



Power Play:

SRPT-03 Outlasts UV-5R Batteries in the FieldLink Xtreme

Overview

The SRPT-03 module enhances a Baofeng UV-5R, turning it into a portable GMRS/ham repeater with impressive battery efficiency. This white paper compares the battery life of the SRPT-03, equipped with a 1000mAh battery, to the Baofeng UV-5R with its stock 1800mAh battery and an upgraded 3800mAh battery. Our goal is to illustrate how often users would need to replace or recharge the Baofeng batteries (stock 1800mAh and upgraded 3800mAh) to match the runtime of a single charge of the SRPT-03's 1000mAh battery. We evaluate this across two usage scenarios: active use (80% talk, 20% standby) and standby-heavy use (20% talk, 80% standby).

Usage Scenarios

- Active Use (80% Talk, 20% Standby): Represents frequent communication, such as 48 seconds active and 12 seconds standby per minute. This is typical for ham radio operators in a net.
- Standby-Heavy Use (20% Talk, 80% Standby): Represents occasional communication, such as 12 seconds active and 48 seconds standby per minute. This is ideal for preppers or emergency setups.
- Talk Time Definition:
 - SRPT-03: A 10-second message requires 20 seconds of active time (10s record + 10s playback).

- UV-5R: A 10-second message requires 10 seconds of transmit (TX) time.
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Power Consumption

- SRPT-03 (1000mAh, 4.2V):
 - Normal Mode: 47mA (talk), 7.2mA (standby).
 - Deep Sleep Mode: 27.7mA (talk), 0.054mA (standby). Requires a 1-second mic hold to wake.
 - Baofeng UV-5R (7.4V):
 - Transmit (TX, 1W): 500mA.
 - Standby: 20mA.
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Battery Life Calculation

We calculate the average current draw and runtime for each device in both scenarios.

SRPT-03 (1000mAh)

- Active Use (80% Talk, 20% Standby):
 - Normal Mode: $(47\text{mA} \times 0.8) + (7.2\text{mA} \times 0.2) = 39.04\text{mA}$
 - $1000\text{mAh} / 39.04\text{mA} = 25.6$ hours active runtime
 - Message time = $25.6 / 2 = 12.8$ hours (since 20s active = 10s message).
 - Deep Sleep Mode: $(27.7\text{mA} \times 0.8) + (0.054\text{mA} \times 0.2) = 22.17\text{mA}$
 - $1000\text{mAh} / 22.17\text{mA} = 45.1$ hours active runtime
 - Message time = $45.1 / 2 = 22.55$ hours.
- Standby-Heavy Use (20% Talk, 80% Standby):
 - Normal Mode: $(47\text{mA} \times 0.2) + (7.2\text{mA} \times 0.8) = 15.16\text{mA}$
 - $1000\text{mAh} / 15.16\text{mA} = 66$ hours total operation
 - Message time = $66 \times 0.5 = 33$ hours (since 20% talk doubles effective message time per cycle).
 - Deep Sleep Mode: $(27.7\text{mA} \times 0.2) + (0.054\text{mA} \times 0.8) = 5.58\text{mA}$
 - $1000\text{mAh} / 5.58\text{mA} = 179.2$ hours total operation
 - Message time = $179.2 \times 0.5 = 89.6$ hours.

Baofeng UV-5R

- Stock Battery (1800mAh):
 - Active Use (80/20): $(500\text{mA} \times 0.8) + (20\text{mA} \times 0.2) = 404\text{mA}$
 - $1800\text{mAh} / 404\text{mA} = 4.46$ hours total operation
 - Message time = $4.46 \times 0.8 = 3.57$ hours.
 - Standby-Heavy Use (20/80): $(500\text{mA} \times 0.2) + (20\text{mA} \times 0.8) = 116\text{mA}$
 - $1800\text{mAh} / 116\text{mA} = 15.52$ hours total operation
 - Message time = $15.52 \times 0.2 = 3.1$ hours.
- Upgraded Battery (3800mAh):

- Active Use (80/20): $(500\text{mA} \times 0.8) + (20\text{mA} \times 0.2) = 404\text{mA}$
 → $3800\text{mAh} / 404\text{mA} = 9.41$ hours total operation
 → Message time = $9.41 \times 0.8 = 7.53$ hours.
 - Standby-Heavy Use (20/80): $(500\text{mA} \times 0.2) + (20\text{mA} \times 0.8) = 116\text{mA}$
 → $3800\text{mAh} / 116\text{mA} = 32.76$ hours total operation
 → Message time = $32.76 \times 0.2 = 6.55$ hours.
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Recharge Frequency Comparison

Here, we determine how many Baofeng battery swaps (stock 1800mAh or upgraded 3800mAh) are required to match the SRPT-03's runtime per single charge.

Active Use (80% Talk, 20% Standby)

- SRPT-03 (1000mAh):
 - Normal Mode: 12.8 hours message time.
 - Deep Sleep Mode: 22.55 hours message time.
- Baofeng UV-5R:
 - Stock 1800mAh: 3.57 hours message time.
 - To match SRPT-03 Normal Mode: $12.8 / 3.57 = 3.58$ swaps.
 - To match SRPT-03 Deep Sleep Mode: $22.55 / 3.57 = 6.32$ swaps.
 - Upgraded 3800mAh: 7.53 hours message time.
 - To match SRPT-03 Normal Mode: $12.8 / 7.53 = 1.7$ swaps.
 - To match SRPT-03 Deep Sleep Mode: $22.55 / 7.53 = 2.99$ swaps.

Standby-Heavy Use (20% Talk, 80% Standby)

- SRPT-03 (1000mAh):
 - Normal Mode: 66 hours total operation.
 - Deep Sleep Mode: 179.2 hours total operation.
 - Baofeng UV-5R:
 - Stock 1800mAh: 15.52 hours total operation.
 - To match SRPT-03 Normal Mode: $66 / 15.52 = 4.25$ swaps.
 - To match SRPT-03 Deep Sleep Mode: $179.2 / 15.52 = 11.55$ swaps.
 - Upgraded 3800mAh: 32.76 hours total operation.
 - To match SRPT-03 Normal Mode: $66 / 32.76 = 2.01$ swaps.
 - To match SRPT-03 Deep Sleep Mode: $179.2 / 32.76 = 5.47$ swaps.
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Key Takeaways

- Active Use (80% Talk, 20% Standby):
 - To match the SRPT-03's message time from a single 1000mAh charge:
 - Stock UV-5R (1800mAh): 3.58 to 6.32 swaps.
 - Upgraded UV-5R (3800mAh): 1.7 to 2.99 swaps.

- Standby-Heavy Use (20% Talk, 80% Standby):
 - To match the SRPT-03's total operation time from a single 1000mAh charge:
 - Stock UV-5R (1800mAh): 4.25 to 11.55 swaps.
 - Upgraded UV-5R (3800mAh): 2.01 to 5.47 swaps.
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Conclusion

The SRPT-03, with its 1000mAh battery, offers exceptional efficiency compared to the Baofeng UV-5R's stock 1800mAh and upgraded 3800mAh batteries. Users relying on the UV-5R would need to swap the stock battery up to 11.55 times or the upgraded battery up to 5.47 times to match the runtime of a single SRPT-03 charge, depending on the usage scenario. This makes the SRPT-03 an outstanding choice for those needing reliable, long-lasting performance without frequent battery charging.