MOBIT Telecom Ltd.

SAT406

User Manual

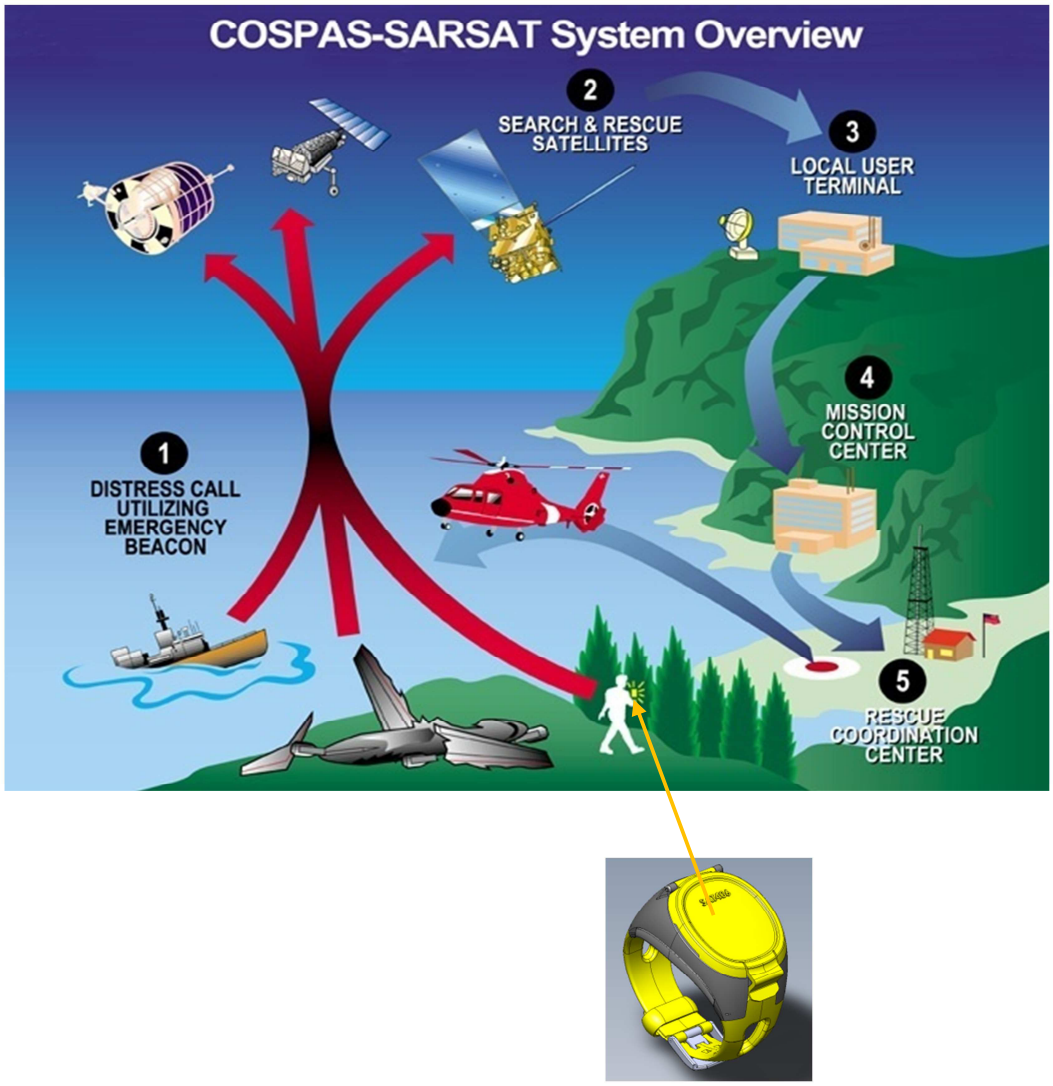
1. Scope

SAT406 is a Personal Locator Beacon (PLB) for Search and Rescue (SAR) of people in emergency, detectable and locatable by Cospas-Sarsat satellites.
Each SAT406 obtains a unique ID, which is part of the transmitted messages, and which is to be registered in the system data base, enabling identification of the PLB user by SAR units.

This document describes the installation, operation and user level maintenance of SAT406.

Important: SAT406 should be activated (SOS) only in case of life danger.

2. System Overview



When the SAT406 user is in life danger:

- SOS button is pressed and the PLB turns to transmit distress signals;
- Satellite payload detects SAT406 signals and relay them to the ground;
- Ground receiving stations receive satellite downlink signals, generate and forward distress alerts to Rescue Coordination Centers.
- Rescue Coordination Centers, typically one per country, launch and coordinate the actual SAR activity.

3. Registration and Installation

3.1 Registration

Upon purchasing SAT406 and before operating it, owners are required to register it with their National Authority. Please check the specific requirements for your particular country of registration.

During registration, the specific SAT406 ID, as well as its country code, are recorded in a national data base, associated with the owners name and contact information. When activated, SAT406 transmits its ID and country code, which can be used by Search and Rescue (SAR) forces to access the national data base, and use the acquired data to improve the efficiency of the SAR operation.

3.2 Installation

When there is no emergency,
SAT406 may be worn on the wrist

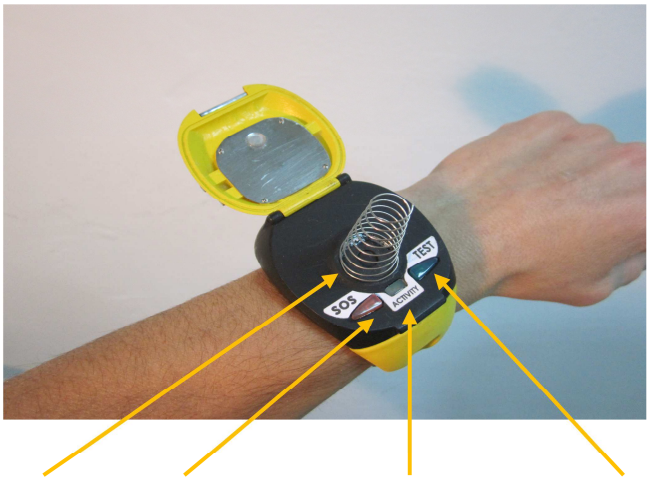
SAT406 is typically operated from the ground or above the ground

4. Operation

4.1 Activating the PLB

To activate the PLB (i.e. transmit SOS or TEST signals), the cover must be open.

Once the cover is open, the antenna extends, and the panel can be accessed.
Two press buttons and two LEDs on the panel implement the user interface.



Helical Antenna SOS button LEDs (orange and green) TEST button

It is strongly recommend that immediately after activation, the beacon shall be placed stationary on ground or above ground with antenna facing upwards, as shown on pictures in section 3.2.

4.2 Operation Modes

4.2.1 General

There are 4 operation modes which the user can select, through the SOS and TEST buttons:

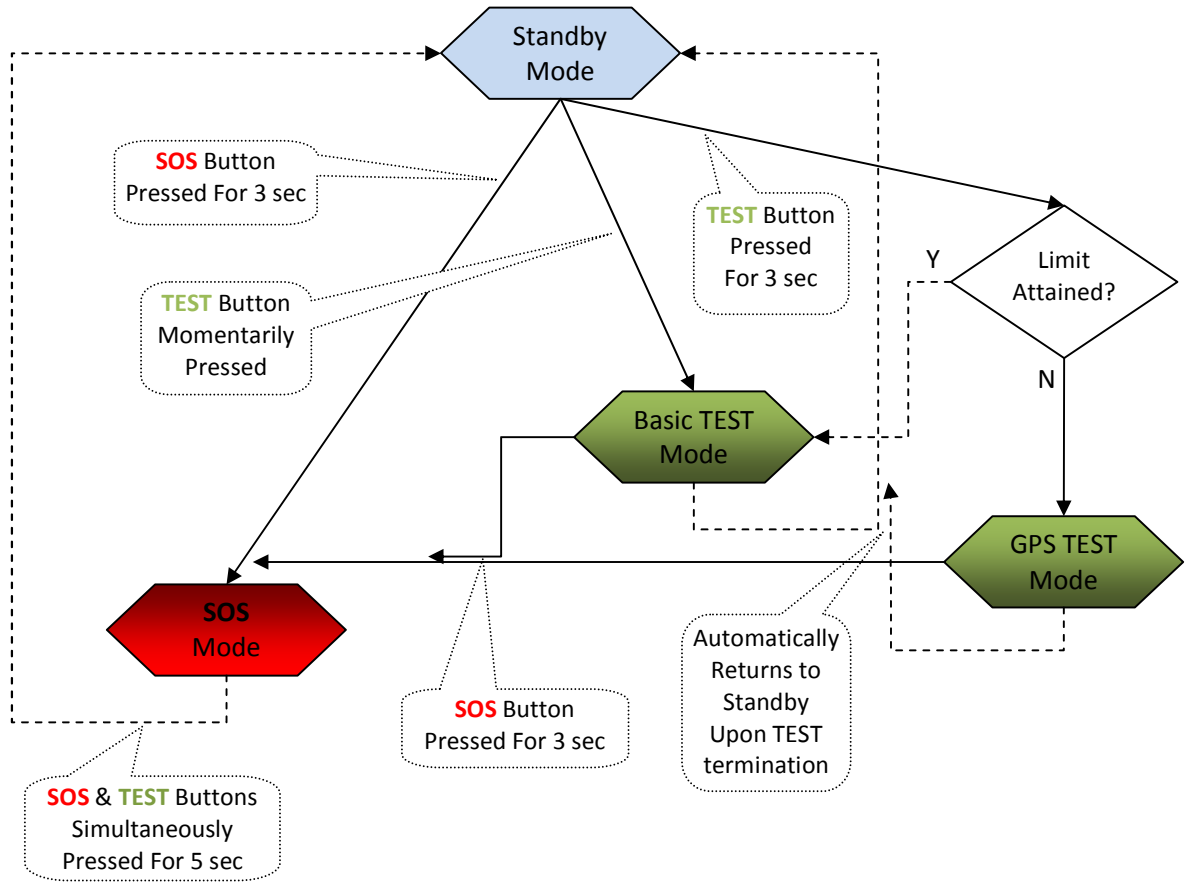
1. Standby – the PLB is not active.
2. Basic self Test – upon momentarily pressing TEST button, SAT406 transmits a single test message with default location, and indicates the PLB operational status by a LED.
3. GPS self Test – upon 3sec pressing TEST button, SAT406 transmits a single test message, with valid GPS location, and indicates the PLB operational status by a LED.
4. Distress (SOS) – upon 3sec pressing **SOS button**, SAT406 cyclically transmits short distress messages, approximately every 50 seconds.

If either self test indicates failure, the user should take the beacon to a certified lab, as soon as possible.

It is recommended to TEST the PLB periodically, but not more than 6 times a year.

The number of GPS self tests that the user may invoke is limited.
After this number is attained, the PLB denies invoking further GPS self tests (until replacing the battery).

Switching between Modes



4.2.2 Standby Mode

The default mode, where the PLB is not active, and LEDs are off.

4.2.3 Basic self TEST Mode

From Standby mode, if TEST button is shortly pressed, SAT406 enters the basic self test mode.
During that mode, the orange LED blinks slowly, once per 3-4 seconds, for about 3 minutes, then the orange LED blinks rapidly, for 4 seconds, and immediately after that the PLB transmits a single test message for 0.5 sec.
Just after transmission, the test result is momentarily indicated by a LED: the green LED if both the transmission power and transmission frequency are OK, otherwise - the orange LED.

4.2.4 GPS self TEST Mode

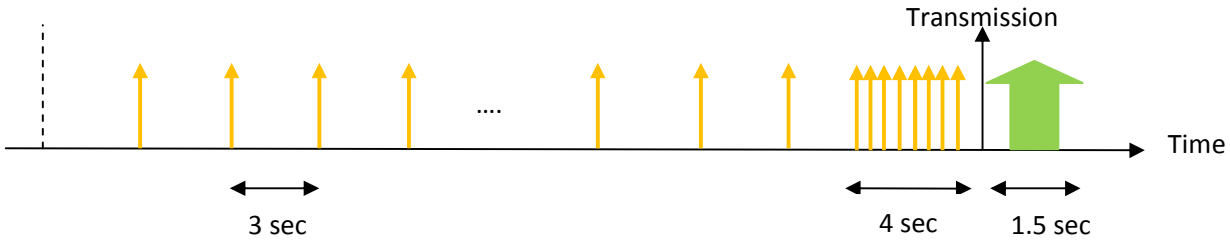
From Standby mode, if TEST button is pressed for 3sec, SAT406 enters the GPS self test mode.
During that mode, the orange LED blinks slowly, once per 3-4 seconds, for about 3 minutes, then the orange LED blinks rapidly, for 4 seconds, and if a valid position was acquired by the internal GPS receiver, the green LED blinks along with the orange LED during these 4 seconds.
Immediately after that the PLB transmits a single test message for 0.5 sec, containing the valid GPS position, if acquired.
Just after transmission, the test result is momentarily indicated by a LED: the green LED if both the transmission power and transmission frequency are OK, otherwise - the orange LED.

SAT406 enables 6 GPS self tests. After that, if pressing TEST for 3 seconds, the PLB will shortly turn on the orange LED, and will not launch the GPS test. This limit is reset when the battery is replaced.

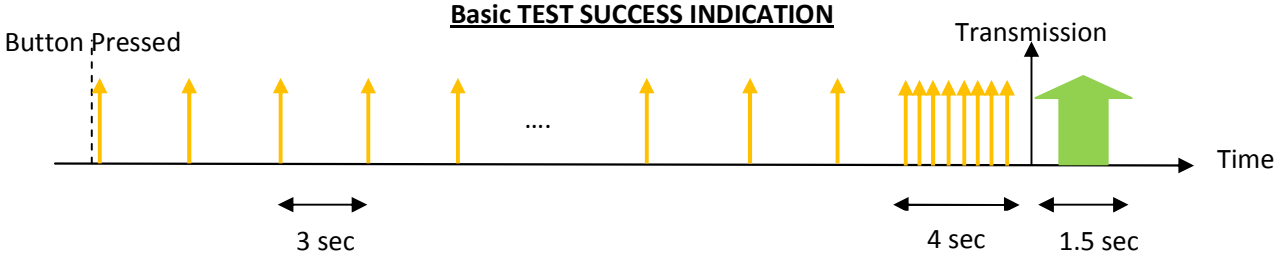
4.2.5 SOS Mode

If SOS button is pressed for 3sec, SAT406 enters the SOS mode.
During that mode, the PLB cyclically transmits distress messages, once per about 50 sec, endlessly.
The first SOS transmission is about 3 minutes after entering SOS mode.
Upon launching SOS, and between successive distress transmissions, orange LED blinks every 3-4 sec.
Just before transmission, the orange LED blinks rapidly, for 4 seconds, and if a valid position was acquired, the green LED blinks along with the orange LED.
Immediately after transmission, the green LED momentarily turns on, if both the PLB transmission power and transmission frequency are OK; otherwise, the orange LED is momentarily turned on.

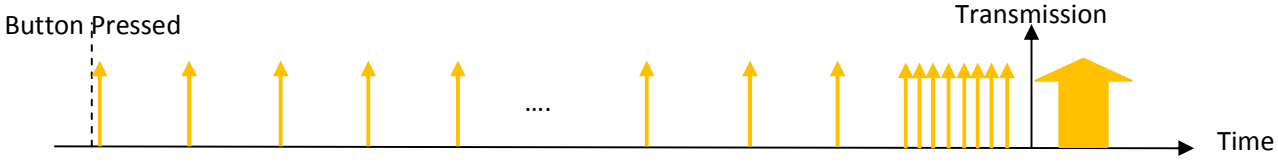
Yellow / Green LED INDICATIONS during SOS Transmission cycle



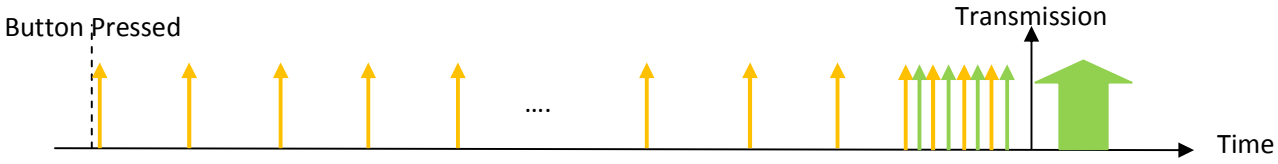
Basic TEST SUCCESS INDICATION



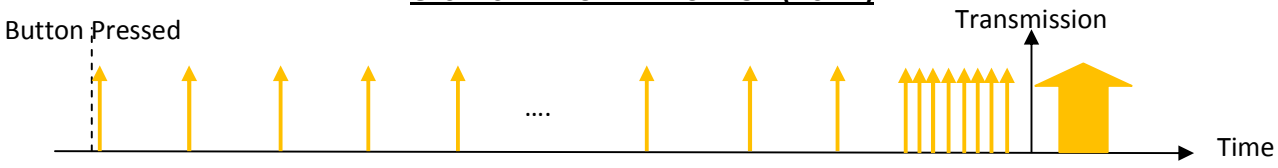
Basic TEST FAILURE INDICATION



GPS TEST SUCCESS INDICATION (Fix acquired)



GPS TEST FAILURE INDICATION (No Fix)



GPS TEST – LIMIT ATTAINED

4.3 Operation Considerations

4.3.1 On Ground and Above Ground

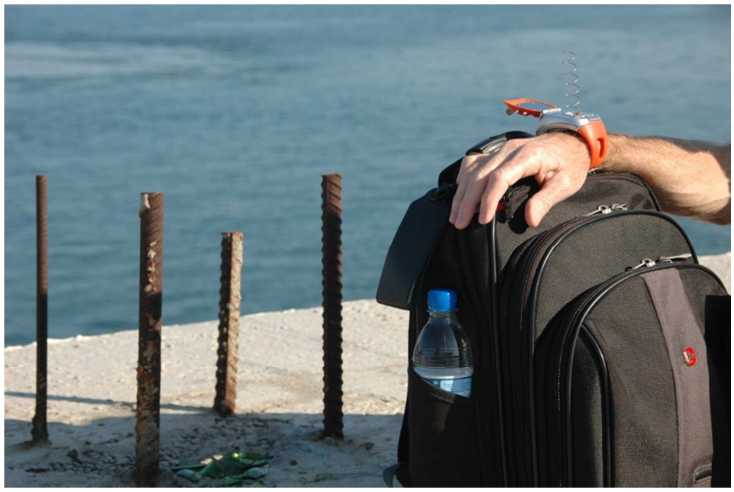
SAT406 may be operated on ground and above ground, as shown on the pictures below.

4.3.2 Placement and Antenna Orientation

During operation, it is strongly recommended to place SAT406 stationary on the ground or above the ground, in view of open sky, while the transmission antenna is in a vertical position, pointing towards the zenith. In exceptional conditions, SAT406 could be operated from the wrist, however it is still recommended to keep the beacon stationary, with the antenna in vertical position.
SAT406 is not effective when operating from the water.

SAT406 above Ground (off wrist)

SAT406 above Ground (on wrist)



SAT406 on the Ground

4.3.3 GPS

SAT406 contains a built-in GPS receiver, to acquire and report accurate self position.
The GPS antenna is installed under the panel, facing up.
Thus, SAT406 panel should not be painted, and should not be covered during operation.

4.3.4 Deactivating the PLB

From TEST mode: SAT406 automatically deactivates, i.e. returns to Standby mode, after TEST is over.

From SOS mode: SAT406 is deactivated by pressing both SOS and TEST buttons simultaneously, for 3 seconds.

An indication of the PLB been deactivated is that no LED turns on for about 10 seconds.
After deactivating the PLB, the cover can be closed, taking care that the antenna is properly stowed. In order to stow back the antenna, place the upper coil of the helical antenna by the center of the cover, and while closing the cover, slightly support the antenna with a finger.

Activation of the beacon in SOS mode even for a short period of time might lead to initiation of search and rescue operation. When a beacon is activated by mistake and there is no emergency situation with a threat to life, the beacon shall be deactivated immediately, and the user is responsible for timely notification of SAR authorities about the incident to prevent the un-necessary deployment of SAR forces and to avoid penalties.

Once SAT406 was set to SOS mode, even for a short time, it is not to be used again before the battery been replaced by a certified laboratory.

5. Maintenance

5.1 Battery Expiration

The PLB operates on an internal Lithium-manganese dioxide battery.
The battery replacement period is 2.5 years. The expiry date is marked on the PLB.
Just before expiry date, the user should take the PLB to a certified laboratory to replace the battery.

5.2 Other Cases Requiring Special Maintenance

SAT406 should be taken to a certified laboratory also if:

- More than 6 TESTs were performed on one battery.
- SOS mode was launched even for a short period.
- The green LED does not turn on at the end of TEST.
- A mechanical destruction is detected, particularly a damage to the antenna.

5.3 Warranty

Limited warranty: 1 year.

6. Brief Technical Specifications

6.1 Electrical

1. Transmission frequency: 406.040 MHz.
2. Transmission power: 5W +/- 2 dB.
3. Spurious emissions:
    - -20dBc at +/- 3KHz
    - -30dBc at +/- 7KHz
    - -35dBc at +/- 12KHz
    - -40dBc at +/- 24KHz and more
4. Antenna VSWR: max 1.5:1.
5. Antenna gain: -3dBi to 4dBi for at least 90% of the region: elevation 5° - 60° and azimuth 0° - 360°
6. Transmission time: 520ms.
7. Transmission repetition period: 47.5 – 52.5 sec.
8. Bit Rate: 400 bps.
9. Modulation: PSK, +/- 1.1 rad.
10. Minimum duration of operation (SOS): 24 hours.

6.2 Mechanical

1. Size (excluding antenna): 60 x 60 x 25 mm typically.
2. Weight: 95 grams typically.
3. Form Factor: wrist watch.
4. External Markings:
    - ID (15Hex)
    - Battery expiry date
    - Operation temperature (class 2 = -20°C to +55°C).
    - Minimum duration of continuous operation (24h).

6.3 Environmental

1. Operation Temperature: -20°C to +55°C (class 2).
2. Storage Temperature: -30°C to +70°C.