



## COMPARISON OF 406 MHz AND 121.5 MHz DISTRESS BEACONS

The following table compares 406 MHz and 121.5 MHz beacons in these critical areas



### 406 MHz Beacons

#### **Coverage:**

- Global

#### **False Alerts:**

- All alerts come from beacons. Satellite beacon transmissions are digital, coded signals. Satellites process only encoded data, other signals are rejected.
- About 1 in 9 alerts are actual distress.
- Beacon-unique coding/registration allow rapid incident corroboration. Registration mandatory since 1994. 90% beacons registered. About 70% of false alerts are resolved by a phone or radio call to registration POCs prior to launching SAR assets.

#### **Alerting:**

- First alert warrants launch of SAR assets. Earlier launches puts assets on scene sooner--Average 3 hrs saved in maritime, 6 hrs in inland.
- Average initial detection/alerting by orbiting satellites is about 45 minutes.
- Average subsequent satellite passes every 60 minutes.
- Vessel/aircraft ID, point of contact information provided with alerts allows rapid verification or stand-down.
- Allows false alert follow -up to continuously improve system integrity/reliability.
- Near instantaneous detection by geostationary satellites. System provides world-wide coverage.

#### **Position Information:**

- 1-3 nm (2-5 km) accuracy on average. Position calculated by Doppler shift analysis.
- Less than 100 yard accuracy with GPS-equipped beacons. GPS position processed with initial alert. **Major beacon enhancement.**

#### **Locating the Target:**

- Superior alert (non-GPS) position accuracy limits initial search area to about 25 sq. nm (65 sq. km).
- GPS-equipped beacons reduce search area to a significantly smaller area.
- 121.5 MHz homing signal facilitates target location by radio detection finder equipped search units.

#### **Power Output:**

- 5.0 Watts (Strong power output)

#### **Cost:**

- Average cost is \$800 (GPS-equipped EPIRB)
- Average cost is \$300 (Personal Locator Beacon)
- Average cost is \$1500-3000 (ELT)

### 121.5 MHz Beacons

- Ground station dependent; ground stations have an effective radius of about 1800 nm (3300 km). Both ground station and beacon must be in satellite footprint. Current coverage is about two-thirds of the world.

- Only about 1 in 5 alerts come from beacons. Satellites cannot discern beacon signals from many non-beacon sources. Beacons transmit anonymously with no unique identifier. Non-beacon interferers have included ATM machines, pizza ovens, and stadium scoreboards!
- Fewer than 2 in 1000 alerts and 2 in 100 composite alerts are actual distress.
- Since 121.5 MHz beacons transmit anonymously, the only way to ascertain the situation is to dispatch resources to investigate -- a costly disadvantage.

- High false alert rate makes first-alert launch unfeasible. Absent independent distress information means RCCs must wait for additional alert information.
- Average initial detection/alerting by orbiting satellites is about 45 minutes.
- Average subsequent satellite passes every 60 minutes.
- Alerts are anonymous. 121.5 MHz analog technology not capable of transmitting data.
- No false alert follow -up capability.
- No GEO detection capability = no instantaneous detection.

- 12-15 nm (15-25 km) accuracy on average. Position calculated by Doppler shift analysis.
- No GPS capability.

- Initial position uncertainty result in 500 sq. nm (800 sq. km) search area on average.
- No GPS capability.
- 121.5 MHz homing signal facilitates target location by radio detection finder equipped search units.

- 0.1 Watt (Weaker power output) – Hard for satellites to detect.

- Average cost is \$200-400 (EPIRB)
- Average cost is \$600-1200 (ELT)
- 121.5 MHz beacons are out of manufacture and no longer listened for at the satellite.

For additional information contact NOAA-SARSAT at: (888) 212-SAVE or (301) 457-5678

Or you can visit our website at: [www.sarsat.noaa.gov](http://www.sarsat.noaa.gov)