6OEM, KA4KHG, KF5ZPA
10:42	Battery check pi3 5/5 bars, tuner 4/4 bars, Chromebook 94%	19:38	Disconnected Chromebook VNC
10:48	Disconnected Chromebook VNC	19:55	Connected Chromebook VNC
11:07	Connected Chromebook VNC	19:56	sent KB7ITU SNR?, no resp
11:10	sent @HERC SNR?, resp from W0BYU, KF0LCJ, K3DOC, N6CYB, NC0N, NZ10N	19:58	sent KB7ITU SNR?, no resp
11:11	sent @ALLCALL QUERY CALL KE0DHO?, resp from KE0MHJ, NCOQ, W0BYU, NC0N, AD00A	19:59	Battery check pi3 3/5 bars, tuner 4/4 bars, Chromebook 72%
11:17	sent MSG to KF0LCJ, no ack	20:00	Shut down
11:18	sent KF0LCJ SNR?, resp -3dB		
11:20	re-sent MSG to KF0LCJ, recv ACK		(Note: RX/TX duty cycle would be impacted by the fact that HB participation was turned on during the entire exercise. Station was transmitting HB responses on a regular basis)
11:22	Disconnected Chromebook VNC		

