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| Project: | **ike304** |
| Title: | **ike304 Battery Lifetime** |
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This document describes the expected battery lifetime of ike304 under various conditions.

Included are assumptions made for typical operation, the measurements were made on several ike304 units, and a number of suggestions are given for optimising battery life.

Measurement results indicate that ike304:

- Operates for around 5 hours with all instruments streaming
- Operates for approximately 9 hours with only the GPS streaming.
- Typical in field operation expected battery life of around 8 hours.

| Version | Date | By | Comments |
|---|---|---|---|
| 0.4 | 14/08/06 | LT | Review |
| 0.3 | 14/08/06 | JG | Repeated tests with multiple units to improve confidence in results. |
| 0.2 | 08/08/06 | JG | Updates after peer review |
| 0.1 | 07/08/06 | JG | Document created |

# 1 Overview

The batteries within ike304 are designed to last 8 hours in typical operating conditions. Depending on the operation and configuration of ike304, this time may vary considerably. This document explains the assumptions made when defining typical operation, and summarises expected and measured battery life for various situations.

# 2 Typical Operation

The design of the battery systems within ike304 is based on the assumption that typically the GPS will be left on all of the time (so that the GPS fix is not lost), and all other instruments (Laser, Compass, and Camera) will be switched on periodically when a point is actually being captured. Typical operation is assumed to have the GPS on at all times, and turn the Laser, Compass, and Camera on for about 1 minute out of every 5 minutes (80% GPS only, 20% all instruments).

# 3 Measurements and analysis

## *3.1 Configurations tested*

The following configurations were tested:

1. Backlight on 100%, AABDCA in Capture screen (all instruments streaming)
2. Backlight on 50%, AABDCA in Capture screen (all instruments streaming)
3. Backlight on 0%, AABDCA in Capture screen (all instruments streaming)
4. Backlight on 100%, AABDCA in Initial screen (GPS only streaming)
5. Backlight on 50%, AABDCA in Initial screen (GPS only streaming)
6. Backlight on 100%, iPAQ in Today screen (No instruments in use)

## *3.2 Test Results*

The following table summarises the configurations tested, and shows expected battery life, and measured battery life.

| Config | Backlight | GPS | Laser | Compass | Camera | Expected Battery Life (hours:minutes) | Num Units Tested | Average Battery Life (hours:minutes) |
|---|---|---|---|---|---|---|---|---|
| 1 | 100% | On | On | On | On | 5:00 | 5 | 5:00 |
| 2 | 50% | On | On | On | On | 6:00 | 2 | 6:03 |
| 3 | 0% | On | On | On | On | 7:00 | 1 | 6:44 |
| 4 | 100% | On | Off | Off | Off | 8:30 | 5 | 8:50 |
| 5 | 50% | On | Off | Off | Off | 9:00 | 5 | 9:56 |
| 6 | 100% | Off | Off | Off | Off | 15:00 | 5 | 14:13 |

The battery life indicated is the time from when external power was removed, until the Laser, Compass, and GPS were no longer being powered. Note that the iPAQ will typically operate for another hour or so after the expansion battery is drained.

# 4 Conclusions

Based on these measurements, the battery is operating as intended.
Assuming that the GPS is on always, and the Laser, Compass, and Camera will be turned on for about 20% of the time, the following table summarises the expected battery life for Typical Usage with backlight on 100%.

| Configuration | Backlight | GPS | Laser | Compass | Camera | Weighting | Average Battery Life (hours:minutes) | Weighted Battery Life (hours:minutes) |
|---|---|---|---|---|---|---|---|---|
| All instruments | 100% | On | On | On | On | 20% | 5:00 | 1:00 |
| GPS Only | 100% | On | Off | Off | Off | 80% | 8:50 | 7:04 |
| **Expected Battery Life under Typical Operation:** | | | | | | | | **8:04** |

If ike304 is used under typical operating conditions as described above, the expected battery life is at least 8 hours.

# 5 Tips for maximising battery life

To maximise battery life while using ike304, the following guidelines are recommended:

- Minimise backlight brightness whenever possible.
- Configure both ‘On Battery Power’ and ‘On External Power’ brightness to the same level.
- Use auto backlight off.
- Leave the Data Capture Application in the Initial Screen when walking between capture locations (GPS only on).
- Turn the unit off when not in use.
- Minimise use WiFi or Bluetooth, and turn these features off when not in use.
- Minimise processor intensive operations.