

TECHNICAL BULLETIN NO. GPS-2005-020
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Effect of Standby Current on 1794AS0953 Battery Life

Affected Radio Products: AN/PRC-112B, AN/PRC-112B1, AN/PRC-112G

Topic:

This Technical Bulletin addresses the reduction in 1794AS0953 battery life that can result when batteries are stored attached to radios for long periods.

Background:

AN/PRC-112B, AN/PRC-112B1, AN/PRC-112G radios draw a small amount of battery current, even if the radio's Volume/Control knob is turned to the off position. The current is small, but a significant amount of battery life can be used up if the battery is connected for a long time. This reduction in battery life depends on the radio type, the storage temperature, and the energy capacity characteristics of the 1794AS0953 battery. These factors are discussed in more detail in the Appendix.

Battery Capacity Reduction

The following tables show the estimated time for the capacity of a 1794AS0953 battery to be reduced to either 75% or zero when connected to an inactive radio. The amount of time depends on the radio type and the storage temperature of the radio/battery. These figures are approximate and may vary in practice.

General Dynamics Mission Systems (GDMS) recommends not storing the battery at temperatures greater than +55°C, due to the significant degradation in battery life, as battery self-discharge increases significantly at extremely high temperatures.

Note

When the radio is off, the radio's fuel gauge cannot monitor battery usage. Therefore, when the radio is activated after a long storage period with the battery attached, the fuel gauge will display more battery life than there really is. The tables below may be used to estimate how much battery life actually remains.

AN/PRC-112B

Time to 75% of Battery Capacity

| | |
|-------|------------|
| -30°C | 3.0 Months |
| +21°C | 4.4 Months |
| +55°C | 4.1 Months |

Time to 0% Battery Capacity

| | |
|-------|-------------|
| -30°C | 11.9 Months |
| +21°C | 17.7 Months |
| +55°C | 16.4 Months |

AN/PRC-112B1

Time to 75% of Battery Capacity

| | |
|-------|-------------|
| -30°C | 8.4 Months |
| +21°C | 12.5 Months |
| +55°C | 10.3 Months |

Time to 0% Battery Capacity

| | |
|-------|-------------|
| -30°C | 33.8 Months |
| +21°C | 50.0 Months |
| +55°C | 41.1 Months |

AN/PRC-112G (J001)

| Time to 75% of Battery Capacity | |
|---------------------------------|------------|
| -30°C | 5.5 Months |
| +21°C | 8.2 Months |
| +55°C | 7.2 Months |

| Time to 0% Battery Capacity | |
|-----------------------------|-------------|
| -30°C | 22.2 Months |
| +21°C | 32.9 Months |
| +55°C | 28.7 Months |

AN/PRC-112G (J002, incl Hybrid)

| Time to 75% of Battery Capacity | |
|---------------------------------|------------|
| -30°C | 3.9 Months |
| +21°C | 5.8 Months |
| +55°C | 5.2 Months |

| Time to 0% Battery Capacity | |
|-----------------------------|-------------|
| -30°C | 15.5 Months |
| +21°C | 23.0 Months |
| +55°C | 20.8 Months |

GDMS Recommendations:

To maximize battery life, GDMS recommends the following:

- Remove the battery from the radio set when storing model AN/PRC-112B1 and AN/PRC-112G radios.
- Remove the battery from the radio set when storing model AN/PRC-112B radios for extended periods (greater than 90 days).¹
- Store batteries in cool, dry locations. For maximum storage life, the recommended temperature range is -40°C to +20°C (room temperature).
- If batteries must be connected to inactive radios, store the radios in cool, dry locations.

Contacts:

If you need additional information concerning this Information Bulletin or the AN/PRC-112G (all models), please contact: gdmsradiosupport@gd-ms.com

¹ This is in accordance with paragraph 5-2 of the Technical Manual, NAVAIR 16-35-PRC112-1-1 / T.O. 31R2PRC112-1-1, dated March 2003. Refer also to paragraph 3.7.4.1 of the Technical Manual for information on recharging the internal coin cell battery in model AN/PRC-112B radios after extended storage. The coin cell must be recharged prior to programming.

Appendix

Factors That Affect Battery Life

Radio Standby Current:

Standby or quiescent current is different for each radio type. The room-temperature current at 12 volts DC for each radio type is approximately as follows:

| <u>Radio Type</u> | <u>Standby Current</u> |
|---------------------------------|------------------------|
| AN/PRC-112B | 325 μ A |
| AN/PRC-112B1 | 115 μ A |
| AN/PRC-112G (J001) | 175 μ A |
| AN/PRC-112G (J002, incl Hybrid) | 250 μ A |

Battery Shelf Life:

A lithium manganese dioxide (LiMnO₂) battery such as the 1794AS0953 loses some energy during storage, even if it is not connected. It is assumed that the battery chemical processes that cause shelf-life losses will continue when a battery is connected to a radio and will add to the losses caused by the standby current drain. The degree of shelf-life loss depends on the storage temperature. The recommended storage temperature range for this battery is from -40°C to $+20^{\circ}\text{C}$ for extended storage periods. Batteries may be safely stored at temperatures from -55° to -40°C and from $+20^{\circ}\text{C}$ to $+85^{\circ}\text{C}$ for periods up to 24 hours. Note that self-discharge will occur during storage at these extreme temperatures and will result in some permanent loss of capacity. Approximate storage losses for lithium batteries are as follows:

| <u>Temperature</u> | <u>Capacity Loss</u> |
|--|----------------------|
| -55°C | .8% in 24 hours |
| -40°C to 0°C | <.5% per year |
| 0°C to $+20^{\circ}\text{C}$ | <1% per year |
| $+20^{\circ}\text{C}$ to $+40^{\circ}\text{C}$ | 2% to 3% per year |
| $+40^{\circ}\text{C}$ to $+60^{\circ}\text{C}$ | 5% to 8% per year |
| $+85^{\circ}\text{C}$ | 14.4% in 24 hours |

Battery Capacity vs. Temperature

The energy capacity of a fresh 1794AS0953 battery is about 50 watt-hours at $+21^{\circ}\text{C}$ and 55°C . At -30°C , the capacity is reduced to about 34 watt-hours, a drop of 32% compared to room temperature.