



RCC Messages

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Overview

- Summary of alert message types
- Revised RCC Message Manual
- Overview of alert message structure




Summary of Alert Message Types

- Cospas-SARSAT standard Subject Indicator Type (SIT) 185 format messages
 - Defined in document Cospas-Sarsat (C/S) A.002
 - Further described in document C/S G.007 (Handbook on Alert Messages for RCCs and SPOCs)
 - Sent by the USMCC to most of its international SAR Points of Contact (SPOCs)
 - Sent by the Canadian MCC (CMCC) to US RCCs and SPOCs during USMCC backup. *Note: CMCC only processes LEO and GEO data*
- USMCC National RCC format messages
 - Sent by the USMCC to all US RCCs and a few international SPOCs
 - The focus of this presentation
 - Further described in the RCC Message Manual
 - SIT numbers 170 – 179 (FGBs) and SIT numbers 370 – 379 (SGBs)



Revised RCC Message Manual

- Version 5.1 uploaded to NOAA website in September 2023
 - See <http://www.sarsat.noaa.gov/documentation.html>
- This version includes updates for ELT(DT)s and SGBs
 - SGB ELT(DT)s operational as of January 2024
 - Updated table for LEO and GEO satellite codes that appear on the SIT messages
- **USCG and USAF liaisons are notified when the RCC Message Manual is updated and SIT 950 message sent to all RCCs** 



Overview of RCC Alert Message Structure

- Message 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, US special program information, encoded position resolution
 - **406 MHz Beacon Registration Data:** beacon owner, contact information, vehicle/usage information for USA beacons; registry contacts for non-USA beacons
 - **Supporting Information:** alert recipients, previous messages
 - **Message Trailer:** end of message



Overview of SPOC Alert Message Structure

- Message field layout differs from RCC messages
- Key content differences
 - **Message header:** SIT number always 185 (Title gives message type)
 - **Alert Data Block:** SRR, EHE for DOA position not provided*
 - Altitude given for DOA position (altitude reliability is not commissioned)
 - **Beacon Decode Information:** no US special program information
 - **406 MHz Beacon Registration Data:** no USA beacon registration data
 - **Supporting Information:** no information provided on alert recipients, previous alert message

**EHE provided in SIT 185 message only if the MEOLUT is commissioned for slow-moving beacon accuracy*



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., **171**)
 - Along with **Message Title** (**highlighted** below), identifies alert message type (per summary of alert message types provided previously)

/17127 00000/3660/17 010 0939

/171/366S

****** 406 BEACON INITIAL LOCATED ALERT ******



Alert Message Structure – Key Fields

1. Message Header (Cont'd)

- **Special Message Title**
 - Provided for “UNRELIABLE BEACON (HEXADECIMAL) ID”, “DISTRESS TRACKING ELT” and for “SHIP SECURITY ALERT”
Sample provided below
 - Precedes standard message title

/17127 00000/3660/17 004 0939

/171/CGOP

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

****** 406 BEACON LOCATED ALERT ******



Alert Message Structure – Key Fields

2. Alert Data Block

BEACON ID

- 15-character hexadecimal code identifies the FGB (see sample below)
- 23-character hexadecimal code identifies the SGB (XXXXXXXX XXXXXX XXXXXX XXXXX)
- 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 176/376 message (Site Status)
- Indicates if the site is open or closed, and if closed, the reason for closure
- The Site Status provided on next line with title “STATUS”
- New status “CLOSED – USER CANCELLATION” for ELT(DT)s and SGBs

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

[MCC Reference Position Summary]
(NEW ALERT INFORMATION)



Alert Message Structure – Key Fields

2. Alert Data Block (Cont'd)

MCC Reference Position Summary (*only present if position 'confirmed'*)

- **LATITUDE** and **LONGITUDE** provided for composite/merged location
 - Doppler location normally accurate within 5 KM (95% for nominal solutions)
 - DOA location required accuracy within 5 KM for early operations: 70% for 1 burst solutions, 90% within 20 minutes (DOA location accuracy for MEOLUTs not commissioned for slow moving beacon accuracy is often poorer for moving beacons)
 - Refined FGB encoded location (or SGB encoded location) matching MCC Reference Position usually more accurate than Doppler/DOA location
 - Refined FGB encoded location has a precision of 4 seconds (180 meters)
 - SGB encoded location has a precision of 18 meters
 - Between encoded position updates (non-ELT(DT) FGBs update every 5 to 20 minutes, or less frequently), encoded position may lag behind actual location for moving beacons
 - If beacon is moving, confirmed (composite) position lags behind actual location
 - USMCC MCC Reference Position only includes positions within last 1 hour, limits lag
- **DURATION** is hours between first and last detect times for the site



Alert Message Structure – Key Fields

2. Alert Data Block (Cont'd)

MCC Reference Position Summary (Cont'd)

- **SRR** is the primary Search and Rescue Region (SRR)
- **BUFFER** provides up to 2 secondary SRRs, within specified buffer (normally 50 km) or overlap of primary SRR
- **SRR** and **BUFFER(s)** in Summary usually based on the first MCC Reference Position

Sample MCC Reference Position Summary:

**** MCC REFERENCE POSITION ****

LATITUDE	LONGITUDE	DURATION	SRR	/BUFFER/BUFF_2
38 45.5N	076 56.9W	001.5 HRS	AFRCC	



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), **D** (DOA), **E** (encoded), or **U** (unlocated)
- **LATITUDE** and **LONGITUDE** provided for new Doppler, DOA or encoded position

Sample below (detect time format contains seconds of the minute)

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

PROB	EE	SOL	LATITUDE	LONGITUDE	DETECT TIME	SAT	NUM	SOURCE	SRR	BUFFER/BUFF_2
53	N/A	A	35 25.2N	076 36.4W	27 093702 SEP	S7	007	CMCC	AFRCC	
47	N/A	B	31 42.7N	058 40.0W	27 093702 SEP	S7	007	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** in Universal Coordinated Time (UTC) – *currently* truncated to minutes (HHMM)
 - 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)
 - For non-Doppler LEOSAR and MEOSAR solutions, is last beacon message detect time
 - For GEOSAR 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)
 - Set to “MEO” for MEOSAR satellites; the list of MEOSAR satellites is not provided
 - Only SARSAT and COSPAS satellites can generate Doppler locations
- **NUM** is number of detections (for LEOSAR/GEOSAR data is number of beacon bursts)
 - If “2” on Doppler alert, 2 LEOSAR bursts + GEOSAR frequency used, “A” probability set to 50
- **SOURCE** of the solution may be US LUT (e.g., AK3) or foreign MCC (e.g., CMCC)

```
**** DETECTION TIME AND POSITIONS FOR THE BEACON ****
PROB EE SOL LATITUDE LONGITUDE DETECT TIME SAT NUM SOURCE SRR BUFFER/BUFF_2
53 N/A A 35 25.2N 076 36.4W 27 093702 SEP S7 007 CMCC AFRCC
47 N/A B 31 42.7N 058 40.0W 27 093702 SEP S7 007 CMCC LANTAR
```



Alert Message Structure – Key Fields

2. Alert Data Block (Cont'd)

New Alert Information – Data Solution Line (Cont'd)

- **DETECT TIME** for Encoded Position
 - An FGB's time of satellite detection does not directly provide the time of encoded position update
 - An updated FGB refined position means the position was updated since time of previous refined position B refined position sent after a coarse position does not imply update in position, but may merely mean that the LUT has now succeeded in decoding all position data in the beacon message
 - Check the associated detect times to assess beacon movement
 - SGBs provide the time of encoded position update
- **Encoded Position Updates** - per document C/S T.001 (FGBs)
 - Encoded position may be updated as frequently as every 5 minutes (update not required for older beacons*)
 - Encoded position should be cleared from beacon message if it is not updated within 4 hours
 - After initial position, encoded position update required at least every 30 minutes until activation + 6 hours*
 - From 6 to 24 hours after activation, encoded position update required at least every 60 minutes*
- Beacon may fail to update the encoded position to reflect its new position because the beacon is unable to obtain sufficient satellite data due to obstructions of the beacon's view of the sky. In short, the encoded position will lag behind the actual position if the beacon is moving.

**Updates only required for beacons first submitted for C/S type approval after 1 Nov. 2015*



Alert Message Structure – Key Fields

2. Alert Data Block (Cont'd)

New Alert Information – Data Solution Line (new detect time format in red)

- **EE** (Expected Horizontal Error, ranges from 0 to 999)
 - Error (km) of DOA position expected within that amount with probability of 95% (+- 2%)
 - “0” means unavailable, “999” means greater than or equal to 999
 - Always provided to US Air Force RCCs and to LGM MCCs
 - Provided to SPOCs and USCG RCCs only if MEOLUT commissioned for slow moving beacon location accuracy; otherwise set to “N/A”.
- **NUM** (number of detections) - for MEOSAR alerts, each beacon burst detected by an antenna is counted separately (e.g., 2 bursts each detected by 3 antennas = 6 detections)
 - DOA position with more detections likely more accurate

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

PROB	EE	SOL	LATITUDE	LONGITUDE	DETECT TIME	SAT	NUM	SOURCE	SRR	BUFFER/BUFF_2
N/A	7	D	31 42.7N	058 40.0W	27 093701	SEP MEO	005	FL-MEO	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(s) 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 3 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 178 or 378) distributed based on country code if location not in the country's SRR
 - For alert manually sent by USMCC to another RCC, the SRR on message is not changed

PROB	EE	SOL	LATITUDE	LONGITUDE	DETECT TIME	SAT	NUM	SOURCE	SRR	/BUFFER/BUFF_2
N/A	N/A	E	34 32.14N	069 11.40E	22 0731 FEB	MEO	002	FMCC	GRMCC/TRMCC	



Alert Message Structure – Key Fields

2. Alert Data Block (Cont'd)

New Alert Information – DETECTION FREQUENCY

- Provided for Doppler, MEOSAR and GEOSAR solutions
- Not provided for LEOSAR solutions without Doppler location (unreliable because the impact of Doppler shift on frequency is not removed, impact especially large when the time of detected beacon bursts are far from the TCA)
- May be used to help correlate an “unreliable beacon ID” alert with another alert in the vicinity
- 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)
- Above 406.060 MHz used for system testing (not allocated for operational use)
- Is near 406.050 MHz for SGBs (whole 406 MHz band used for “spread spectrum” SGBs)

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

PROB	EE	SOL	LATITUDE	LONGITUDE	DETECT TIME	SAT	NUM	SOURCE	SRR	BUFFER/BUFF_2
53	N/A	A	35 25.2N	076 36.4W	27 093714 SEP	S7	007	CMCC	AFRCC	
47	N/A	B	31 42.7N	058 40.0W	27 093714 SEP	S7	007	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 position confirmation
- 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” beacon position is independent of image determination
- This information may help SAR prosecution prior to position confirmation

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

PROB	EE	SOL	LATITUDE	LONGITUDE	DETECT TIME	SAT	NUM	SOURCE	SRR	BUFFER/BUFF_2
53	N/A	A	35 25.2N	076 36.4W	27 093714 SEP	S7	007	CMCC	AFRCC	
47	N/A	B	31 42.7N	058 40.0W	27 093714 SEP	S7	007	CMCC	LANTAR	

DETECTION FREQUENCY: 406.0281 MHZ

LIKELY IMAGE POSITION: **THE A POSITION**



Alert Message Structure – Key Fields

2. Alert Data Block (Cont'd)

New Alert Information – MEOSAR First Detect Time

- First Detect Time for MEOSAR alert provided in new line after DETECTION FREQUENCY
- Last Detect Time for MEOSAR alert provided as DETECT TIME in alert solution data line (e.g., **14 024733** UTC FEB in sample below)
- USA MEOLUTs compute DOA position using data with time span up to 20 minutes (i.e., the FIRST DETECT TIME may remain the same, while the Last Detect Time changes for 20 minutes); more detections (i.e., larger NUM) usually results in a more accurate DOA position
- Update of FIRST DETECT TIME (to a time after the previous Last Detect Time) likely indicates that the MEOLUT has started to compute DOA position anew; this may correspond to a noticeable change in the DOA position

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

PROB	EE	SOL	LATITUDE	LONGITUDE	DETECT TIME	SAT	NUM	SOURCE	SRR	/BUFFER/BUFF_2
N/A	N/A	D	35 25.4N	066 36.7W	14 024733 FEB	MEO	044	FL_MEO	CGD05	

DETECTION FREQUENCY: 406.0281 MHZ

FIRST DETECT TIME: 14 022819 FEB



Alert Message Structure – Key Fields

2. Alert Data Block (Cont'd)

New Alert Information – Information on Doppler Position Accuracy

- 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 required to be accurate within 5 km in 95% of cases (red text in sample below is for a nominal solution)
- “NEW DOPPLER POSITION ERROR MAY EXCEED 5 KM DUE TO TECHNICAL PARAMETERS” set if at least 1 technical parameter is poor for the Doppler solution (i.e., solution not nominal)
- “NEW DOPPLER POSITION ERROR MAY EXCEED 10 KM DUE TO SATELLITE MANEUVER” set if a large satellite maneuver occurred in the last 24 hours, whether or not solution is nominal
- Information may assist SAR prosecution

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

PROB	EE	SOL	LATITUDE	LONGITUDE	DETECT TIME	SAT	NUM	SOURCE	SRR	/BUFFER/BUFF_2
75	N/A	A	35 25.4N	076 36.7W	14 024707 FEB	S12	011	AK1	AFRCC	
25	N/A	B	31 42.1N	058 42.0W	14 024707 FEB	S12	011	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

2. Alert Data Block (Cont'd)

New Alert Information – Information on Doppler/DOA Position Accuracy

- Statement “NEW DOPPLER POSITION DATA SUSPECT – OUTSIDE REPORTING SATELLITE FOOTPRINT” is provided if the USMCC determines that *either the A or B* Doppler position is outside the footprint of the reporting LEOSAR satellite
- Statement “NEW DOA POSITION DATA SUSPECT – OUTSIDE REPORTING SATELLITE FOOTPRINT” is provided if the USMCC determines that the DOA position is outside the footprint of any reporting MEOSAR satellite
- Positions outside of satellite footprint positions should be treated with caution
- Encoded position outside of satellite footprint is filtered (not included in message)

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

PROB	EE	SOL	LATITUDE	LONGITUDE	DETECT TIME	SAT	NUM	SOURCE	SRR	/BUFFER/BUFF_2
75	N/A	A	35 25.4N	076 36.7W	14 024714	FEB S12	011	AK1	AFRCC	
25	N/A	B	31 42.1N	058 42.0W	14 024714	FEB S12	011	AK1	LANTAR	

DETECTION FREQUENCY: 406.0281 MHZ

NEW DOPPLER POSITION DATA SUSPECT – OUTSIDE REPORTING SATELLITE FOOTPRINT
NEW DOPPLER POSITION ERROR MAY EXCEED 5 KM DUE TO TECHNICAL PARAMETERS



Alert Message Structure – Key Fields

2. Alert Data Block (Cont'd)

New Alert Information – Uncorroborated (Suspect) MEOSAR Alerts

- MEOSAR alert is “Uncorroborated” if beacon detected only on one burst, by only one satellite, and by only one MEOLUT (or only by multiple MEOLUTs networked with another MEOLUT)
- Act with caution since the beacon ID or encoded position may be unreliable
- Uncorroborated MEOSAR alerts have led to SARSAT rescues
- Per document C/S A.001, sent if MEOLUT meets “processing anomaly” requirements, beacon known to be registered or is an ELT(DT)
- Validity of a suspect alert can be corroborated by:
 - A subsequent alert for the beacon ID
 - Registration data for the beacon ID (US or foreign)
 - Registration data for the encoded craft ID (per Beacon Decode section)
 - Finding that the encoded C/S Type Approval Certificate (TAC) number provided in field “MANUFACTURER” of the Beacon Decode section is allocated (per C/S website). If TAC not allocated, the alert is likely a system anomaly (not a real beacon)
 - Match of reported Detection Frequency (if available) and the detection frequency for the beacon model (per C/S website)



Alert Message Structure – Key Fields

2. Alert Data Block (Cont'd)

New Alert Information – Suspect MEOSAR Alerts (Cont'd)

- “UNCORROBORATED MEOSAR ALERT” also sent to SPOCs in SIT 185 message
- LEOSAR or GEOSAR alert with 1 detection (NUM=1) may also be suspect, but there is no MCC rule to flag it. Can take similar actions to corroborate a LEOSAR or GEOSAR ‘suspect’ alert (e.g., check registration data, TAC #).

Sample provided below

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

PROB EE SOL LATITUDE LONGITUDE DETECT TIME SAT NUM SOURCE SRR /BUFFER/BUFF_2
N/A N/A E 24 45.00N 172 30.00E 09 180418 MAR MEO 001 FMCC CGD14

DETECTION FREQUENCY: NOT AVAILABLE

FIRST DETECT TIME: 09 180418 MAR

UNCORROBORATED MEOSAR ALERT



Alert Message Structure – Key Fields

3. Beacon Decode Information

- Based on decode of 406 MHz Beacon Message per document C/S T.001 (FGB) and C/S T.018 (SGB)
- **COUNTRY** identifies the country or territory responsible for the beacon registration
 - C/S website provides Registry Points of Contact for non-US beacons; see “406 MHz Beacon Registries” under “Contact Lists” at <https://www.cospas-sarsat.int/en/contacts-pro/contacts-details-all>
 - Registrations in C/S International Beacon Reg. Database (IBRD) for some countries
- **MID CODE** is 3-digit number assigned by ITU and associated with the **COUNTRY**
- **BEACON TYPE** shows the beacon type as EPIRB, ELT, ELTDT, PLB, or SHIP SECURITY
 - CRAFT ID only present for non-serialized beacons
 - NATIONAL, STANDARD (STD) or RETURN LINK indicates location protocol
 - CATEGORY I means that the EPIRB activation method is unknown (manual or automatic)
 - CATEGORY II means that the EPIRB can only be activated manually
 - Starts with “SGB” for SGBs
 - *Gives controlled (reliable) information on beacon type coded in the beacon message vs. free-form RGDB information provided by beacon manufacturer or beacon owner*

**** 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:	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:
<https://www.itu.int/en/ITU-R/terrestrial/mars>
- **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 (decoded) for US serialized user beacons
 - See <https://www.cospas-sarsat.int/en/beacons-pro/experts-beacon-information/approved-beacon-models-tacs> to get Manufacturer and Model and search on C/S Type Approval Certificate (TAC) number, if TAC number is provided in the **MANUFACTURER** field

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

COUNTRY : USA

MID CODE : 366

MANUFACTURER:

24 BIT ADDR : HEX=A19DFE

POSITION DEVICE: INTERNAL

BEACON TYPE: ELT 24 BIT ADDRESS (STD)

CRAFT ID : N203JP

SPECIFIC BEACON: 0

MODEL :

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** for FGBs, identifies the homer as 121.5 MHZ, SART (SAR transponder), OTHER, or NONE
 - For SGBs, the value is YES (available or active) or NIL (not available or not active)
- **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 is not location protocol or information is unreliable)
- **POSITION RESOLUTION** is the resolution of encoded/GNSS position (details on next two pages)

```
**** 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)



- **ACTIVATION TYPE** specified values are:
 - MANUAL
 - UNKNOWN
 - AUTOMATIC BY BEACON
 - AUTOMATIC BY BEACON (G-SWITCH/PROBABLE CRASH), and
 - AUTOMATIC BY EXTERNAL MEANS (AVIONICS)

The last two values only occur for ELT(DT)s

- **AIRCRAFT OPERATOR DESIGNATOR** – (i.e., 3LD) provided for ELT(DT) when available
 - 3LD is a key to access the ICAO Location of Aircraft in Distress Repository (LADR) for ELT(DT)s

```
**** BEACON ID CONTAINS THE FOLLOWING ENCODED INFORMATION ****
COUNTRY      : USA                BEACON TYPE: SGB ELTDT
MID CODE     : 366                CRAFT ID   :                SPECIFIC BEACON:
MANUFACTURER: TAC 43567          MODEL      :
SERIAL NUM   : 123                HOMING     : YES
POSITION DEVICE: NIL              POSITION RESOLUTION: 18 METERS
ACTIVATION TYPE: AUTOMATIC BY BEACON (G-SWITCH/PROBABLE CRASH)
AIRCRAFT OPERATOR DESIGNATOR: QAN
```

Alert Message Structure – Key Fields

3. Beacon Decode Information (Cont'd)



- **CRAFT ID TYPE** – only available for SGBs (when vessel/craft information encoded)
 - Craft ID type encoded in SGB separately from the beacon type [EPIRB, ELT, ELT(DT), or PLB]
 - If MMSI, a 2d field EPIRB-AIS ID provides the AIS ID (see example below).
Prefix “974” applies to all AIS IDs and is not encoded in the beacon message
 - If 24 BIT ADDRESS, a 2d field AIRCRAFT OPERATOR DESIGNATOR (3LD) may be available
 - If AIRCRAFT OPERATOR, a 2d field AIRCRAFT OPERATOR SERIAL NUMBER is provided
 - Other values are RADIO CALL SIGN, TAIL NUMBER and SYSTEM TEST
 - There is no 2d Craft ID field for these other CRAFT ID TYPEs

```
**** BEACON ID CONTAINS THE FOLLOWING ENCODED INFORMATION ****
COUNTRY      : USA                BEACON TYPE: SGB EPIRB
MID CODE     : 366                CRAFT ID   : 123456          SPECIFIC BEACON:
MANUFACTURER: TAC 12345          MODEL      :
SERIAL NUM   : 4133              HOMING     : YES
POSITION DEVICE: NIL             POSITION RESOLUTION: 18 METERS
CRAFT ID TYPE: MMSI
EPIRB-AIS ID: 974 2468
```

Alert Message Structure – Key Fields

3. Beacon Decode Information (Cont'd)



- NOAA allocates groups of US coded beacons to US government **SPECIAL PROGRAMS**
 - Special program beacon 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** set to “**BEACON TEST XXX...**” indicates beacon test (“**XXX...**” describes the test)
- **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**
 - [...] in sample message indicates that some details have been excluded

```
**** BEACON ID CONTAINS THE FOLLOWING ENCODED INFORMATION ****
COUNTRY      : USA                BEACON TYPE: PLB SERIAL (NATIONAL)
MID CODE     : 366                CRAFT ID   :                SPECIFIC BEACON:
MANUFACTURER:                    MODEL      :
[...]
PROGRAM: FBI                      PROGRAM BLOCK REGISTRATION ID: XXXXXXXX81FE0
```



Alert Message Structure – Key Fields

3. Beacon Decode Information (Cont'd)

- **Return Link Service** – notifies a 406 MHz beacon that an associated alert was sent to an RCC
 - Only available if BEACON TYPE is “RETURN LINK” (e.g., “EPIRB RETURN LINK”)
 - Only sent once the position is confirmed
 - Intended to inform persons in distress that a SAR authority is responding to the distress
 - RLS PROVIDER indicates the satellite constellation that provides the return link service (i.e., the RLSP)
 - Listed as GALILEO, GLONASS (future possibility), or UNKNOWN
 - TYPE-1 means the beacon can receive automatic acknowledgement from the RLSP
 - TYPE-2 (not supported by C/S) means the beacon can receive manual acknowledgement from the RLSP
 - After TYPE-#, “CAPABLE” means acknowledgment not received, or “RECEIVED” means ack received

```
**** BEACON ID CONTAINS THE FOLLOWING ENCODED INFORMATION ****
COUNTRY      : FRANCE                BEACON TYPE: PLB RETURN LINK
MID CODE     : 227                   CRAFT ID   :                SPECIFIC BEACON:
MANUFACTURER:                       MODEL      :
SERIAL NUM   : 135                   HOMING     : 121.5 MHZ
POSITION DEVICE: INTERNAL            POSITION RESOLUTION: 4 SECONDS
[...]
RLS PROVIDER: GALILEO
RLM TYPE-1 RECEIVED (AUTOMATIC ACKNOWLEDGEMENT)
```



Alert Message Structure – Key Fields

3. Beacon Decode Information (Cont'd)

- **FGB ELT(DT)** – additional information
 - If available, GNSS (encoded) position altitude information provided in meters and feet
 - Per C/S, the term GNSS POSITION replaces ENCODED POSITION
 - If available, encoded position currency information is provided in format
UPDATE TIME WITHIN [AAAA] OF DETECTION TIME” where “[AAAA]” is
“0 – 2 SECONDS”, “2 – 60 SECONDS” or “1 MINUTE TO 4 HOURS”

```
**** BEACON ID CONTAINS THE FOLLOWING ENCODED INFORMATION ****
COUNTRY      : FRANCE              BEACON TYPE: ELTDT A/C DESIGNATOR
MID CODE     : 227                 CRAFT ID   :                SPECIFIC BEACON:
MANUFACTURER:                     MODEL      :
SERIAL NUM   : 135                 HOMING     : 121.5 MHZ
POSITION DEVICE: INTERNAL          POSITION RESOLUTION: 4 SECONDS
ACTIVATION TYPE: AUTOMATIC BY EXTERNAL MEANS (AVIONICS)
AIRCRAFT OPERATOR DESIGNATOR (3LD): QAN
ALTITUDE OF GNSS LOCATION: BETWEEN 1600 AND 2200 METERS (BETWEEN 5200 AND 7200 FEET)
UPDATE TIME WITHIN 0 - 2 SECONDS OF DETECTION TIME
```



Alert Message Structure – Key Fields

3. Beacon Decode Information (Cont'd)

- **SGBs** – additional information
 - TIME OF GNSS POSITION UPDATE: DD MON HHMMSS (ELT(DT)s only)
 - TIME SINCE GNSS LOCATION GENERATED: nnnn MINUTES
 - ALTITUDE OF GNSS LOCATION: nnnnn METERS (yyyyyyy FEET)
 - ELAPSED TIME SINCE ACTIVATION: nn HOURS (if available, for values up to 63 hours)
 - REMAINING BATTERY CAPACITY: BETWEEN nn AND nnn PERCENT (if available)
 - BEACON CHARACTERISTICS PER TAC DATABASE PROVIDED IN A SEPARATE MESSAGE (if available, a separate SIT 956 message sent; related C/S maintained info based on TAC number)

```
**** BEACON ID CONTAINS THE FOLLOWING ENCODED INFORMATION ****
COUNTRY      : FRANCE              BEACON TYPE: SGB ELTDT
MANUFACTURER: TAC 234             MODEL:
[...]
TIME OF GNSS POSITION UPDATE: 25 APR 130459
TIME SINCE GNSS LOCATION GENERATED: 0 MINUTES
ALTITUDE OF GNSS LOCATION: 13072 METERS (42887 FEET)
ELAPSED TIME SINCE ACTIVATION: 0 HOURS
REMAINING BATTERY CAPACITY: BETWEEN 10 AND 25 PERCENT
BEACON CHARACTERISTICS PER TAC DATABASE PROVIDED IN A SEPARATE MESSAGE
```




Alert Message Structure – Key Fields

3. Beacon Decode Information (Cont'd)

- **Unreliable beacon message**
 - Occurs if Beacon ID contains invalid or inconsistent information
 - Due to beacon transmission, beacon miscoding, LUT or satellite problem
 - Do not rely on C/S website Beacon Decode (invalid/inconsistent information may not be apparent from the 15 hex or 23 hex Beacon ID provided in RCC message)
 - Alerts with unreliable beacon message are sent solely based on Doppler or DOA location
 - Does not mean that the Doppler or DOA location is poor
 - Has occurred for true distress beacon activations
 - If Detection Frequency is above 406.060 MHz, and Doppler or DOA location is near a reference beacon (e.g., buoy beacon) or beacon simulator, alert is likely due to a non-operational beacon signal (call USMCC)
 - 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, contains 3 sections based on information in **US RGDB** for Beacon ID
- 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, including Leasing Agent, Aircraft Manufacturer, Model, Aircraft Use, Color, Radio Equipment, Capacity, Registration Number, Fixed Survival Craft Description, Deployable Survival Craft Description, Airport and Airport SRRs. ELT manufacturer and model number are provided.
 - For EPIRBs: vessel information, including Vessel Name, Type, Length, Capacity, Radio Call Sign, Registration Number, Color, Radio Equipment, InMarsat Number, Cell Number, Radio Call Sign, AIS Number, Number of Life Boats, Homeport, Homeport SRRs, EPIRB Manufacturer/Model Number, Activation Type (CAT1, CAT2)
 - For PLBs: Radio Call Sign, Registration Number, Radio Equipment, AIS Number, Vehicle Type, Specific Usage, PLB Manufacturer, and Model Number.
- Review “free form” info provided by beacon owner (e.g., about the Survival Craft) in the context of the controlled/reliable info about BEACON TYPE in Beacon Decode section.



Alert Message Structure – Key Fields

4. Beacon Registration Data (Cont'd)

- Section 3 provides Registration Dates, Remarks (from beacon owner), and Special Status information
 - DATE FIRST REGISTERED only refers to the registration by the current beacon owner
 - SPECIAL STATUS indicates if beacon is reported as SOLD, STOLEN, REPLACED, OUT OF SERVICE, DUPLICATEID, 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
 - A significant portion (15 - 20%) of US registered beacons have Special Status information
- *If the REMARKS section ends with "See RGDB," then the information is truncated on the message (limit is 255 characters), and the RCC should access the RGDB to see the entire field*
- If a USA beacon is not registered in the **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
- The C/S International Registration Database (IBRD) web address is www.406registration.com
 - The IBRD is maintained by the C/S Secretariat (not available 24x7)
 - For countries with beacons in the IBRD and no national registry, **AFTN** and **TELEPHONE** contact information is provided for the USMCC (available 24x7)

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

- **USMCC PROCESSING TIME** – time message initially sent by USMCC
 - If more than 1 minute before the Send Time in Message Header, then the message was probably resent manually by USMCC
- **THIS ALERT MESSAGE IS BEING SENT TO**
 - Lists all destinations for the USMCC for this message
 - Lists final MCC destinations from the USMCC (not intermediate nodal MCC destinations) use this list and the SRRs for the new alert to coordinate SAR response with other agencies
 - Some destinations may not be in USMCC destination list (per US and C/S distribution rules)
 - Some alert messages (e.g., 406 BEACON DETECTION UPDATE) sent by USMCC are not defined in C/S
- **ALERT MESSAGES FOR THIS BEACON PREVIOUSLY SENT TO**
 - Lists all destinations for the USMCC for previous messages for this beacon activation (alert site)
 - May be used to contact SAR agencies that are already working on a SAR case
 - Set to “N/A” on the first alert sent for a beacon activation

```
**** SUPPORTING INFORMATION ****
```

```
USMCC PROCESSING TIME: 15 0104 FEB
```

```
THIS ALERT MESSAGE IS BEING SENT TO:
```

```
AFRCC,CGD08,CGD07
```

```
ALERT MESSAGES FOR THIS BEACON PREVIOUSLY SENT TO: N/A
```



Alert Message Structure – Key Fields

5. Supporting Information (Cont'd)

- **PREVIOUS MESSAGE INFORMATION** lists previous messages sent by USMCC for the beacon
 - Ordered by time messages received at USMCC (most recent listed first)
 - Up to 5 previous messages are listed
 - Solution Data fields (EE, SOL, etc.) have same format as in alert data block
 - SRR and BUFFER fields only shown prior to position confirmation (see sample below)
 - First alert to an RCC may show previous message information sent to another destination
 - Location data shown per original message (locations from multiple sources are not merged)
 - Once position is confirmed, if a Doppler position matches the confirmed position, the associated incorrect Doppler position is not reported (e.g., no “B” solution in sample below)
 - *Excludes the initial alert used to confirm position, if this initial alert was not sent by USMCC*
 - View alert data block in many messages in detect time order to help identify a moving beacon

Sample: position update after position confirmation (no “B” SOL, no SRR)

PREVIOUS MESSAGE INFORMATION:										
PROB	EE	SOL	LATITUDE	LONGITUDE	DETECT	TIME	SAT	NUM	SOURCE	
85	N/A	A	64 11.4N	151 22.3W	17	102323	FEB	S10	N/A	AK4
N/A	10	D	64 11.9N	151 21.9W	17	102514	FEB	MEO	004	CMCC
N/A	4	D	64 11.6N	151 21.8W	17	102054	FEB	MEO	005	FL-MEO
N/A	N/A	U	N/A		17	101928	FEB	G16	N/A	MD1



Alert Message Structure – Key Fields

6. Message Trailer

- Three lines indicate the end of message:

QQQQ
/LASSIT
/ENDMSG



Questions & Contact Info

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