



# RCC Messages

SAR Controllers Training 2015

3 – 5 March 2015

Tom Griffin

ERT, Inc.

USMCC Systems Analyst





# Overview

---



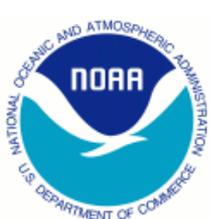
- **Summary of alert message types**
- Overview of alert message structure
- Revised RCC message manual
- MEOSAR RCC messages



# Summary of Alert Message Types

---

- Cospas-SARSAT standard Subject Indicator Type (SIT) 185 format messages
  - Defined in document Cospas-Sarsat (C/S) A.002
  - Sent by USMCC to most of its international SAR Points of Contact (SPOCs)
  - Sent by the Canadian MCC (CMCC) to U.S. RCCs during USMCC backup
- USMCC National RCC format messages (SIT 160 to 169)
  - Sent by USMCC to all US RCCs and a few international SPOCs
  - Are the main subject of this presentation



# Summary of Alert Message Types

---

## SIT 160

- Message Title: **406 BEACON UNLOCATED FIRST ALERT**
- Sent when a beacon is first detected but no encoded or Doppler position information is available
- Typically sent when a beacon is detected by a Geostationary satellite [Geostationary (GOES) satellites do not provide Doppler location]
- For US beacons, only sent if beacon is registered or associated with a special program, or the craft ID is encoded in the Beacon ID
- If US beacon registered, distributed based on homeport SRR in RGDB
- If US beacon not registered, distributed based on beacon type (EPIRBs to PacArea, ELTs and PLBs to AFRCC)
- Non-US beacons distributed to the responsible RCC based on country code in the Beacon ID; example: sent to San Juan RCC for Barbados-coded beacons



# Summary of Alert Message Types

---

## SIT 161

- Message Title: **406 BEACON LOCATED FIRST ALERT (AMBIGUITY UNRESOLVED)**
- Sent when a beacon is first detected with encoded or Doppler position information available, but ambiguity is not resolved
- Distribution based primarily on location (SRR)
- If unlocated (SIT 160) alert was sent, located first alert is also distributed to previous destination(s)
- Alerts for US special program beacons may be distributed specially
  - Adds to or replaces normal distribution
- When available, information on “likely image position” and the accuracy of Doppler position data can be used to help prosecute SAR cases
  - Doppler position accuracy information also provided on other SIT messages



# Summary of Alert Message Types

---

## SIT 162

- Message Title (1): **406 BEACON LOCATED FIRST ALERT UPDATE (AMBIGUITY UNRESOLVED)**
- Sent after Doppler first alert (SIT 161) when better A/B probability information is available from the same satellite pass
- Only sent if **new A** side probability is at least 30% higher than **previous A** side probability (e.g., **previous A** = 55%, **new A** = 85%)
- Only sent prior to ambiguity resolution



# Summary of Alert Message Types

---

## SIT 162

- Message Title (2): **406 BEACON DOPPLER POSITION MATCH (AMBIGUITY UNRESOLVED)**
- Sent after Doppler first alert (SIT 161) when both Doppler locations for a new satellite pass match the Doppler locations for a different (previous) satellite pass
- When both sets of Doppler locations match ambiguity resolution is delayed; A/B probabilities can be used to help prosecute SAR case
- Only sent prior to ambiguity resolution



# Summary of Alert Message Types

---

## SIT 163

- Message Title: **406 BEACON POSITION CONFLICT ALERT (AMBIGUITY UNRESOLVED)**
- Sent prior to ambiguity resolution, when Doppler or encoded positions for a beacon differ by more than 50 kilometers from another position for the beacon
- Indicates that at least one location is inaccurate
- Position conflict due to poor quality location data or a moving beacon
- Distribution based on new location(s)
- Also distributed to all previous recipients (to allow SAR coordination)
- After position conflict (SIT 163), missed passes and next passes are not computed again until ambiguity is resolved



# Summary of Alert Message Types

---

## SIT 164

- Message Title: **406 BEACON NOTIFICATION OF AMBIGUITY RESOLUTION**
- Sent when the ambiguity in Doppler (A/B) position is resolved by independent position data from another Doppler solution or encoded location that matches within 50 kilometers
- May be the first alert for a beacon when Doppler and encoded position match on the same alert
- Resolved (composite) position is a merge of all matching locations
- Encoded location matching the resolved position is usually more accurate than Doppler location
- If a beacon is moving, the resolved position lags behind actual location
  - View each elemental location individually



# Summary of Alert Message Types

---

## SIT 165

- Message Title (1): **406 BEACON COMPOSITE POSITION UPDATE**
- Sent after ambiguity resolved when new Doppler or encoded position matches resolved position within 50 kilometers
  
- Message Title (2): **406 BEACON COMPOSITE UPDATE WITH POSITION CONFLICT**
- Sent after ambiguity resolved when Doppler or encoded positions differ by more than 50 kilometers from the previous resolved position
- Repeated position conflicts (without a composite position update) probably means that the beacon is moving



# Summary of Alert Message Types

---

## SIT 166

- Message Title: **406 BEACON MISSED PASS/SITE STATUS REPORT**
- Sent when a satellite pass (at least 10 degrees above the horizon to the reported beacon position) fails to detect the beacon
  - Only sent if missed detect time is after last time beacon detected
  - Alert site closes after 3 missed passes
  - Missed passes not computed prior to ambiguity resolution if position conflict
- Sent when alert site closes due to age - 18 hours without a detection
- Sent when alert site closes due to USMCC Operator action
  - RCCs should request closure only if the beacon has been secured, and
    - at least 1 missed pass is received (if located) or 30 minutes with no message (if unlocated)
- Sent before or after ambiguity resolution
- When alert site closes in US service area, alert data sent to IHDB
  - Site closure message sent to US SPOCs includes incident feedback request



# Summary of Alert Message Types

---

## SIT 167

- Message Title: **406 BEACON DETECTION UPDATE**
- Sent when an unlocated alert is received:
  - With detect time at least two hours later than the most recent detect time sent to the RCC for the alert site
  - That **causes the missed pass counter to be reset** (missed pass counter is reset when detect time is later than time of missed detection)
- Sent to notify the RCC that the beacon is still active
- Sent before or after ambiguity resolution



# Summary of Alert Message Types

---

## SIT 168

- Message Title: **NOTIFICATION OF COUNTRY OF REGISTRATION**
  - Acronym is NOCR
- NOCR: sent to US RCC when a US-coded 406 MHz beacon is detected outside the US Search and Rescue Region (SRR), source of the NOCR is the MCC servicing the location of the alert.
- NOCR: sent to US RCC responsible for a foreign SRR when a beacon coded for that country is detected outside its SRR (e.g., sent to CGD07 for Bahamas-coded beacon)
- If US beacon is registered, distributed based on homeport SRR in RGDB
- If US beacon not registered, distributed based on beacon type (EPIRBs to PacArea, ELTs and PLBs to AFRCC)
- Allows US RCC to ensure that there is a SAR response for (US) beacon
- Sent for the first alert with Doppler or encoded location



# Summary of Alert Message Types

---

## SIT 169

- Message Title: **406 BEACON ENCODED POSITION UPDATE**
- Sent when the position encoded in the 406 MHz beacon message changes by more than 3 kilometers and less than 50 kilometers
- Only sent when there is no new Doppler location data
- Provides RCC with timely updates on beacon position, which may be particularly valuable in difficult SAR conditions, such as rough seas or mountainous terrain
- Primary source is Geostationary (GOES) satellite
  - GOES alert sent by US GEOLUT to the USMCC whenever encoded position changes
- May be sent before or after ambiguity resolution



# Overview

---

- Summary of alert message types
- **Overview of alert message structure**
- Revised RCC message manual
- MEOSAR RCC messages



# Overview of Alert Message Structure

---

- Messages fields are provided in a logical, consistent format
- Key message **sections** and fields are as follows:
  - **Message header:** message number, transmit time, message type
  - **Alert Data Block:** beacon ID, site ID, position, detect time, SRR
  - **406 MHz Beacon Decode Information:** country of registration, beacon type, craft ID, special program information, encoded position resolution
  - **406 MHz Beacon Registration Data:** beacon owner, contact information, vehicle/usage information, registry contacts for non-USA beacons
  - **Supporting Information:** alert recipients, previous detections, predicted detections
  - **Message Trailer:** end of message



# Alert Message Structure – Key Fields

## 1. Message Header



- **Message number**
  - On first line of message (e.g., **17127**)
  - Sequential per RCC: track to ensure all messages are received
  - Reference to discuss a specific message with USMCC
- **Subject Identifier Type (SIT) number**
  - 3-digit number in second line of message (e.g., **161**)
  - Along with **Message Title** (**highlighted** below), identifies alert message type (per summary of alert message types provided previously)

**/17127 00000/3660/12 010 0939**

**/161/366S**

**\*\*\*\*\* 406 BEACON LOCATED FIRST ALERT (AMBIGUITY UNRESOLVED) \*\*\*\*\***



# Alert Message Structure – Key Fields

## 1. Message Header (Cont'd)



- **Special Message Title**

- Only present in two cases: “UNRELIABLE BEACON (HEXADECIMAL) ID” and “SHIP SECURITY ALERT” . A sample of the latter is provided below.

- Precedes standard message title

```
/17127 00000/3660/09 270 0939
```

```
/161/CGOP
```

```
!!! SHIP SECURITY ALERT !!!!!!!!!!!
```

```
***** 406 BEACON LOCATED FIRST ALERT (AMBIGUITY UNRESOLVED) *****
```



# Alert Message Structure – Key Fields

## 2. Alert Data Block

### BEACON ID

- 15-character hexadecimal code identifies the 406 MHz beacon
- Used to reference USMCC registration (RGDB) data for the beacon
- Used to discuss SAR case with SAR agencies other than US RCCs or US SPOCs

### SITE ID

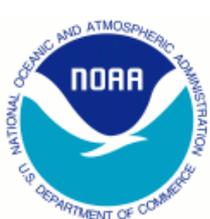
- 5 digit number assigned by USMCC identifies a beacon activation
- Used to discuss SAR case with USMCC, US RCCs, or US SPOCs

### SITE STATUS

- Only present on SIT 166 message  
**(406 BEACON MISSED PASS/SITE STATUS REPORT)**
- Indicates if the site is open or closed, and if closed, the reason for closure

**/BEACON ID: XXXXX XXXXX XXXXX      SITE ID: NNNNN      [Site Status]**

**[Ambiguity Resolution Summary]  
(NEW ALERT OR MISSED PASS INFORMATION)**



# Alert Message Structure – Key Fields

## 2. Alert Data Block (Cont'd)

### Ambiguity Resolution Summary (only present if ambiguity has been resolved)

- **LATITUDE** and **LONGITUDE** provided for composite/merged location
  - Doppler location normally accurate within 5 KM
  - Refined encoded location matching composite usually more accurate than Doppler location
    - Refined encoded location has a precision of 4 seconds (180 meters)
  - If beacon is moving, composite location lags behind actual location
- **DURATION** is hours between first detect time and last detect time
- **SRR** is the primary Search and Rescue Region (SRR)
- **BUFFER** is the secondary SRR (within 50 km buffer or overlap of primary SRR)
- **SRR** and **BUFFER** in Ambiguity Resolution Summary are usually based on first composite location

\*\*\*\*\* **AMBIGUITY RESOLVED TO THE FOLLOWING POSITION** \*\*\*\*\*

<b>LATITUDE</b>	<b>LONGITUDE</b>	<b>DURATION</b>	<b>PASSES</b>	<b>SRR</b>	<b>/BUFFER</b>
<b>38 45.5N</b>	<b>076 56.9W</b>	<b>001.5 HRS</b>	<b>003</b>	<b>AFRCC</b>	



# Alert Message Structure – Key Fields

## 2. Alert Data Block (Cont'd)

### New Alert Information – Data Solution line

- **PROB** (Probability) provided for Doppler (“**A**” and “**B**”) locations
  - “**A**” side assigned to location more likely to be real (ranges from 50 to 99)
  - “**B**” side assigned to location less likely to be real (ranges from 1 to 50)
  - “**A**” side location with very high “**A**” probability (e.g., 95) may be incorrect
  - A higher “**A**” probability location is usually more accurate (e.g., 90 vs. 55)
- **SOL** (Solution) is **A** (Doppler), **B** (Doppler), **E** (encoded), **N/A** (unlocated)
- **LATITUDE** and **LONGITUDE** provided for new Doppler or encoded position

\*\*\*\*\* DETECTION TIME AND POSITIONS FOR THE BEACON \*\*\*\*\*

PROB	SOL	LATITUDE	LONGITUDE	DETECT TIME	SAT	SOURCE	SRR	/BUFFER
53	A	35 25.2N	076 36.4W	27 0937 SEP	S7	CMCC	AFRCC	
47	B	31 42.7N	058 40.0W	27 0937 SEP	S7	CMCC	LANTAR	

DETECTION FREQUENCY: 406.0281 MHZ



# Alert Message Structure – Key Fields

## 2. Alert Data Block (Cont'd)

### New Alert Information – Data Solution line (Cont'd)

**DETECT TIME** provided in Universal Coordinated Time (UTC)

- For Doppler solutions, is computed Time of Closest Approach (TCA) of the satellite to beacon
  - May differ from individual beacon message detect times by 8 to 10 minutes (an RCC may receive an alert prior to the computed TCA)
- For non-Doppler LEOSAR solutions, is last beacon message detect time
- For GOES solutions, is first beacon message detect time
- **SAT** (Satellite): first digit is **S** (SARSAT), **C** (COSPAS), **G** (GOES), **M** (MSG), **I** (INSAT), **R** (Russian GEO)
  - Only SARSAT and COSPAS satellites can generate Doppler locations
- **SOURCE** of the solution may be US LUT (e.g., AK1) or foreign MCC (e.g., CMCC)

\*\*\*\*\* **DETECTION TIME AND POSITIONS FOR THE BEACON** \*\*\*\*\*

PROB	SOL	LATITUDE	LONGITUDE	DETECT TIME	SAT	SOURCE	SRR	/BUFFER
53	A	35 25.2N	076 36.4W	27 0937 SEP	S7	CMCC	AFRCC	
47	B	31 42.7N	058 40.0W	27 0937 SEP	S7	CMCC	LANTAR	

**DETECTION FREQUENCY: 406.0281 MHZ**



# Alert Message Structure – Key Fields

## 2. Alert Data Block (Cont'd)

### New Alert Information – Data Solution line (Cont'd)

- **SRR** is primary Search and Rescue Region (SRR) for the alert location
- **BUFFER** is secondary SRR for alert location, either a buffer or overlap of primary SRR (50 KM buffer between SRRs for US RCCs)
- EPIRB located in US Air Force SRR with buffer in US Coast Guard SRR is shown with the Coast Guard SRR as **SRR** and the Air Force SRR is removed from SRR list
- SRR/BUFFER usually indicates message destinations and responsible SRRs, **however**
  - Only 2 SRRs are listed – see Supporting Information for other message destinations
  - Alert location is irrelevant for Ship Security beacons (distributed by country code)
  - US special program beacons are sent specially (adding to or replacing normal distribution)
    - Special program shown in Beacon Decode Information (if applicable)
  - NOCR (SIT 168) distributed based on country code if location not in country's SRR
  - For alert manually sent by USMCC to another RCC, SRR on message is not changed

PROB	SOL	LATITUDE	LONGITUDE	DETECT TIME	SAT	SOURCE	SRR	/BUFFER
N/A	E	34 32.1N	069 11.4E	22 0731 FEB	M1	NMcc	<b>AFGHAN</b>	<b>TRMCC</b>



# Alert Message Structure – Key Fields

## 2. Alert Data Block (Cont'd)

### New Alert Information – DETECTION FREQUENCY

- Provided for Doppler solutions (from LEO satellites) and GOES solutions
- Not provided for LEO satellite solution without Doppler location (not reliable because the impact of Doppler shift on frequency is not removed, especially when the detected beacon bursts are far from the TCA)
- May be used to select 3-KHz channel for 406 MHz beacon homing equipment  
(e.g., select 406.028 MHz, 406.031 MHz, or 406.034 MHz)

***** DETECTION TIME AND POSITIONS FOR THE BEACON *****										
PROB	SOL	LATITUDE	LONGITUDE	DETECT	TIME	SAT	SOURCE	SRR	/BUFFER	
53	A	35 25.2N	076 36.4W	27 0937	SEP	S7	CMCC	AFRCC		
47	B	31 42.7N	058 40.0W	27 0937	SEP	S7	CMCC	LANTAR		

**DETECTION FREQUENCY: 406.0281 MHZ**



# Alert Message Structure – Key Fields

## 2. Alert Data Block (Cont'd)

### New Alert Information – LIKELY IMAGE POSITION

- Data line only provided when one new Doppler position (A or B) is determined to be an image (non-real) position prior to ambiguity resolution
- Occurs when a beacon was previously detected as an unlocated alert and exactly one new Doppler (A or B) position was not visible to the satellite that detected the unlocated alert
- When one position is an image (“A” in sample below), the other position may also be incorrect
- The determination of the “real” Doppler is independent of image determination
- This information may assist SAR prosecution prior to ambiguity resolution
- The sample below correlates to the illustration on the next page

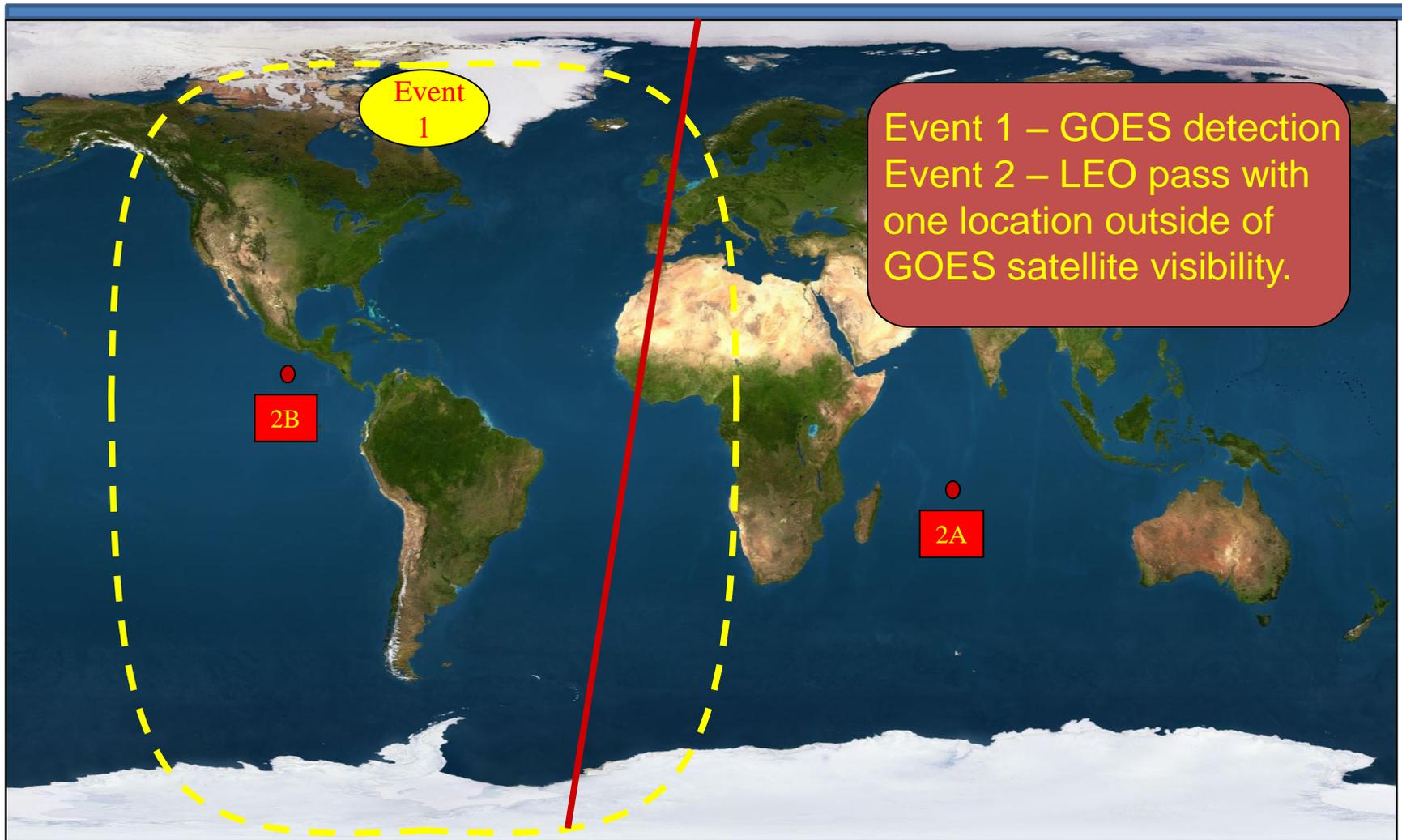
\*\*\*\*\* DETECTION TIME AND POSITIONS FOR THE BEACON \*\*\*\*\*

PROB	SOL	LATITUDE	LONGITUDE	DETECT TIME	SAT	SOURCE	SRR	/BUFFER
53	A	35 25.2N	076 36.4W	27 0937 SEP	S7	CMCC	AFRCC	
47	B	31 42.7N	058 40.0W	27 0937 SEP	S7	CMCC	LANTAR	

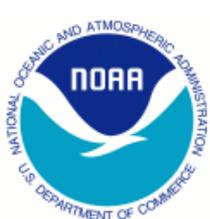
DETECTION FREQUENCY: 406.0281 MHZ  
LIKELY IMAGE POSITION: **THE A POSITION**

# Alert Message Structure –

## 2. Alert Data Block (Likely Image Position)



Sample Image Determination with GOES Satellite (likely image is the A position)



# Alert Message Structure – Key Fields

## 2. Alert Data Block (Cont'd)

### New Alert Information – Information on Doppler Position accuracy

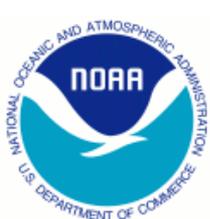
- Data line only provided when the USMCC determines that there is a high probability that the new Doppler position data is very accurate
- Accuracy determination based on technical parameters defined in document C/S A.002 (Appendix B.1 to Annex B) that are associated with a “nominal” Doppler solution
- Per document C/S T.005 (LEOLUT Commissioning Standard), “nominal” solutions are required to be accurate within 5 km in 95% of cases
- “Accuracy” indicator is absent if at least 1 technical parameter is poor for the Doppler solution or a large maneuver occurred in the last 24 hours for the satellite
- Information may assist SAR prosecution prior to ambiguity resolution

\*\*\*\*\* DETECTION TIME AND POSITIONS FOR THE BEACON \*\*\*\*\*

PROB	SOL	LATITUDE	LONGITUDE	DETECT TIME	SAT	SOURCE	SRR	/BUFFER
75	A	35 25.4N	076 36.7W	14 0247 FEB	S12	AK1	AFRCC	
25	B	31 42.1N	058 42.0W	14 0247 FEB	S12	AK1	LANTAR	

DETECTION FREQUENCY: 406.0281 MHZ

**HIGH PROBABILITY THAT THE NEW DOPPLER POSITION DATA IS ACCURATE WITHIN 5 KM**



# Alert Message Structure – Key Fields

## 3. Beacon Decode Information

- Information based on decode of 406 MHz Beacon ID
- **COUNTRY** identifies the country or territory responsible for the beacon registration
  - C/S website provides Registry Points of Contact for non US beacons; see “Contacts” at <http://www.cospas-sarsat.org>
  - some countries registrations held in C/S International Beacon Reg. Database (IBRD)
- **MID CODE** is 3-digit number assigned by ITU and associated with the **COUNTRY**
- **BEACON TYPE** shows the beacon type as EPIRB, ELT, PLB, or SHIP SECURITY
  - Shows if beacon is serialized (no CRAFT ID for serialized beacons)
  - For location protocol beacons, indicates if NATIONAL or STANDARD (STD)
  - CATEGORY I means that the EPIRB activation method is unknown (manual or automatic)
  - CATEGORY II means that the EPIRB can only be activated manually

\*\*\*\*\* BEACON ID CONTAINS THE FOLLOWING ENCODED INFORMATION \*\*\*\*\*

<b>COUNTRY</b> : USA	<b>BEACON TYPE</b> : ELT 24 BIT ADDRESS (STD)
<b>MID CODE</b> : 366	CRAFT ID : N203JP                      SPECIFIC BEACON: 0
MANUFACTURER:	MODEL :
24 BIT ADDR : HEX=A19DFE	HOMING : 121.5 MHZ
POSITION DEVICE: INTERNAL	POSITION RESOLUTION: NONE



# Alert Message Structure – Key Fields

## 3. Beacon Decode Information (Cont'd)

- **CRAFT ID** provides an alternate reference for registration data (not US RGDB)
  - Craft IDs include tail Number (e.g., **N203JP**), radio call sign and ship station ID
  - Use the radio call sign or MID code/ship station ID to access ITU registration data:  
[http://www.itu.int/online/mms/mars/ship\\_search.sh](http://www.itu.int/online/mms/mars/ship_search.sh)
- **SPECIFIC BEACON** identifies the specific beacon on a vessel or aircraft
  - Field value may be numeric or alphanumeric, depending on the beacon type
- **MANUFACTURER** and **MODEL** are only provided for US serialized user beacons
  - see <http://www.cospas-sarsat.org/beacons/typeApprovedList.htm> to get Manufacturer and Model and search on CSTA number, if CSTA (C/S Type Approval) number is provided in **MANUFACTURER** field

```
***** BEACON ID CONTAINS THE FOLLOWING ENCODED INFORMATION *****
COUNTRY      : USA                      BEACON TYPE: ELT 24 BIT ADDRESS (STD)
MID CODE     : 366                      CRAFT ID : N203JP                SPECIFIC BEACON: 0
MANUFACTURER:
24 BIT ADDR  : HEX=A19DFE              MODEL   :
POSITION DEVICE: INTERNAL              HOMING   : 121.5 MHZ
                                           POSITION RESOLUTION: 4 SECONDS
```

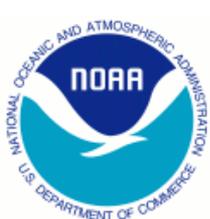


# Alert Message Structure – Key Fields

## 3. Beacon Decode Information (Cont'd)

- **SERIAL NUM** provides the Serial Number, if the beacon is serialized
  - **24 BIT ADDR** provides the 24-bit address; if present, it replaces serial number
- **HOMING** identifies the beacon's homer as 121.5 MHZ, SART (SAR transponder), OTHER or NONE
- **POSITION DEVICE** indicates the device type used to provide encoded position
  - INTERNAL (device internal to beacon)
  - EXTERNAL (device external to beacon, encoded position may be incorrect if beacon becomes separated from vessel)
  - NIL (information not available – beacon not location protocol or information is unreliable)
- **POSITION RESOLUTION** is the resolution of encoded position (details on next page)

```
***** BEACON ID CONTAINS THE FOLLOWING ENCODED INFORMATION *****
COUNTRY      : USA                BEACON TYPE: PLB SERIAL (STANDARD)
MID CODE     : 366                CRAFT ID :                SPECIFIC BEACON:
MANUFACTURER: ACR                MODEL   : UNKNOWN
SERIAL NUM   : 12345              HOMING   : 121.5 MHZ
POSITION DEVICE: NIL              POSITION RESOLUTION: 2 MINUTES
```



# Alert Message Structure – Key Fields

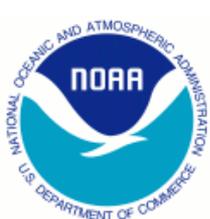
## 3. Beacon Decode Information (Cont'd)

### • POSITION RESOLUTION

- Depends on beacon protocol and usability of 2 data fields in beacon message protected by error correction codes (called Protected Data Field-1 and Protected Data Field-2)

- If encoded position not available, the value is NONE

Beacon Protocol	Only PDF-1 usable	PDF-1 and PDF-2 usable
Standard Location	15 MINUTES (at 45 degrees latitude, equals 10.6 nm longitude and 15.0 nm latitude)	4 SECONDS
National Location	2 MINUTES (at 45 degrees latitude, equals 1.4 nm longitude and 2.0 nm latitude)	4 SECONDS
User (not National)	NONE	4 MINUTES
User – National (CSEL)	1 DEG LAT, 15 DEG LONG	2 SECONDS
User – National (SEPIRB)	1 DEGREE	2 SECONDS



# Alert Message Structure – Key Fields

## 3. Beacon Decode Information (Cont'd)

- NOAA allocates groups of US coded beacons to US government **SPECIAL PROGRAMS**
  - Alerts usually distributed specially (adding to or replacing normal distribution)
- **PROGRAM** provides the name of the Special Program for a group of US beacons
  - Set to “**SEE JSETS**” if beacon registered in JSETS but not in a special program
  - Data Line only shown on message if beacon in JSETS or allocated to special program
- **PROGRAM BLOCK REGISTRATION ID** allows one beacon in the RGDB to represent a group of allocated beacons and to refer to a separate registry (e.g., JSETS)
  - If **BLOCK REG. ID** is 000000000000001, RGDB data is shown for specific beacon (if present) and “**SEE JSETS...**” is shown in next data line after **PROGRAM**.

```
***** BEACON ID CONTAINS THE FOLLOWING ENCODED INFORMATION *****
COUNTRY      : USA                BEACON TYPE: PLB SERIAL (NATIONAL)
MID CODE     : 366                CRAFT ID   :                SPECIFIC BEACON:
MANUFACTURER:                    MODEL      :
SERIAL NUM   : 123                HOMING     : 121.5 MHZ
POSITION DEVICE: INTERNAL        POSITION RESOLUTION: 4 SECONDS
PROGRAM: FBI                      PROGRAM BLOCK REGISTRATION ID: XXXXXXXX81FE0
```



# Alert Message Structure – Key Fields

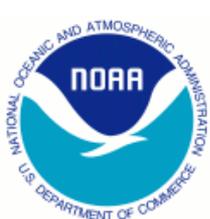
## 3. Beacon Decode Information (Cont'd)



- **Unreliable beacon message**

- Occurs if Beacon ID contains invalid or inconsistent information
- Do not rely on C/S website Beacon Decode (invalid/inconsistent information may not be apparent from 15 hex Beacon ID provided in RCC message)
- Alerts with unreliable beacon message distributed solely based on Doppler location
- Does not mean that the Doppler location is poor
- Has occurred for true distress beacon activations
- Indicated by special Message Title “UNRELIABLE BEACON (HEXADECIMAL) ID ”
- Indicated in beacon decode information as follows:

**NO DATA PROVIDED BECAUSE THE BEACON CODING IS NOT RELIABLE**

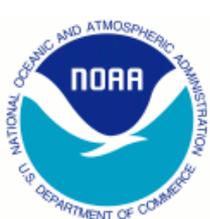


# Alert Message Structure – Key Fields

## 4. Beacon Registration Data



- For USA beacons, based on information in **US RGDB** for Beacon ID
  - Contains three sections
- Section 1 contains information about beacon owner and points of contact
  - Owner name, owner address, points of contact names and telephone numbers
  - Owner name “SEE JSETS” indicates that the beacon registration information is provided in the U.S. military JSETS database
- Section 2 contains information about beacon carriage and type of use
  - For ELTs: aircraft information is provided, including Leasing Agent, Aircraft Manufacturer, Model, Aircraft Use, Color, Radio Equipment, Capacity, Tail Number, Airport and Airport SRRs. ELT manufacturer and model number are also provided.
  - For EPIRBs: vessel information is provided, including Vessel Name, Type, Length, Capacity, Radio Call Sign, Registration Number, Color, Radio Equipment, InMarsat Number, Cell Number, Number of Life Boats, Homeport, and Homeport SRRs. EPIRB Manufacturer/Model Number and Activation Type (CAT1, CAT2) are also provided.
  - For PLBs: Radio Equipment, Vehicle Type, Specific Usage, PLB Manufacturer, and Model Number are provided.



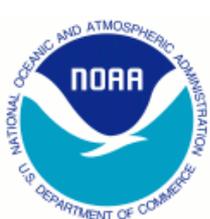
# Alert Message Structure – Key Fields

## 4. Beacon Registration Data (Cont'd)



- Section 3 provides Registration Dates, Remarks (from beacon owner or RCC), and Special Status information
  - SPECIAL STATUS indicates if beacon is reported as SOLD, STOLEN, REPLACED, OUT OF SERVICE, LOST, RECODED, or DESTROYED
  - Beacons in special status are usually unavailable for normal use or not in the owner's possession
  - View SPECIAL STATUS INFO for more information on special status condition
  - Roughly half of activated US registered beacons have Special Status information
- If a USA beacon beacon is not registered in **US RGDB**, this message section states:

**REGISTRATION INFORMATION IS NOT AVAILABLE IN THE USMCC DATABASE**



# Alert Message Structure – Key Fields

## 4. Beacon Registration Data (Cont'd)

- For a non-USA beacon this message section provides point of contact information for the associated beacon registry

**REGISTRATION INFORMATION AT**  
[Name of Registry Contact]  
**TELEX:**  
**AFTN:**  
**TELEPHONE:**  
**FACSIMILE:**  
**EMAIL:**  
**WEB:**

- If no point of contact information beacon registry is available for non-USA beacon, this message section states

**REGISTRATION INFORMATION – NIL**



# Alert Message Structure – Key Fields

## 5. Supporting Information

- **PREVIOUS PASS INFORMATION** lists previous passes that detected the beacon
  - Ordered by time pass first received at USMCC (most recent listed first)
  - Up to 4 satellite passes are listed
  - Solution Data fields (PROB, SOL, etc.) have same format as in alert data block
  - SOURCE “MULT” indicates that the pass was received from multiple sources
    - Merged (multiple source) location may differ from initial (single source) location
  - After ambiguity resolved, locations that do not match the composite are not reported
    - View alert data block in many messages in detect time order to detect moving beacon
- Sample below: position conflict before ambiguity resolved

### PREVIOUS PASS INFORMATION:

PROB	SOL	LATITUDE	LONGITUDE	DETECT	TIME	SAT	SOURCE	SRR	/BUFFER
52	A	34 53.3N	136 14.2W	18 1438	FEB	S8	CMcc	PACARE	
48	B	27 04.3N	101 15.6W	18 1438	FEB	S8	CMcc	MEXTEL	
50	A	18 18.9N	098 29.8W	18 1347	FEB	S9	MULT	MEXTEL	
50	B	05 07.0N	039 14.2W	18 1347	FEB	S9	MULT	BRMCC	/FMCC
N/A	E	20 30.0N	100 30.0W	18 1356	FEB	G15	MULT	MEXTEL	

NEXT TIME SIGNAL SHOULD BE DETECTED: N/A



# Alert Message Structure – Key Fields

## 5. Supporting Information (Cont'd)

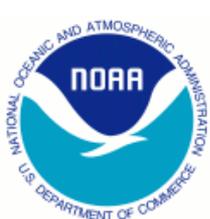
- **NEXT TIME BEACON SHOULD BE DETECTED**

- Gives the next two satellite passes that should detect the reported beacon location(s)
- Based on a polar orbiting (i.e., SARSAT or COSPAS) satellite pass having mutual visibility to the beacon location and a US LUT scheduled to track that pass
- **SOL** gives received solution (A, B, E or C) that is predicted to be detected
- **HIGH** VISIBILITY PASS (over 10 degrees) not received is counted as “missed”
- **LOW** VISIBILITY PASS (5-10 degrees) not received is not counted as “missed”
- Next pass not predicted before ambiguity resolved, if there is position conflict
- Next pass predictions only for resolved (composite) position after ambiguity resolved

PREVIOUS PASS INFORMATION: N/A

**NEXT TIME BEACON SHOULD BE DETECTED:**

SOL	DETECT TIME	SAT	SOURCE	VISIBILITY
A	15 0200 FEB	S7	AK2	HIGH
A	15 0239 FEB	S8	GU1	LOW (WILL NOT COUNT AS MISSED PASS)
B	15 0200 FEB	S7	AK2	HIGH
B	15 0240 FEB	S11	FL1	HIGH



# Alert Message Structure – Key Fields

## 6. Message Trailer

---



- Three lines indicate the end of message:

QQQQ

/LASSIT

/ENDMSG



# Overview

---

- Summary of Alert Message Types
- Overview of Alert Message Structure
- **Revised RCC Message Manual**
- MEOSAR RCC messages



# Revised RCC Message Manual

---

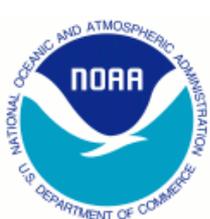
- Version 2.11 uploaded to NOAA website in Feb. 2015
- All revisions identified in “Document History” at the start of the manual



# Overview

---

- Summary of Alert Message Types
- Overview of Alert Message Structure
- Revised RCC Message Manual
- **MEOSAR RCC messages**



# MEOSAR RCC Messages

---

- Planned for distribution to RCCs by summer 2015
- Initial distribution before the MEOSAR system is operational
- Will enable “pre-IOC” use for SAR (per Policy and Procedures issued by Coast Guard and Air Force)
- Will enable RCC personnel to assess the impact of the MEOSAR system on SAR (to support C/S MEOSAR D&E test O-6)
- Planned for operational distribution in 2016



# MEOSAR RCC Messages

---

- Similar to current LEOSAR/GEOSAR messages
  - Will use SITs 170 – 179 (similar to SITs 160 – 169)
- A single Difference of Arrival (DOA) position computed by MEOLUT vs. Doppler A/B positions computed by LEOLUT
  - DOA position computed using differences in Time of Arrival (TOA) and Frequency of Arrival (FOA) data from multiple MEOSAR satellites
- Determination of real beacon position
  - Requires data from independent sources (for MEOSAR and for the operational LEOSAR/GEOSAR system)
  - deemed “Position Confirmation” vs. “Ambiguity Resolution” in LEOSAR/GEOSAR system (no A/B position ambiguity with a single DOA position).



# MEOSAR RCC Messages

---

- Next Pass/ Missed Pass Information will not be provided
  - In current system, based on pass schedules created by USMCC for U.S. LEOLUTs (in contrast, U.S. MEOLUTs generate their own pass schedules)
  - Multiple MEOSAR satellites should always be in view of beacon location, making next pass/ missed pass information superfluous
- Prior to MEOSAR operational phase (pre-IOC)
  - MEOSAR data processed independently of LEOSAR/GEOSAR data
  - DOA Position matching (e.g., position confirmation) threshold is 10 km vs. 50 km for LEOSAR Doppler position (e.g., ambiguity resolution)
- During MEOSAR operational phase
  - MEOSAR and LEOSAR/GEOSAR data will be merged (e.g., DOA position may be confirmed by a Doppler position)
  - Proposed DOA and Doppler Position matching threshold is 20 km



# MEOSAR RCC Messages

---



- Contact Information
- Tom Griffin
  - [Tom.Griffin@noaa.gov](mailto:Tom.Griffin@noaa.gov)
  - 301 817-4532