**Smith Aerospace**
Test Systems Inc.

# BG-105 Beacon Generator

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Quality Management System
REGISTERED TO ISO 9001:2008

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## General description

Beacon Generator BG-105 is high-precision simulator of Cospas-Sarsat emergency beacon messages (EPIRB, ELT, PLB operating in 406MHz frequency range). BG-105 allows to simulate up to five simultaneously operating beacons with messages overlay in time. The generator is intended to operate under PC control to provide the customization of main parameters of each simulated beacon on every of five channels by means of terminal program.

A critical part of the International Cospas-Sarsat system is the capability to run tests on the system. A beacon simulator is a critical part of the testing capability. It provides the capability:

• to ensure that the system is operating properly,

• to measure certain parameters of the system such as capacity,

• to validate the installation and operation of new LUTS and MCC's,

• to test new technology,

• to support POES and GOES spacecraft post launch tests, and

• to support Cospas-Sarsat spacecraft, LUT and MCC commissioning tests.

The BG-105 is a custom-made test instrument. Its purpose is to simulate the simultaneous activation of multiple distress beacons. The BG-105 contains five independent frequency generators, each capable of producing either a stream of time-multiplexed signal pulses from one or more beacons or a continuous wave output. The generators provide the capability to produce up to five concurrent beacon transmissions. The net effect is the production of multiple beacon signals with possible overlaps in both time and frequency. The sum of the outputs from the generators can be amplified by a high-powered RF transmitter before delivery to the appropriate antenna. The BG-105 control software provides the capability for configuring simulated beacon signals and complex test scenarios.

## Operation / Features

The BG-105 Beacon Simulator has the following operation capabilities:

• Generate Beacon Test Sequences pursuant to Cospas-Sarsat commissioning standards.

• Simulate a large number of beacons for system capacity tests.

• Vary the radio frequency and data content parameters associated with each beacon transmission to test the capability of the system and to detect and process beacons with different parameters.

• Add interfering carriers or white noise to the beacon transmissions to test the system for impacts of detection and processing from external in band interference.

• A self verification capability consisting of the processing capability of a GEOLUT. This allows the verification that the transmitted signals are correct.

• Simulate collisions between beacons; that is, beacons that overlap in time, in frequency or both to determine how the system reacts to overlapping beacons.

## Connection to PC or laptop

The BG-105 Simulator requires to be connected to any PC or laptop for proper operation. The connection is carried out by means of standard USB cable and special software. The minimal requirements are Microsoft OS, such as Windows XP, Windows Vista or Windows 7 or 8, at least 1 USB port. No special hardware configuration is required.

Also the special FTDI driver should be installed for proper connection. It can be downloaded at our web-site as well.

It is very simple to connect the tester to PC. Connect one side of the cable to tester and other to PC. Then install the drivers following the standard Windows wizard. After the driver is installed run the software. No installation is required. Just run the software and start operation.

## Technical description

### Operational Modes

Up to five independent Beacons (Channels) transmitted simultaneously. Operational Modes is as follows:

• Continuous Wave (CW)
• Continuous Message (CM)
• Burst – deterministic repetition period
• Burst – random repetition period
• Burst – External Triggered
• Burst – Manual Triggered

### Individual Beacon-Transmitter Parameters:

#### Digital Message Generator

• Repetition Period: 0,5…65 s, Resolution - 0,001 s
• Relative Message Offset: 0…16 s, Resolution - 0,1 s
• Total Time Transmission: 435.6…444.4 ms and 514.8…525.2 ms, Resolution - 0,1 ms
• Unmodulated Carrier Time: 158.4…161.6 ms, Resolution - 0,1 ms
• Bit Rate: 400bps ±1%

#### Modulator and 406 MHz Transmitter

• Frequency: 406.000000…406.100000 MHz, Resolution - better than 1 Hz
• Frq. short temperature variation: better than 2*E-09 (2 ppb)
• Frq. mean slope: better than 1*E-09 (1 ppb)
• Residual frequency variation: better than 3*E-09 (3 ppb)
• RF Output signal attenuation: 0…45 dB (0…85.5 dB max), Resolution - 0.5 dB
• Phase Deviation: 0.9…1.3 rad, Resolution - 0.1 rad
• Modulation Rise/Fall Time: 50…250 us, Resolution: 1 us
• Modulation symmetry: ≤ 0.05
• Burst-switch attenuation: ≥ 45 dB

### RF Output

Output Connector: SMA Female

Power Level (when 5 simultaneous beacons at max power): 0dBm ±1dB

Output Impedance: 50 Ω

VSWR: <1.3

### Safety and EMC

Safety class: I (EN61010-1)

EMC: Complies with EN61326 Class B.

### Power Supply

Power supply: 115/230V ± 10%, 50/60 ±3 Hz

Power consumption: <10 W

### Operating environmental conditions

Operating temperature: +5°C…+40°C

Storage temperature: -20°C…+40°C

Max. rel. humidity: 40%...60% (non condensing)

### Transport and storage environmental conditions

Temperature: -40°C to +60°C

Humidity: 5% to 95% (non-condensing)

Pressure: equivalent up to 15km altitude

### Mechanical

Dimensions (W x H x D): 485 x 132 x 405 (mm)

Weight: 8 kg

### Complete set of the BG-105 Beacon Simulator

• Beacon Generator BG-105 - main unit
• PC Cable (USB A – USB B 3.0m)
• Power supply unit
• PC Software (OS Windows)
• User manual (English)
• Package