COSPAS-SARSAT
MISSION CONTROL CENTRES
STANDARD INTERFACE
DESCRIPTION

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COSPAS SARSAT

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History

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1. INTRODUCTION

1.1 Overview

The purpose of the Cospas-Sarsat System is to provide distress alert and location data for search and rescue (SAR) by using spacecraft and ground facilities to detect and locate distress signals. The computed position of the distress and other related information is transmitted to appropriate SAR authorities.

Distress beacons (Emergency Locator Transmitters - ELTs, Emergency Position Indicating Radio Beacons - EPIRBs, Personal Locator Beacons - PLBs) transmit 406 MHz signals that are detected by Cospas-Sarsat polar-orbiting or geostationary spacecraft. These signals are relayed to Cospas-Sarsat ground receiving stations termed Local User Terminals (LUTs), which process the signals to determine the beacon location. Alerts are then relayed, together with location data, via a Mission Control Centre (MCC), either to another MCC or to the appropriate search and rescue point of contact (SPOC) to initiate SAR activities.

After the February 2009 phase-out of satellite processing at 121.5/243 MHz, the only frequency currently in use is 406 MHz.

Each MCC distributes Cospas-Sarsat messages according to the System document C/S A.001 “Cospas-Sarsat Data Distribution Plan” which defines the Cospas-Sarsat ground communication network. Cospas-Sarsat messages are sent in formats which permit the data to be automatically processed and transmitted. These message formats are referenced in this document C/S A.002 “Cospas-Sarsat Mission Control Centres Standard Interface Description”.

1.2 Document Objective

The Cospas-Sarsat System is operated in accordance with the 1988 International Cospas-Sarsat Programme Agreement and other related documents. The purpose of this document C/S A.002 (SID) is to describe the message formats and communication standards required to transmit data between Cospas-Sarsat MCCs. It is designed to facilitate information exchange between Cospas-Sarsat MCCs and between those MCCs and Rescue Coordination Centres (RCCs) of countries without MCCs.

This document specifies the structure and content of the information portion of Cospas-Sarsat messages regardless of the communication network to be used. For an operational implementation, the information portion will of necessity be framed with the addressing, header and trailer data required by the specific network protocol.

1.3 Required Implementation Data

The following information must be agreed upon between two agencies establishing a communications interface:

a. Network and protocols to be used.

b. Data rate.

c. Addressing/routing.

d. Packet size constraints.

e. Security (e.g., password, call identification and caller user data).

1.4 Reference Documents

a. C/S T.001 “Specification for Cospas-Sarsat 406 MHz Distress Beacons”.

b. C/S A.001 “Cospas-Sarsat Data Distribution Plan”.

1.5 Document Amendments and Updates

a. Amendments of message formats which affect all MCCs require recommendation for change by the Joint Committee (JC) and approval by the Cospas-Sarsat Council (CSC).

b. Formats and content of any messages which are exchanged between two MCCs on a bilateral basis only, may be amended by mutual agreement. Written notification of changes will be provided to the Cospas-Sarsat Secretariat for document control and formal amendment.

c. If any two MCCs find the need to introduce a new message format which is strictly used bilaterally, details will be submitted to the Cospas-Sarsat Secretariat who will assign a Subject Indicator Type (SIT) code to the message and publish the relevant amendment.

- END OF SECTION 1 -

2. COMMUNICATION CHANNEL INTERFACES

Two types of communications are required among the Cospas-Sarsat MCCs. Voice communication is required for general coordination and follow-up/confirmation of certain automated message transmissions. Data communication using formatted messages are required for the transfer of Cospas-Sarsat alert data and System information.

2.1 Voice Communication Facilities

Voice communications are made over the public dial-up telephone network or other available networks. Voice communication will not be discussed further in this document.

2.2 Data Communication Facilities

All text and data transmissions between MCCs, including alert messages and System information messages, shall be made in character text format only. The information transmitted in character format shall be sent in accordance with Table 4.3. Each respective MCC is responsible for:

a. making the necessary provisions for connecting to the appropriate communication networks; and

b. implementing MCC to MCC communications on the selected communication networks in accordance with the standards described in the Annexes to this document.

Participating countries may bilaterally choose to implement primary and alternate communications systems.

2.2.1 Cospas-Sarsat Message Text

All Cospas-Sarsat messages contain specified types of information. Each one of these information types, called a Message Field (MF), is described in greater detail in Annex B. These message fields are then grouped as shown in Annex C to produce the messages for the various Subject Indicator Types (SITs) listed in Annex A.

Originators of operational messages should endeavor to provide actual values in all fields indicated by the letter “A” in Tables C-1 and C-2. Fields indicated by the letter “X” must not be omitted, but may use default values if actual data is not available.

2.2.2 Subject Indicator Types (SITs)

The types of messages that are exchanged between the MCCs are listed in Annex A. Each type of message is identified by a SIT. The SIT is used to facilitate automatic message handling. Annex A lists the SIT code numbers and their assigned use. Annex C defines the content of each of the SIT messages.

2.2.3 Character Text

This specification is based on a text format using International Alphabet No.5 representation. To provide for use on networks using the International Telegraph Alphabet No.2 (ITA2) characters, a table of equivalence between the International Alphabet No.5 character representation and ITA2 is provided in Table 4.3.

- END OF SECTION 2 -

3. COMMUNICATION STANDARDS

The message formats presented in this document provide flexibility, efficiency, and compatibility among MCCs. They are independent of the communication network and protocol employed.

All MCC messages are formed as a series of octets (one octet is 8 bits, or one byte). A message may be made up of any number of octets, subject to the restriction in section 4.

The communication networks accepted for MCC to MCC communications are introduced below and the standards to which each MCC must adhere for their use in the Cospas-Sarsat Ground Segment are described in the Annexes to this document. Some of these networks provide an error detection and/or error correction capability for detecting and correcting data errors introduced by the communications system.

It is the responsibility of the MCC accepting data to implement adequate security and to co-ordinate security measures with other MCCs from whom it will receive data. All MCCs with an Internet connection must be protected by firewall technology.

3.1 X.25 Communications

The X.25 protocol provides an inherent error detection and correction capability required for reliable communications between Cospas-Sarsat MCCs. Guidance for using X.25 for MCC to MCC communications is provided at Annex E to this document.

While the X.25 network allows MCCs to establish real-time data links, the CCITT recommendations themselves do not specify how messages should be exchanged over these links. Therefore, Annex E provides the Cospas-Sarsat standards for exchanging data between MCCs. In addition to Annex E, MCCs are expected to follow the recommendations of the CCITT which can be found in the publication “CCITT Blue Book, (Volume VIII – Fascicle VIII.2) Data Communication Networks: Services and Facilities, Interfaces Recommendations X.1-X.32.

Due to the fact that X.25 services are being terminated in many countries and because of increasing user costs, X.25 is being phased-out for MCC to MCC communications.

3.2 File Transfer Protocol (FTP) Communications

FTP is an Internet based protocol that can be used to exchange messages between Cospas-Sarsat MCCs. It is highly reliable due to its inherent error detection and correction capability. Each MCC communicating via FTP shall comply with the applicable standards described in the Internet Engineering Task Group document RFC 959 - File Transfer Protocol. In

addition, MCCs communicating via FTP shall comply with the Cospas-Sarsat standards contained in Annex F.

All FTP servers used for the exchange of SIT messages should be linked exclusively using Internet VPNs that meet the Cospas-Sarsat standard provided at Annex G.

3.3 AFTN/AMHS Communications

The aeronautical fixed telecommunications network (AFTN) is a worldwide system that provides point-to-point communications for text messages. Access to the AFTN network is restricted to terminals that are operated in controlled locations, such as Air Traffic Control Centres and MCCs. The network operates at fairly low data rates (i.e. 300 or 9600 baud). Communications procedures for the AFTN are controlled by ICAO and are detailed in Annex 10 to the Convention on International Civil Aviation, Volume II, Communication Procedures. Guidance for using AFTN for MCC to MCC communications is provided at Annex H to this document.

AFTN is being upgraded by ICAO to the Aeronautical Message Handling System (AMHS). The transition from AFTN to AMHS will be implemented gradually to meet the requirements of Administrations. This transition is expected to enhance communication services in several regions of the world and should not negatively impact the use of AFTN communications by Cospas-Sarsat.

- END OF SECTION 3 -

4. MESSAGE FORMAT

4.1 Format Requirements

All Cospas-Sarsat messages shall be framed as shown in Figure 4.1. The structure of the frames is specified by the host network and does not impact the Cospas-Sarsat information transmitted.

For the entire message, including the required network framing, the number of characters on any one line shall not exceed 69. This does not include the New Line (NL) sequence described below.

Each line shall end with a new line (NL) sequence that is defined as CRCRLF or CRLF where

CR means Carriage Return - Hex 0D (i.e. zero D)

LF means Line Feed - Hex 0A (i.e. zero A)

The entire message including any network required framing shall not exceed 25,000 characters.

However, message originators may need to further limit message size depending on specific network constraints.

Format Frame	Contents
HEADER (network dependent)	Made available to satisfy the host network requirements if any. These contents must be designed into the application software of the agency using the network.
INFORMATION (SIT message)	Cospas-Sarsat message text as defined in this document, irrespective of the network in use.
TRAILER (network dependent)	As per HEADER above.

Figure 4.1: General Message Structure

Since some communication networks may add a Header that precedes the SIT message, MCCs must be able to identify the beginning of a SIT message. The presence of SIT Message Fields 1 - 3 shall be used to identify the beginning of a SIT message. That is, Message Fields 1 - 3 shall have the format "/nnnnn nnnnn/nnnn/nnn nn nnnn", where n is a numeral between 0 - 9.

4.2 Character Set

The set of International Alphabet No.5 characters that have an equivalent ITA2 character is the set of allowable characters for the INFORMATION frame of Figure 4.1.

To ensure compatibility, Tables 4.1, 4.2 and 4.3 provide details of those characters. Table 4.1 defines the International Alphabet No.5 characters while Table 4.2 illustrates ITA2 characters. Table 4.3 details the conversions between the two character sets.

Characters not found in Table 4.3 are not permitted.

The octothorpe (#) character shall not be used in the information frame of Cospas-Sarsat messages as it is a command character for some networks.

The "@" (AT sign) and "_" (underscore sign) are not accepted for AFTN communications. The "@" (AT sign)should be replaced by "(AT)" and the "_" (underscore sign) should be replaced by "(-)" in messages exchanged between MCCs.

Table 4.1

International Alphabet No.5 (IA5)

				b7 ->	0	0	0	0	1	1	1	1
	BITS			b6 ->	0	0	1	1	0	0	1	1
				b5 ->	0	1	0	1	0	1	0	1
b_4	b_3	b_2	b_1	Column->	0	1	2	3	4	5	6	7
				Row								
0	0	0	0	0	NUL	DLE	SP	0	@	P	\	p
0	0	0	1	1	SOH	DC1	!	1	A	Q	a	q
0	0	1	0	2	STX	DC2	"	2	B	R	b	r
0	0	1	1	3	ETX	DC3	#	3	C	S	c	s
0	1	0	0	4	EOT	DC4	$	4	D	T	d	t
0	1	0	1	5	ENQ	NAK	%	5	E	U	e	u
0	1	1	0	6	ACK	SYN	&	6	F	V	f	v
0	1	1	1	7	BEL	ETB	'	7	G	W	g	w
1	0	0	0	8	BS	CAN	(	8	H	X	h	x
1	0	0	1	9	HT	EM	)	9	I	Y	i	y
1	0	1	0	10	LF	SUB	*	:	J	Z	j	z
1	0	1	1	11	VT	ESC	+	;	K	[	k	{
1	1	0	0	12	FF	FS	,	<	L	/	l	|
1	1	0	1	13	CR	GS	-	=	M	]	m	}
1	1	1	0	14	SO	RS	.	>	N	^	n	~
1	1	1	1	15	SI	US	/	?	O	___	o	DEL

Table 4.2

International Telegraph Alphabet No.2 (ITA2)

Combination Number	Code Element 1	2	3	4	5	Character Allocations	
1	1	1	0	0	0	A	-
2	1	0	0	1	1	B	?
3	0	1	1	1	0	C	:
4	1	0	0	1	0	D	WHO R U
5	1	0	0	0	0	E	3
6	1	0	1	1	0	F	
7	0	1	0	1	1	G	
8	0	0	1	0	1	H	#
9	0	1	1	0	0	I	8
10	1	1	0	1	0	J	BELL
11	1	1	1	1	0	K	(
12	0	1	0	0	1	L	)
13	0	0	1	1	1	M	.
14	0	0	1	1	0	N	,
15	0	0	0	1	1	O	9
16	0	1	1	0	1	P	0
17	1	1	1	0	1	Q	1
18	0	1	0	1	0	R	4
19	1	0	1	0	0	S	'
20	0	0	0	0	1	T	5
21	1	1	1	0	0	U	7
22	0	1	1	1	1	V	=
23	1	1	0	0	1	W	2
24	1	0	1	1	1	X	/
25	1	0	1	0	1	Y	6
26	1	0	0	0	1	Z	+
27	0	0	0	1	0	Carriage Return	
28	0	1	0	0	0	Line Feed	
29	1	1	1	1	1	Letters Shift	
30	1	1	0	1	1	Figures Shift	
31	0	0	1	0	0	Space	
32	0	0	0	0	0	Not Used	

Table 4.3

Equivalents for Translation between International Telegraph Alphabet No.2 and International Alphabet No.5

ITA2 Combination No. (Table 4.2 refers)	IA5 Column/Row (Table 4.1 refers) Conversion at Interface					
	ITA2 Letters Case			ITA2 Figures Case		
1	A	-	4/1, 6/1	-	-	2/13
2	B	-	4/2, 6/2	?	-	3/15
3	C	-	4/3, 6/3	:	-	3/10
4	D	-	4/4, 6/4	ENQ	-	0/5
5	E	-	4/5, 6/5	3	-	3/3
6	F	-	4/6, 6/6			
7	G	-	4/7, 6/7			
8	H	-	4/8, 6/8	#	-	2/3
9	I	-	4/9, 6/9	8	-	3/8
10	J	-	4/10, 6/10	BEL	-	0/7
11	K	-	4/11, 6/11	(	-	2/8
12	L	-	4/12, 6/12	)	-	2/9
13	M	-	4/13, 6/13	.	-	2/14
14	N	-	4/14, 6/14	,	-	2/12
15	O	-	4/15, 6/15	9	-	3/9
16	P	-	5/0, 7/0	0/	-	3/0
17	Q	-	5/1, 7/1	1	-	3/1
18	R	-	5/2, 7/2	4	-	3/4
19	S	-	5/3, 7/3	.	-	2/7
20	T	-	5/4, 7/4	5	-	3/5
21	U	-	5/5, 7/5	7	-	3/7
22	V	-	5/6, 7/6	=	-	3/13
23	W	-	5/7, 7/7	2	-	3/2
24	X	-	5/8, 7/8	/	-	2/15
25	Y	-	5/9, 7/9	6	-	3/6
26	Z	-	5/10, 7/10	+	-	2/11
27	CR	-	0/13			
28	LF	-	0/10			
29	SI	-	0/15			
30	SO	-	0/14			
31	SP	-	2/0			
32	NUL	-	0/0			

- END OF SECTION 4 -

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ANNEXES
TO
COSPAS-SARSAT
MISSION CONTROL CENTRES
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ANNEX A

SUBJECT INDICATOR TYPES (SITs)

1. GENERAL

All Cospas-Sarsat messages are identified by a Subject Indicator Type (SIT) number according to the subject matter being transmitted.

Descriptions of the Subject Indicator Types are included in Tables A.1 and A.2.

2. SIT BLOCK ASSIGNMENT

To maintain uniqueness between the SIT numbers for all Cospas-Sarsat agencies, Table A.3 subdivides the range of possible numbers, from 000 to 999 by subject and application.

The proper application of this table will ensure standardization in numbers and usage to facilitate automatic message handling by the MCCs.

TABLE A.1

Subject Indicator Types for Alert Messages

SIT		Meaning	Page
121	406 INTERFERER NOTIFICATION	This message is used for notification of 406 MHz interferer signals.	C-8
122	406 INCIDENT (NO DOPPLER)	A 406 MHz alert message with no Doppler positions. An encoded position may or may not be available.	C-9
123	406 POSITION CONFLICT (ENCODED ONLY)	A 406 MHz alert message with no Doppler positions for which the encoded position differs by more than the match criteria from all previous positions.	C-9
124	406 AMBIGUITY RESOLUTION (ENCODED ONLY)	A 406 MHz alert message with no Doppler positions that identifies the resolved position of a 406 MHz alert.	C-9
125	406 INCIDENT	A beacon alert message computed from 406 MHz incident data. The message contains Doppler positions.	C-10
126	406 POSITION CONFLICT	A beacon alert message computed from 406 MHz incident data. The message contains Doppler and/or encoded position(s) which may differ from previous position(s) by the match criteria.	C-10
127	406 AMBIGUITY RESOLUTION	A 406 MHz alert message with Doppler positions that identifies the resolved position of a 406 MHz alert. It may or may not contain an encoded position.	C-10
132	406 NOTIFICATION OF COUNTRY OF REGISTRATION (ENCODED ONLY)	This message is used between MCCs to notify the country of registration of a 406 MHz beacon (NOCR). This message contains only an encoded position.	C-9
133	406 NOTIFICATION OF COUNTRY OF REGISTRATION	This message is used between MCCs to notify the country of registration of a 406 MHz beacon (NOCR). This message contains Doppler positions. It may or may not contain an encoded position.	C-10
185	COSPAS-SARSAT ALERTS	This message is used for alert messages and as NOCR message between MCCs and SPOCs.	C-11 to C-21

TABLE A.2

Subject Indicator Types for System Information and Narrative Messages

SIT		Meaning	Page
215	ORBIT VECTORS	Sarsat or Cospas spacecraft orbit position and time message.	C-22
216	ORBIT VECTORS	Sarsat or Cospas spacecraft orbit position and time message. Used in special conditions (e.g., after a satellite manoeuvre) when it is required that orbit vectors at the MCC and its associated LUTs be initialized. See C/S A.001, section 3.7.5.	C-22
415	SARP CALIBRATION	Time and frequency calibration for a SARP.	C-23
416	SARP TELEMETRY	SARP telemetry from a Sarsat spacecraft.	C-24
417	SARP-3 CALIBRATION	Time and frequency calibration for a SARP-3.	C-25
425	SARP OUT OF LIMIT	Warning message to indicate abnormal performance of the SARP.	C-24
435	SARP COMMAND	Command request for the SARP.	C-26
445	SARP COMMAND VERIFICATION	Verification of the execution (or non-execution) of a SARP command as requested by command message.	C-24
510	406 MHz SARR FREQUENCY CALIBRATION OFFSET	Offset between actual and 406 MHz SARR-provided beacon frequencies.	C-27
515	SARR TELEMETRY	SARR telemetry from a Sarsat spacecraft.	C-24
525	SARR OUT OF LIMIT	Warning message to indicate abnormal performance of the SARR.	C-24
535	SARR COMMAND	Command request for the SARR.	C-26
545	SARR COMMAND VERIFICATION	Verification of the execution (or non-execution) of a SARR command as requested by a SARR COMMAND message.	C-24
605	SYSTEM STATUS TO ALL MCCs	Narrative message transmitted to all MCCs to indicate changes in System status. System status messages include System element and System function failures, scheduled maintenance, integration or testing of new System elements, and the commissioning of new equipment or new capabilities of existing equipment.	C-24 & C-28 to C-32
721 and 722	Reserved for MEOSAR		
915	FOR MCC INFORMATION TRANSMISSION TO A SINGLE MCC	Narrative message for MCC to MCC operator. This is a free format message, except when a specific format is defined (Note 1).	C-24
925	406 BEACON REGISTRATION INFORMATION	This message is used between MCCs to provide 406 MHz beacon registration information.	C-33

Note 1: Free format applies only to the message text. The complete message must still be formatted as per the host communication networks procedures.

TABLE A.3

SIT Number Assignment

Subject Matter	Between Cospas-Sarsat MCCs	Internally by each Cospas-Sarsat Participant	Between Cospas-Sarsat MCCs and non Cospas-Sarsat Agencies	Future Growth
				000 - 099
INCIDENTS	100 - 149	150 - 179	180 - 199	
ORBIT	200 - 249	250 - 279	280 - 299	
				300 - 399
SARP	400 - 449	450 - 479	480 - 499	
SARR	500 - 549	550 - 579	580 - 599	
STATUS	600 - 649	650 - 679	680 - 699	
LUT	700 - 749	750 - 779	780 - 799	
				800 - 899
NARRATIVE	900 - 949	950 - 979	980 - 999	

Note: SIT for new messages other than those used internally by each Cospas-Sarsat participant must be coordinated with all Cospas-Sarsat MCCs before being placed in use.

- END OF ANNEX -

ANNEX B

MESSAGE FIELDS DESCRIPTION

1. GENERAL

All Cospas-Sarsat messages can be divided into a series of fields, each field containing unique information. Each Message Fields (MF) is described in this Annex in terms of possible characters and range of numbers.

All fields must be present when required for a specific SIT message; no positional field can be omitted from a SIT message.

Message formats and examples by SIT numbers are given in Annex C.

2. MESSAGE FIELD LIST

A detailed description of each Message Field is given in this Annex. Once it is known which MFs form a particular SIT, their corresponding formats are concatenated to form the information frame of the message.

This list is composed of four columns;

a. Message Field Number (MF#)
b. Message Field Name (Name)
c. Content
d. Character Text

2.1 MF#

The numbers in this column are for simplicity of reference in Annex C.

2.2 Name

This column contains the name of the message field.

2.3 Content

This column contains the value ranges and meanings of the numbers of each MF.

The listed default values are inserted in the field only when the MCC has no proper value to insert.

2.4 Character Text

This column contains the format for each MF. Note that for MF#1 to MF#44, fields are separated by a "/" inserted at the beginning of the field, while the elements within a field are separated by a space (indicated as "b"). For MF#45 to MF#63 all required "/" and spaces (b) are indicated where they are needed. Refer to the notes at the end of the list for more information.

TABLE B.1

Message Fields Description

MF#	NAME	CONTENT	CHARACTER TEXT	
1	MESSAGE NUMBER	CURRENT MESSAGE ORIGINAL MESSAGE RANGES = 00001 -> 99999	nnnnn nnnnn	(Note 1) (Note 2)
2	REPORTING MCC	(See www.cospas-sarsat.org)	nnnn	
3	MESSAGE TRANSMIT TIME	YEAR = 00 -> 99 DAY (JULIAN) = 001-> 366 UTC - HRS = 00 -> 23 MINS = 00 -> 59	nn nnn nnnn	
4	SIT	(SEE TABLE A.1 & A.2) RANGE = 000 -> 999	nnn	
5	DESTINATION MCC	(See www.cospas-sarsat.org)	nnnn	
6	SPACECRAFT ID	Sarsat = 001 -> 099 Cospas = 101 -> 199 GOES = 201 -> 220 Electro-L / Louch-5 = 221 -> 240 INSAT-2, INSAT-3 = 241 -> 260 MSG = 261 -> 280 GPS = 300 -> 399 Galileo = 400 -> 499 Glonass = 500 -> 599 (See www.cospas-sarsat.org for spacecraft status)	nnn	
7	ORBIT NUMBER	RANGE = 00001 -> 99999	nnnnn	
8	NUMBER OF ALERTS WITH DOPPLER POSITIONS	01 -> 99	nn	(Note 3)
9	NOT USED (previously Number of Images Reported)			
10	NUMBER OF ALERTS WITHOUT DOPPLER POSITIONS	01 -> 99	nn	(Note 3)

Note 1: The following legend applies:
all upper case = the actual transmitted character
a = all transmittable characters
h = Hexadecimal characters (0-9, A-F)
s = sign symbol, plus (+) or minus (-)
n = numerals 0 to 9
b = space.

Note 2: If the outgoing message is not a retransmission, "00000" will be inserted as the original message number.

Note 3: Ensure the 25,000 character transmission limit is not exceeded.

Table B.1 (Cont.)

Message Fields Description

MF#	NAME	CONTENT	CHARACTER TEXT
11	SOURCE ID	(See www.cospas-sarsat.org)	nnnn
12	LOCAL / GLOBAL FLAG	LOCAL = + GLOBAL or LOCAL&GLOBAL = -	sn
	FREQUENCY BAND	BAND 1 - not used 2 - not used 3 - not used 4 - 406 SARP * 5 - 406 COMBINED LEO/GEO WITH SARP 6 - 406 COMBINED LEO/GEO WITH SARR 7 - 406 COMBINED LEO/GEO WITH SARP AND SARR 8 - 406 SARR 9 - 406 COMBINED SARP AND SARR	
13	BIAS (Hz)	- 30000.0 -> + 75000.0 DEFAULT VALUE = +99999.9	snnnnn.n
	BSDEV (Hz)	000.0 -> 900.0 DEFAULT VALUE = 999.9	nnn.n
	DRIFT (Hz/min)	-99.00 -> +99.00 DEFAULT VALUE = +99.99	snn.nn
14	TCA	YEAR = 00 -> 99 DAY(JULIAN) = 001 -> 366 UTC - HRS = 00 -> 23 MINS = 00 -> 59 SECS = 00.00 -> 59.99	nn nnn nnnn nn.nn
15	WINDOW FACTOR (WF)	0 = IN WINDOW 1->9 = OUTSIDE WINDOW WF = Integer of the Quotient $\left\lvert \frac{TCA - \frac{1}{2}(Tf + Tl)}{\frac{1}{2}(Tf - Tl)} \right\rvert$ where: TCA = Time of closest approach Tf = Time of first data point Tl = Time of last data point All times are in an absolute time reference (e.g., seconds since 1980)	n
16	NUMBER OF ITERATIONS	1 -> 9 DEFAULT VALUE = 0	n
17	CTA (DEGREE)	00.000 -> 33.000	nn.nnn
18	SECONDARY SOURCE ID	(See www.cospas-sarsat.org) DEFAULT VALUE = 0000	nnnn

Note: * Value to be used for SIT 121 messages (406 MHz interferer notification).

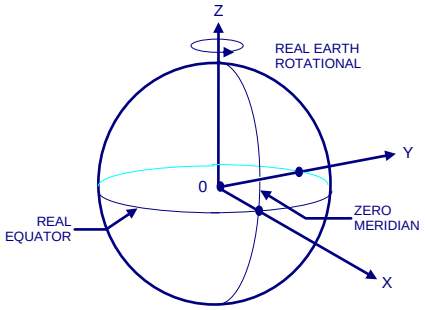
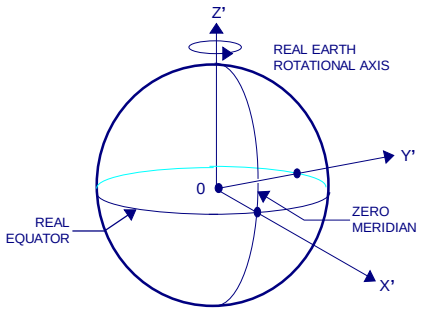
Table B.1 (Cont.)

Message Fields Description

MF#	NAME	CONTENT	CHARACTER TEXT
19	NUMBER OF SIDEBANDS	00 -> 99 DEFAULT VALUE = 00	nn
20	SWEEP PERIOD (mSec) SPSDEV (mSec)	SPERIOD = 0001 -> 9999 DEFAULT VALUE = 0000 SPSDEV = 01 -> 90 DEFAULT VALUE = 99	nnnn nn
21	NUMBER OF POINTS	01 -> 99	nn
22	BEACON ID (SEE C/S T.001)	15 HEX CHARACTERS (BITS 26-85)	hhhhhhhhhhhhhhh
23	406 MESSAGE (SEE C/S T.001)	30 HEX CHARACTERS (BITS 25-144)	h.....h
24	DDR/SERVICE AREA AR FLAG	MCC COUNTRY CODE = 100-> 999 AMBIGUITY RESOLUTION: "+" = RESOLVED OR NON-IMAGE POSITION IN SOLUTION "-" = IMAGE POSITION "-" IN 'A' AND 'B' = RESOLVED POSITION IN ENCODED DATA "+" IN 'A' AND 'B' = DEFAULT = NO RESOLVED POSITION	snnn
25	LATITUDE (DEGREE)	LAT: ±00.000 -> ±90.000 WHERE: + = NORTH and - = SOUTH	snn.nnn
26	LONGITUDE (DEGREE)	LONG: ± 000.000 -> ±180.000 WHERE: + = EAST and - = WEST	snnn.nnn
27	ERROR ELLIPSE: ANGLE (DEGREES) MAJ AXIS (km) MIN AXIS (km)	 000 -> 359 000.1 -> 999.9 000.1 -> 999.9	 nnn nnn.n nnn.n
28	PROBABILITY (%)	01 -> 99	nn
29	NEXT TIME OF VISIBILITY	(SAME AS MF#3) DEFAULT VALUE = ALL 0s	(SAME AS MF#3)
30	CONFIDENCE FACTOR	1 -> 4	n
31	DATA RESIDUAL: SDEV (Hz) TREND (Hz)	 SDEV: 000.0 -> 250.0 DEFAULT VALUE = 255.0 TREND: 000.0 -> 250.0 DEFAULT VALUE = 255.0	 nnn.n nnn.n

Table B.1 (Cont.)

Message Fields Description

MF#	NAME	CONTENT	CHARACTER TEXT	
32	NUMBER OF ORBIT VECTORS	01	nn	
33	NUMBER OF PROCEDURE NAMES	01 -> 99	nn	(Note 3)
34	ORBIT TIME	YEAR = 00 - 99 DAY (JULIAN 001 - 366) UTC - HOURS 00 - 23 - MINUTES 00 - 59 - SECONDS 00.000 - 59.999	nn nnn nnnn nn.nnn	
35	ORBIT POSITION (km)	X = ± 0000.0000 -> ± 9999.9999	snnnn.nnnn	
		Y = ± 0000.0000 -> ± 9999.9999	snnnn.nnnn	
		Z = ±0000.0000 -> ±9999.9999	snnnn.nnnn	
36	ORBIT VELOCITY (km/sec)	X' = ±000.00000 -> ±999.99999	snnn.nnnnn	
		Y' = ±000.00000 -> ±999.99999	snnn.nnnnn	
		Z' = ±000.00000 -> ±999.99999	snnn.nnnnn	

Note 3: Ensure the 25,000 character transmission limit is not exceeded.

Table B.1 (Cont.)

4.3 Message Fields Description

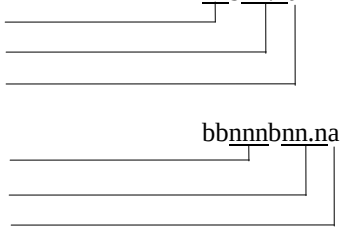
MF#	NAME	CONTENT	CHARACTER TEXT
37	CALIBRATION TIME	(SAME AS MF #34)	(SAME AS MF #34)
38	USO FREQUENCY (Hz)	0000000.000 -> 9999999.999	nnnnnnn.nnn
38a	USO FREQUENCY (Hz)	00000000.000 -> 99999999.999	nnnnnnnn.nnn
39	COMMAND PROCEDURE NAME	DEFINED BY MCC/MCC REQUIREMENT	aaaaaaaaaaa p
	PRIORITY	R -> ROUTINE E -> EMERGENCY DEFAULT = R	
40	EXECUTE TIME	(SAME AS MF #14)	(SAME AS MF #14)
41	NARRATIVE TEXT	69 CHARACTERS PER LINE, TERMINATED WITH "QQQQ" SUCH THAT MSG <25,000 CHARACTERS	a.....a a.....a QQQQ
42	ENDSIT LASSIT	LASSIT	
43	ENDMSG ENDMSG	ENDMSG	
44	NUMBER OF SPACECRAFT	01 -> 99	nn (Note 3)
45	MESSAGE TYPE	HEADING	1.bbDISTRESSbbCOSPAS-SARSATbaaaaa...a or 1.bbSHIPbbSECURITY bbCospas-Sarsatbaaaaa...a
46	CURRENT MSG NO MESSAGE NUMBER	HEADING CURRENT MESSAGE NUMBER	2.bbMSGbNOb nnnnnbb
47	MCC REFERENCE MESSAGE NUMBER	HEADING REFERENCE MESSAGE NUMBER	aaaaabREFbNOb nnnnn
48	DETECTION TIME & SPACECRAFT ID	HEADING	3.bbDETECTED AT
	DETECTION TIME	DAY = 01 -> 31 MONTHS = (SEE APPENDIX B.1) YEAR = 00 -> 99 UTC-HRS = 00 -> 23 MINS = 00 -> 59	nnbaaabnnbnnnnbUTCbBYb
	SPACECRAFT ID	Cospas xx, Sarsat xx, GOES xx, INSAT-2 x, INSAT-3 x, MSG x, or Electro-L / Louch-5	aaaaaaabnn

Note 3: Ensure the 25,000 character transmission limit is not exceeded.

Table B.1 (Cont.)

Message Fields Description

MF#	NAME	CONTENT	CHARACTER TEXT
49	DETECTION FREQUENCY	HEADING	4.bbDETECTIONbFREQUENCYbb
	DETECTION FREQUENCY	THE ACTUAL DETECTION FREQUENCY:	406.nnnnbMHZ
50	COUNTRY OF BEACON REGISTRATION	HEADING	5.bbCOUNTRYbbOFbbBEACON REGISTRATION
	COUNTRY NAME	COUNTRY CODE/ TEN CHARACTER ABBREVIATION OF COUNTRY (SEE C/S A.001)	nnn/aaaaaaaaaa
51	USER CLASS OF BEACON	HEADING	6.bbUSERbCLASSbb
	USER CLASS	(SEE APPENDIX B.1)	aaaaaaaaaaaaaa
52	IDENTIFICATION	HEADING	/IDENTIFICATIONbb
	IDENTIFICATION	(SEE C/S T.001) or UNKNOWN UNIDENTIFIED MODIFIED-BAUDOT CODE CHARACTER = "?"	aaaaaaa
53	EMERGENCY CODE	HEADING	7.bbEMERGENCYbCODEbb
	EMERGENCY CODE	(SEE C/S T.001) or NIL	aaaaaaaaaaaaaa
54	POSITIONS*HEADING	8.bbPOSITIONS	
54a	RESOLVED POSITION	HEADING	bbbbbbbbRESOLVEDbbb-b
	RESOLVED LATITUDE DEGREES 00 -> 90 MINUTES 00.0 -> 59.9	LAT	nnbnn.na
	NORTH OR SOUTH	N or S	
	RESOLVED LONGITUDE DEGREES 000 -> 180 MINUTES 00.0 -> 59.9	LONG	bbnnnbnn.na
	EAST OR WEST	E or W	



Note: * If the latitude is exactly 90 degrees (North or South) or if the longitude is exactly 180 degrees (East or West) for a Resolved or Doppler Position, then the corresponding value for minutes must be exactly 00.0.

Table B.1 (Cont.)

Message Fields Description

MF#	NAME	CONTENT	CHARACTER TEXT
54b	A POSITION HEADING & PROBABILITY		bbbbbbbbDOPPLERbAb-b
	A LATITUDE	LAT	nnbnn.na
	DEGREES	00 -> 90	
	MINUTES	00.0 -> 59.9	
	NORTH OR SOUTH	N or S	
	A LONGITUDE	LONG	bbnnnbnn.nabbbb
	DEGREES	000 -> 180	
	MINUTES	00.0 -> 59.9	
	EAST OR WEST	E or W	
	A PROBABILITY(%)	PROB 01 -> 99	PROBbnn
54c	B POSITION HEADING & PROBABILITY	bbbbbbbbDOPPLERbBb-b	
	B LATITUDE	(SAME AS MF#54b)	nnbnn.na
	B LONGITUDE	(SAME AS MF#54b)	bbnnnbnn.nabbbb
	B PROBABILITY(%)	(SAME AS MF#54b)	PROBbnn
54d	ENCODED POSITION & TIME OF UPDATE	HEADING	bbbbbbbbENCODEDbbb-b
	ENCODED LATITUDE	(SAME AS MF#54b)	nnbnn.nna
	ENCODED LONGITUDE	(SAME AS MF#54b)	bbnnnbnn.nnabbbb
	TIME OF UPDATE	TIME OF UPDATE	UNKNOWN
55	SOURCE OF ENCODED POSITION DATA	HEADING	9.bbENCODEDbPOSITIONb PROVIDEDbBYb
		(SEE APPENDIX B.1)	aaaaaaaaaaaaaaaaaaaaaaaaaaaaaa
56	NEXT PASS TIMES	HEADING	10.bbNEXTbPASSbTIMES
56a	NEXT TIME OF VISIBILITY OF RESOLVED POSITION	HEADING	bbbbbbbbRESOLVEDbbb-b
		DAY/MONTH/YEAR	DDbMMMbYYbb
		HOURS/MINUTES (UTC) 0000-> 2359 UTC or UNKNOWN	HHMMbUTC

Table B.1 (Cont.)

Message Fields Description

MF#	NAME	CONTENT	CHARACTER TEXT
56b	NEXT TIME OF VISIBILITY A POSITION	HEADING	bbbbbbbbDOPPLERbAb-b
		DAY/MONTH/YEAR	DDbMMMbYYbb
		HOURS/MINUTES (UTC) 0000-> 2359 UTC or UNKNOWN	HHMMbUTC
56c	NEXT TIME OF VISIBILITY B POSITION	HEADING	bbbbbbbbDOPPLERbBb-b
		(SAME AS MF#56a)	
56d	NEXT TIME OF VISIBILITY OF ENCODED POSITION	HEADING	bbbbbbbbENCODEDbb-b
		(SAME AS MF#56a)	
57	BEACON HEX ID & HOMING SIGNAL	HEADING	11.bbHEXbIDbb
	HEX ID	(SEE APPENDIX B.1)	hhhhhhhhhhhhhh
	HOMING SIGNAL	(SEE APPENDIX B.1)	bbbbHOMINGbSIGNALbb aaaaaaaaaa
58	ACTIVATION TYPE	HEADING	12.bbACTIVATIONbTYPE
		UNKNOWN or MANUAL	aaaaaaaaa
59	BEACON NUMBER	HEADING	13.bbBEACONbNUMBERbON bAIRCRAFTbORbVESSELbNO.b
		NUMBER OR NIL	aaa
60	OTHER ENCODED INFORMATION (SEE APPENDIX B.1)	HEADING aaa.....a	14.bbOTHERbENCODEDb INFORMATION
61	OPERATIONAL INFORMATION	HEADING	15.bbOPERATIONALb INFORMATION
		(SEE APPENDIX B.1)	aaa.....a
62	REMARKS HEADING		16.bbREMARKS
		(SEE APPENDIX B.1)	aaa.....a
63	END OF MESSAGE	HEADING	ENDbOFbMESSAGE

Table B.1 (Cont.)

Message Fields Description

MF#	NAME	CONTENT	CHARACTER TEXT
64	406 MHz SARR FREQ. CALIBR. OFFSET (Hz)	-9999.999 -> +9999.999	snnnn.nnn
65	406 MHz SARR FREQ. CALIB. DRIFT (Hz/day)	-99.999 -> +99.999 DEFAULT VALUE = +00.000	snn.nnn
66	TIME OF 406 MHz SARR FREQ. CALIB. DETERMINATION	(SAME AS MF # 3)	(SAME AS MF # 3)
67 to 76	Reserved for MEOSAR		

APPENDIX B.1 TO ANNEX B

MESSAGE FIELDS DEFINITION

MF # Message Fields Definition

1. Message Number

If the outgoing message is a retransmission of a previous message, the current message number will be followed by the message number of the original message.

For message accountability it is recommended that the outgoing message number be unique and sequential for each destination. See Appendix B.3 for a suggested algorithm for message sequence tracking.

2. Reporting MCC

The identification code corresponding to the MCC sending the current message.

3. Message Transmit Time

The time at which the current message is placed on the communication channel by the reporting agency.

4. SIT

The Subject Indicator Type corresponding to the format required for the message being sent.

5. Destination MCC

The identification code corresponding to the destination of the SIT message. For the SIT 915 and 925 messages this is the final destination of the SIT message, for all other SIT messages this is the MCC receiving the current message.

6. Spacecraft ID

The satellite identification to which the message data applies.

7. Orbit Number

The orbit number of the spacecraft designated in MF#6.

8. Number of Alerts with Doppler Positions

The number of alerts of this SIT format with Doppler positions, that are included between the SIT header and the SIT trailer as specified in Table C.1. 406 MHz alerts may or may not contain encoded position information.

9. Not Used (previously: Number of Images Reported)

10. Number of Alerts without Doppler Position

The number of alerts of this SIT format without Doppler positions, that are included between the SIT header and the SIT trailer as specified in Table C.1.

11. Source ID

The identification code corresponding to the MCC / LUT that originally provided the solution data being reported on in the SIT message.

12. Local/Global Flag

Indicates if the reported Doppler location has been obtained from the local mode or from the global mode of operation. If the Doppler location is a mixture of global and real time data and the time of the first data point is before the AOS of the LUT, the flag is set as GLOBAL.

Processing Channel

The processing channel used to produce a solution. 406 SARP solutions only use data bursts processed through the SARP channel on-board the satellite. 406 SARR solutions only use data bursts relayed through the repeater on-board the satellite. 406 COMBINED SARP and SARR are solutions where the data bursts or the solutions are combined at the LUT.

406 MHz combined LEO/GEO solutions contain Doppler locations that have been produced by LEO/GEO processing.

The value for this field shall be computed from the 'A' solution.

13. Bias

The frequency offset of the detected signal around the frequency of 406.025000 MHz.

For GEOSAR alerts bias is given for the last detected burst.

BSDEV

The standard deviation of the bias measurement.

For GEOSAR alerts BSDEV is the absolute value of the difference between the first and last detected bursts.

A standard deviation of the bias measurement greater than 999 will be limited to 900.0.

Drift

The rate of frequency change of the beacon carrier frequency with time.

A drift rate greater than +/- 99.00 will be limited to +/- 99.00.

For GEOSAR alerts drift is the average frequency drift between the first and last detected burst ('+' if frequency increases verses time).

The value for this field shall be computed from the 'A' solution.

14. TCA

For LEOSAR Doppler location data, the Time of Closest Approach (TCA) indicates the time at which the satellite was closest to the beacon. For LEOSAR alerts, the value for this field shall be computed from the 'A' solution. For LEOSAR detect only solutions, the TCA is the time of the last data point.

For the first GEOSAR alert message, the TCA field contains the time of the first beacon burst of the first integration process. For the second and subsequent Beacon Message updates, the TCA field contains the time of the first burst of the current integration process.

15. Window Factor

The Window Factor is an indicator of the position of the data points relative to the TCA.

If the TCA is included in the set of data points, then the Window Factor is set to "0". If the TCA is not included in the set of data points, then the Window Factor has a range between "1" and "9". All values greater than "9" are set to "9".

The value for this field shall be computed from the 'A' solution.

16. Number of Iterations

The number of times the LUT computer had to process the detected incident data to arrive at the solution being reported on.

If the number of iterations is greater than 9, it shall be reported as a value of 9.

The value for this field shall be computed from the 'A' solution.

17. CTA

The Cross Track Angle (CTA) is the angle at the centre of the earth, between the satellite and the beacon at TCA.

The value for this field shall be computed from the 'A' solution.

18. Secondary Source ID (previously: Power Indicator)

For 406 MHz combined LEO/GEO data, the identification code corresponding to the GEOLUT that originally provided the GEOSAR data for combined processing.

The default value for this field is "0000".

19. Number of Sidebands

The number of identified sideband components around the solution curve that have been removed (filtered out) by the LUT/MCC.

20. Sweep Period

For 406 MHz interferers, use the default value (0000).

(Previously the time taken by the amplitude modulation (AM) of the 121.5/243 MHz beacon signal to change from the higher to the lower AM frequency limit.)

SPSDEV

For 406 MHz interferers, use the default value (99).

(Previously the Sweep Period Standard Deviation, defined as the measured standard deviation of the sweep period for the solution being reported, computed from the 'A' solution.)

21. Number of Points

For data originating from the LEOSAR system: The number of bursts detected by the LEOLUT for each beacon identification, used to develop a solution. For combined SARP and SARR, it is the number of unique time-frequency data points after the two processes have been merged.

For data originating from the GEOSAR system: The number of independent integrations performed to produce a Beacon Message as described in document C/S T.009. For unconfirmed messages, the number of points shall be set to "1". For confirmed messages the number of independent integrations shall be reported.

For combined LEO/GEO processing, it is the number of data points used from the LEOSAR channel in the combined processing.

The value for this field shall be computed from the 'A' solution.

22. Beacon ID

Bits 26-85 of the Beacon Message, shown in 15 character hexadecimal representation. For location protocol beacons, the bits are defaulted according to document C/S T.001.

23. Beacon Message

The 406 MHz binary message of the solution, in its undecoded form, shown in the full 30 hexadecimal character representation. Short format messages are left justified and zero-filled.

24. DDR/Service Area

The MCC country code for the individual MCC service area or the MCC country code of the nodal MCC for the DDR as provided on the Cospas-Sarsat website (www.cospas-sarsat.org).

Nodal MCCs will fill this field with service area.

Ambiguity Resolution Flag
Indicates which position has been determined to be the resolved (unambiguous) or image position.

For ambiguity resolution messages, the ambiguity resolution flag indicates the resolved position. A "+" indicates the resolved position in this solution. A "-" in both the "A" and "B" solution indicates that the resolved position is the encoded position contained in the Beacon Message.

For messages prior to ambiguity resolution, a "-" indicates that this position is an image, as determined by the "406 MHz LEOSAR Image Position Determination" algorithm in Appendix B.2 to Annex B. Determining that a position is an image prior to ambiguity resolution is optional.

25. Latitude

The calculated latitude of the solution.

26. Longitude

The calculated longitude of the solution.

27. Error Ellipse

An ellipse centred at latitude (MF#25) and longitude (MF#26) and containing the true location with a 50% probability.

Angle

The orientation to true north of the major axis of the error ellipse, in a clockwise direction.

Major Axis

The half length, in kilometres, of the major axis of the ellipse.

Any half length axis value greater than 999.9 kilometres will be limited to 999.9.

Minor Axis

The half length, in kilometres, of the minor axis of the ellipse.

Any half length axis value greater than 999.9 kilometres will be limited to 999.9.

28. Probability

The probability that the location reported in the SIT message is the actual solution and not the image solution.

29. Next Time of Visibility

The predicted time (predicted Loss of Signal - LOS) at which the next beacon event (in local mode) for the position being reported will occur. This time is provided by the originating MCC or a nodal MCC (only if an earlier time is available at the node). The default value of zeros shall be used when the next time of visibility is not calculated.

30. Confidence Factor

An indication of the accuracy of the calculated solution based on a correlation between a variety of parameters.

Confidence Factor No.	Meaning
4	Within 5.0 nautical miles
3	Within 20.0 nautical miles
2	Within 50.0 nautical miles
1	Less accurate than the above

31. Data Residual

SDEV

The standard deviation of the actual data points to the solution Doppler curve.

A small number is desirable.

TREND

The standard deviation on the time shifted solution Doppler curve.

It is an indication of the curve dispersion and a number higher than SDEV is desirable.

32. Number of Orbit Vectors

The number of orbit vectors (MF#s 34, 35 and 36) that are being transmitted in the SIT message.

33. Number of Procedure Names

The number of SARR or SARP commands that are being transmitted in the SIT message.

34. Orbit Time

The time at which the position (MF#35) and the velocity (MF#36) vectors of the satellite, are valid.

35. Orbit Position

The position of the satellite in relation to the centre of the earth in X, Y and Z co-ordinate, in effect at the time specified by MF#34.

36. Orbit Velocity

Velocity of the spacecraft relative to the earth-fixed co-ordinate system shown for MF#35, expressed in that same co-ordinate system.

37. Calibration Time

The time at which the Ultra-Stable Oscillator (USO) time reference on Sarsat was rolled over as per MF#38.

38. USO Frequency

The oscillator frequency that was measured at the time specified in MF#37.

38a. USO Frequency for SARP-3

The same as MF#38 above but with an additional integer to accommodate SARP-3 frequencies.

39. Command Procedure Name

The name of the commands to be executed at the time specified by MF#40 for both SARR and SARP command messages.

Priority

The indication of urgency for the execution of the spacecraft command procedure.

40. Execute Time

The time at which the command procedure name specified in MF#39 is to be executed.

41. Narrative Text

The character text to be transmitted as part of SIT message. Always terminated by 2 Carriage Returns, 1 Line Feed, 4 Qs, 2 Carriage Returns and 1 Line Feed. In SIT 605, 915 and 925 messages, the originating MCC shall identify itself and the final destination MCC(s) in plain text; in SIT 605 messages, the final destination is "ALL MCCs".

42. ENDSIT

This field always contains the code LASSIT at the end of every SIT message.

43. ENDMSG

This field is inserted at the end of every current message to be transmitted. It will always follow the ENDSIT field (MF#42) LASSIT.

44. Number of Spacecraft

The number of spacecraft for which orbit vectors are being transmitted in the SIT message.

45. Message Type

For a ship security alert, the message type begins with "SHIP SECURITY COSPAS-SARSAT …", otherwise, the message type begins with "DISTRESS COSPAS-SARSAT …".

Indicates type of alert message, for example:

- DISTRESS COSPAS-SARSAT POSITION RESOLVED ALERT
- DISTRESS COSPAS-SARSAT POSITION RESOLVED UPDATE ALERT
- DISTRESS COSPAS-SARSAT POSITION CONFLICT ALERT
- DISTRESS COSPAS-SARSAT POSITION UPDATE ALERT

- DISTRESS COSPAS-SARSAT INITIAL ALERT
- DISTRESS COSPAS-SARSAT UNRESOLVED DOPPLER POSITION MATCH
- DISTRESS COSPAS-SARSAT NOTIFICATION OF COUNTRY OF BEACON REGISTRATION ALERT
- SHIP SECURITY COSPAS-SARSAT POSITION RESOLVED ALERT
- SHIP SECURITY COSPAS-SARSAT POSITION RESOLVED UPDATE ALERT
- SHIP SECURITY COSPAS-SARSAT POSITION CONFLICT ALERT
- SHIP SECURITY COSPAS-SARSAT POSITION UPDATE ALERT
- SHIP SECURITY COSPAS-SARSAT INITIAL ALERT

If the alert message is sent because the encoded position does not meet the encoded to encoded position match criterion (per C/S A.001) and the encoded position differs from a previous encoded position by less than 50 km, then the message type shall indicate "POSITION UPDATE ALERT "(e.g., DISTRESS COSPAS-SARSAT POSITION UPDATE ALERT).

46. Current Message Number

The message number assigned to this message by the transmitting MCC.

47. MCC Reference

This reference is a unique designator supplied by the MCC to identify all messages sent for that beacon.

48. Detection Time & Spacecraft ID

The detection time is TCA (as defined at MF#14) and abbreviation for months is as per table below. The time is followed on the same line by the identity of the satellite which provided the alert data.

Abbreviation	Month	Abbreviation	Month
JAN	January	JUL	July
FEB	February	AUG	August
MAR	March	SEP	September
APR	April	OCT	October
MAY	May	NOV	November
JUN	June	DEC	December

49. Detection Frequency

Actual values will be used when available. If actual values are not available, then the value 406 MHz will be used.

50. Country of Beacon Registration

Three numeric characters of the Country Code followed by the ten character abbreviation of the country where the detected beacon is registered as defined in System document C/S A.001 "Cospas-Sarsat Data Distribution Plan".

Enter "NIL" if the Beacon Message is invalid per C/S A.001, section III/B.1.1.3.

51. User Class of Beacon

User class information as per table below and produced from beacon information by the MCC.

Enter "NIL" if the Beacon Message is invalid per C/S A.001, section III/B.1.1.3.

4.3.1.1 Beacon Protocol	**User Class in RCC Message**
Standard Location Protocol	STANDARD LOCATION - followed by
Aviation	ELT - AIRCRAFT SERIAL NO: CSTA CERTIFICATE NO ELT - AIRCRAFT 24-BIT ADDRESS 6 HEX CHARACTERS: ELT - AIRCRAFT OPERATOR DESIGNATOR OPERATOR: SERIAL NO:
Maritime	EPIRB - SERIAL NO: CSTA CERTIFICATE NO EPIRB - MMSI LAST 6 DIGITS:
Personal Locator Beacon	PLB - SERIAL NO: CSTA CERTIFICATE NO:
Ship Security	SHIP SECURITY - MMSI LAST 6 DIGITS:
National Location Protocol	NATIONAL LOCATION - followed by
Aviation	ELT - SERIAL NO:
Maritime	EPIRB - SERIAL NO:
Personal Locator Beacon	PLB - SERIAL NO:
User/User Location protocol	USER/USER LOCATION - followed by
Maritime	EPIRB USER MMSI - LAST 6 DIGITS: (OR) RADIOCALLSIGN:
Radio Call Sign	EPIRB USER RADIO CALLSIGN:
Aviation	ELT USER AIRCRAFT REGISTRATION
Serial:	SERIAL USER/USER LOCATION - followed by
(a) Aviation	ELT - AIRCRAFT SERIAL NO: (CSTA CERTIFICATE NO:)
(b) Maritime (Float-Free)	EPIRB (FLOAT FREE) SERIAL NO: (CSTA CERTIFICATE NO:)
(c) Maritime (Non Float-Free)	EPIRB (NON FLOAT FREE) SERIAL NO: (CSTA CERTIFICATE NO:)
(d) Personal Locator Beacon	PLB SERIAL NO: (CSTA CERTIFICATE NO:)
(e) Aircraft 24-Bit Address	ELT - AIRCRAFT 24-BIT ADDRESS 6 HEX CHARACTERS: (CSTA CERTIFICATE NO:)
(f) Aircraft Operator Designator	ELT - AIRCRAFT OPERATOR DESIGNATOR OPERATOR: SERIAL NO: (CSTA CERTIFICATE NO:)
(g) Not assigned	UNKNOWN
Spare	UNKNOWN
Test	TEST

52. Identification

The identification information as described in the Cospas-Sarsat beacon specifications.

Enter "NIL" if the Beacon Message is invalid per C/S A.001, section III/B.1.1.3.

53. Emergency Code

The emergency code as indicated by the beacon coding as described in the Cospas-Sarsat beacon specification.

Enter "NIL" if the Beacon Message is invalid per C/S A.001 section III/B.1.1.3.

54. Position Information

The position information associated with the resolved position, A&B Doppler positions, and the encoded position as appropriate.

54a. Resolved Position

Latitude and longitude of resolved position.

54b. A Position & Probability

The latitude and longitude of the A Doppler Position and the percentage probability that the A Position is the actual position of the incident.

54c. B Position & Probability

Same as MF#54b above but for B Position.

54d. Encoded Position and Time of Update

Latitude and longitude of encoded position. Time of update is UNKNOWN.

Enter "NIL" if the Beacon Message is invalid per C/S A.001, section III/B.1.1.3.

55. Source of Encoded Position Data

This indicates whether the encoded position data was provided to the beacon by an internal or external device. Enter "NIL" if the Beacon Message is invalid per C/S A.001, section III/B.1.1.3.

56. Next Pass Times

The predicted time (predicted Loss of Signal – LOS) at which the next beacon event (in local mode) for the position being reported will occur.

56a. Next Time of Visibility of Resolved Position

Optional information indicating the next time of visibility for the resolved position; "UNKNOWN" if the information is not available.

56b. Next Time of Visibility A Doppler Position

Same as MF#56a above but for A Position.

56c. Next Time of Visibility B Doppler Position

Same as MF#56a above but for B Position.

56d. Next Time of Visibility of Encoded Position

Same as for MF#56a but for the Encoded Position.

57. Beacon HEX ID & Homing Signal

Fifteen character hexadecimal representation of beacon identification code and type of homing signal as per table below. Information is taken from the Beacon Message (reference MF#23) by the MCC. If the Beacon Message is invalid per C/S A.001, section III/B.1.1.3, then the fifteen character hexadecimal representation shall be based on bits 26 - 85 of the Beacon Message with no bits defaulted.

Homing Signal Interpretation

Term	Meaning
NIL	no homing transmitter
121.5	121.5 MHz ELT/EPIRB signal in addition to 406 MHz
Maritime	9 GHz Search and Rescue Radar Transponder (SART) in addition to 406 MHz
Other	a nationally assigned signal has been included in the beacon.

58. Activation Type

Type of beacon activation for USER protocols only (non-location protocols).

MANUAL	IF BIT 108 IS SET TO 0
AUTOMATIC OR MANUAL	IF BIT 108 IS SET TO 1

For Ship Security (Standard Location Protocol), enter MANUAL.

Enter “NIL” if the Beacon Message is invalid per C/S A.001, section III/B.1.1.3.

59. Beacon Number

Beacon number on the vessel or aircraft, with the first beacon on the vessel or aircraft designated as “0”. Information is determined by decoding the 406 MHz message.

Enter “NIL” if the Beacon Message is invalid per C/S A.001, section III/B.1.1.3.

60. Other Encoded Information

Other information decoded from the Beacon Message as determined by the servicing MCC. Could include such information as Cospas-Sarsat certificate number, resolution of the encoded position data, or data according to national assignment.

When encoded position data is present, the degree of resolution may be provided by the following:

For user location protocol beacons when location data is present in PDF-2 enter ‘ENCODED POSITION UNCERTAINTY PLUS-MINUS 4 MINUTES OF LATITUDE AND LONGITUDE’.

For standard location protocol beacons when location data is present in PDF-1 and missing in PDF-2 enter ‘ENCODED POSITION UNCERTAINTY PLUS-MINUS 30 MINUTES OF LATITUDE AND LONGITUDE’.

For national location protocol beacons when location data is present in PDF-1 and missing in PDF-2 enter ‘ENCODED POSITION UNCERTAINTY PLUS-MINUS 4 MINUTES OF LATITUDE AND LONGITUDE’.

Enter 'NIL' if no other encoded information is available or if the Beacon Message is invalid per C/S A.001, section III/B.1.1.3.

For protocol containing the aircraft 24-bit address, the country which assigned the 24-bit address will be indicated. If the country that assigned the 24-bit address is unknown, this value will be set to “UNKNOWN”. If the registration marking corresponding to the 24-bit address is known, it will be given. If the registration marking is unknown, the full 24-bit address will be given as a 6 character hexadecimal number.

61. Operational Information

Operational information obtained separately from encoded beacon information such as:

- reliability indicator for encoded or Doppler position data *
- database registry information
- people on board
- 'NIL' if not available.

The statement, “THE [A|B] POSITION IS LIKELY TO BE AN IMAGE POSITION.” shall be included, as appropriate, per the “LEOSAR Image Position Determination” algorithm in Appendix B.2 to Annex B. Determining that a position is an image prior to ambiguity resolution is optional.

Note 1: * The warning “RELIABILITY OF DOPPLER POSITION DATA - SUSPECT” for 406 MHz solutions shall be included on the SIT 185 message when at least one of the following criteria from the alert data values is satisfied:

- Window factor $\geq$ 3, or
- Bias standard deviation > 20 Hz, or
- The absolute value of the cross track angle is < 1 or > 22, or
- Position calculated from < 4-point solution.

This warning is only included in messages before ambiguity resolution.

Note 2: * The warning “RELIABILITY OF DOPPLER POSITION DATA - SUSPECT DUE TO SATELLITE MANOEUVRE.” shall be included in the SIT 185 message during the 24-hour period after the manoeuvre, when the maximum expected error in Doppler location exceeds 10 kilometres within 24 hours of the manoeuvre. See C/S A.001, section 3.6.5.

Note 3: * The warning “WARNING: AMBIGUITY IS NOT RESOLVED” shall be included in the SIT 185 message for an Unresolved Doppler Position Match, as defined in document C/S A.001, Annex III / B.2.

If the Beacon Message is invalid per C/S A.001, section III/B.1.1.3 then the warning "DATA DECODED FROM THE BEACON MESSAGE IS NOT RELIABLE" shall be included in SIT 185 message.

If the alert message is sent because the encoded position does not meet the encoded position match criterion (per C/S A.001) and the encoded position differs from a previous encoded position by less than 50 km, then the statement "POSITION UPDATE BASED ON DISTANCE SEPARATION OF 3 TO 50 KM" shall be included in the SIT 185 message.

62. Remarks

Heading for the variable length section of the message. Additional information may be provided at the discretion of the originating MCC as illustrated in the sample alert messages. 'NIL' if no Remarks are available.

For ship security alerts the following should be included: "THIS IS A SHIP SECURITY ALERT. PROCESS THIS ALERT ACCORDING TO RELEVANT SECURITY REQUIREMENTS."

63. End of Message

To indicate to the message recipient that no more information is to come on this message.

64. SARR Frequency Calibration Offset

Difference (in Hz) between the computed frequency produced by the calibration LEOLUT and the known transmit frequency of a reference beacon.

The SARR frequency calibration offset prepared for distribution to other MCCs shall be based on the average of a minimum of twenty satellite passes, each of which includes at least ten data measurements and each of which is associated with a computed location which is accurate to within three kilometres.

65. SARR Frequency Calibration Drift

Drift (in Hz/day) of the SARR frequency provided by the LEO satellite.

66. Time of SARR Frequency Calibration Determination

Time when a SARR frequency calibration offset for a given LEO satellite was determined through the procedure described for MF # 64.

67-76. Reserved for MEOSAR

APPENDIX B.2 TO ANNEX B

DETERMINING THE LEOSAR IMAGE POSITION

The LEOSAR Doppler processing produces two solutions for each satellite pass; a "real" position corresponding to the actual location of the beacon and an "image" position on the opposite side of the satellite track. Prior to determining the "real" position of a beacon, it is possible to use unlocated alert data to determine if one position is an image, as summarised in Figure B.2.

The LEOSAR image position can be determine using the following inputs:

a) LEOSAR Doppler alert, including beacon ID, A and B latitude/longitude positions (defined as Input "I_2" in the DDP);

b) GEOSAR or LEOSAR unlocated alert with beacon ID (defined as Input "I_1" in DDP); and

c) ephemeris data and orbit propagation software, if the unlocated alert originated from a LEOSAR satellite, or the position of the GEOSAR satellite if the alert originated from a GEOSAR satellite.

Figure B.1 and the text below document the procedures for MCCs to follow to determine if a position is inside the footprint of the LEOSAR or GEOSAR satellite at time of detection, and whether a position is an image.

The process of determining an image position is triggered when a LEOSAR Doppler alert (I_2) is received at the MCC (reference process 1 in Figure B.1) for a beacon which has been previously detected, but no location information is available (I_1). The status of the MCC processing prior to receiving the LEOSAR Doppler alert must be at Sw_1 (i.e., only identification information available, no location information present). If the status of the MCC processing is not at Sw_1, then an image position will not be indicated when the alert message is sent by the MCC.

All unlocated alerts on file with a detect time within 60 minutes of the Doppler TCA are examined (reference 3) to determine if the image position can be determined. For LEOSAR unlocated alerts the time of the detection, along with orbit propagation software, is used to determine the sub-satellite position of the LEOSAR satellite at time of detection (reference 4). For GEOSAR satellites the sub-satellite position is obtained from www.cospas-sarsat.org (reference 5).

Each of the LEOSAR Doppler positions are analysed to determine if they are within the GEOSAR or LEOSAR unlocated footprint using the algorithm shown in Figure B.2 and using the sub-satellite points as input (reference 6). Each unlocated footprint must be analysed before a position can be determined to be an image.

If one of the LEOSAR Doppler positions is conclusively outside the footprint for at least one unlocated alert, then it is the image position, as long as the other position is inside the

footprint of every unlocated alert. If neither position is outside of any footprint or each position is outside of any footprint, then the image position cannot be determined.

When a position has been determined to be an image, this will be indicated on the alert message sent by the MCC, as specified in the description of Message Fields 24 and 61 in Appendix B.1 to Annex B.

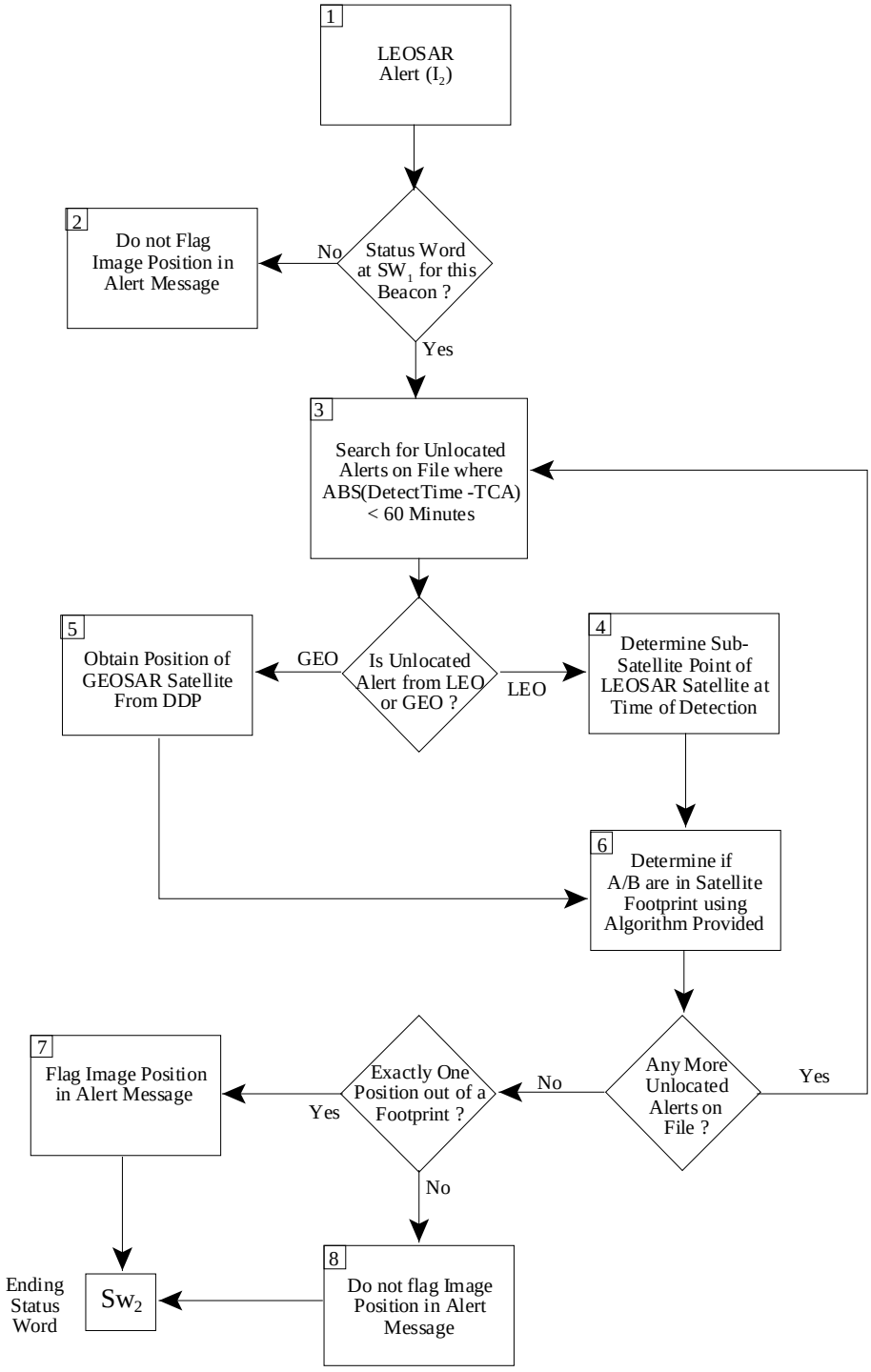


Figure B.1: Using Unlocated Alerts to Determine and Flag the Image Position

Input:	lat	LEOSAR computed position latitude in degrees
	lon	LEOSAR computed position longitude in degrees
	llat	GEOSAR or LEOSAR sub-satellite point at time of detection, latitude in degrees
	llon	GEOSAR or LEOSAR sub-satellite point at time of detection, longitude in degrees
	Emin	Minimum elevation angle required (set to -5 degrees)
Constants:	Rg	altitude of GEOSAR or LEOSAR satellite (note difference in Sarsat and Cospas)
	Re	Equatorial radius of earth = 6378 km
	ro	Re / (Re + Rg)
	PI	3.1415927
Compute:	rlat =	PI * lat / 180
	rlon =	PI * lon / 180
	rllat =	PI * llat / 180
	rllon =	PI * llon / 180
	c =	sin(rlat) * sin(rllat) + cos(rlat) * cos(rllat) * cos(rllon - rlon)
	e =	(c - ro) / sqrt (1 - c^2)
	E =	180 * arctan (e) / PI
Output:	If E ≥ Emin then LEOSAR computed position is within satellite footprint, else	
	If E < Emin then LEOSAR computed position is outside satellite footprint	

Figure B.2: Algorithm to Determine if Computed Position is Inside Satellite Footprint

APPENDIX B.3 TO ANNEX B

SUGGESTED ALGORITHM FOR MESSAGE SEQUENCE TRACKING

The flowcharts in this Appendix define a procedure for the identification of missed messages through message sequence tracking. The procedure relies on the following data items or structures:

Data Item	Purpose
CurMsgNo	The current message number contained in MF#1 of the arriving message
PrvMsgNo	The previous message number contained in MF#1 of the arriving message
NextExpected	The next message number expected from a given source. This item could be represented as an array indexed by source: NextExpected [MF#2] i.e. each MCC must maintain a table of NextExpected message numbers – one such number for each reporting MCC. When a message is received, the reporting MCC in MF#2 is used to lookup the appropriate NextExpected message number from the table.
MissedMsgList	A list of messages that have been identified (by the sequence checking procedure) as overdue. MCCs may choose to implement this as a single list of MF#2:MF#1 pairs or maintain a separate list for each source.
TimeMissed	The time at which a message was declared “missing” by the message sequence tracking facility. The message would be added to the MissedMsgList at that time.
MAX_MISSING	A configuration constant that limits the number of missed messages that can be generated by a single sequence check. This minimises the impact of an MCC unilaterally resetting its message sequence generator to an arbitrary value. Set to [15].
MAX_MSGNO	A configuration constant that defines the largest message number before message number wrap around is to occur. Set to 99999.
MAX_WAIT_TIME	A configuration constant that defines the length of time the MCC will wait for an out of sequence message to arrive before a lost message is declared (and recovery action initiated). Set to [20 minutes].

The procedure is executed in two threads (parallel streams of execution):

1. message-checking thread, where each arriving message is subjected to a message sequence check; and
2. monitor thread which constantly checks the missed message list for lost messages.

The two threads are represented in separate flowcharts.

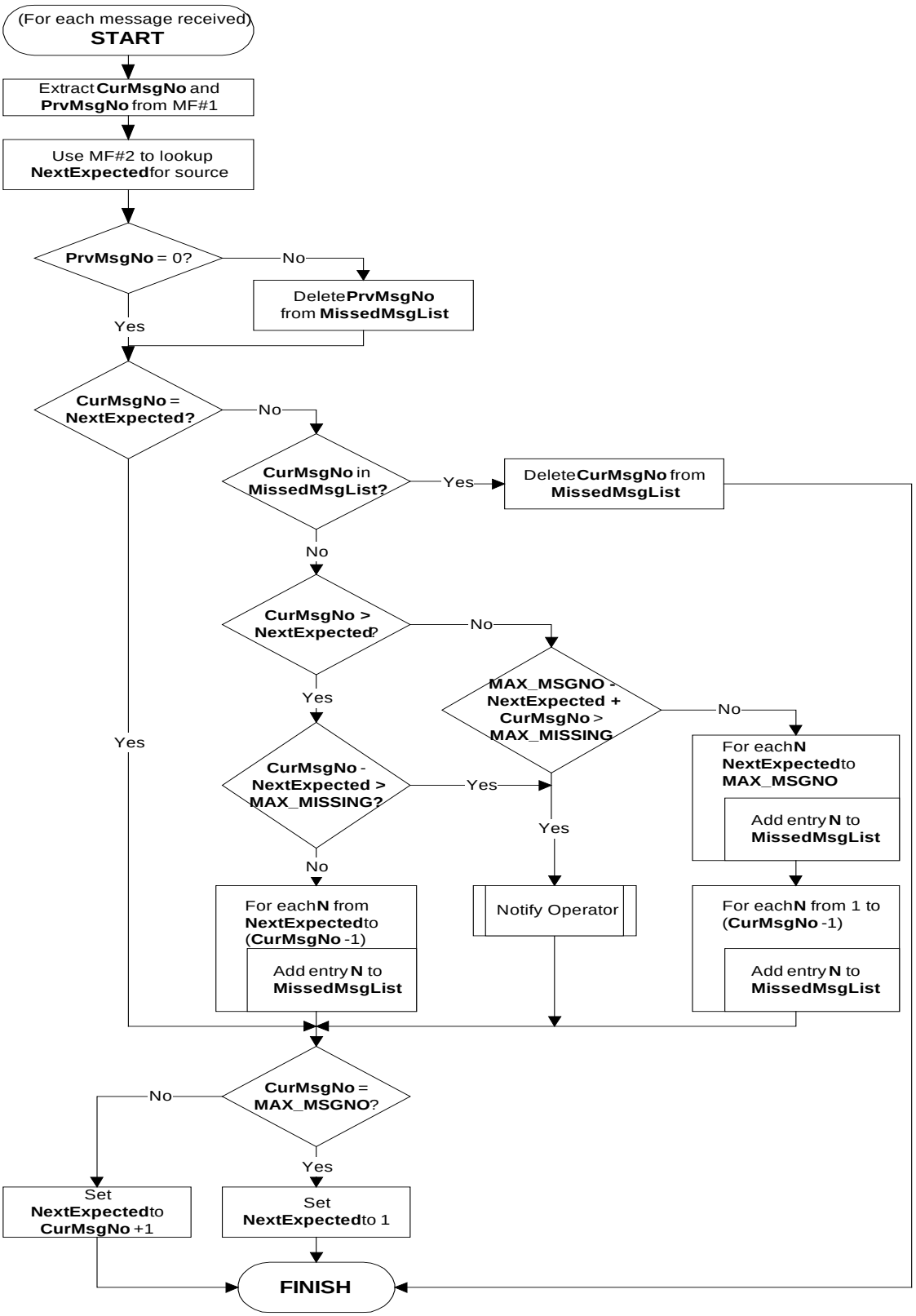


Figure B.3: Message Sequence Checking Flowchart

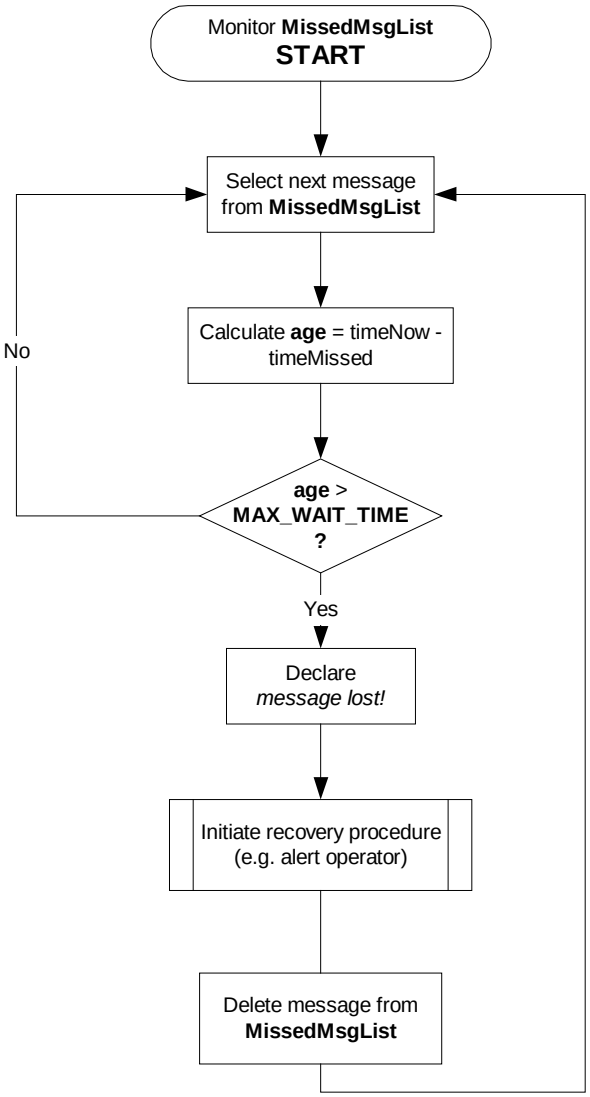


Figure B.4: Missed Message List Monitoring Flowchart

- END OF ANNEX B -

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ANNEX C

MESSAGE CONTENT BY SIT

1. MESSAGE TEXT FORMATS

Cospas-Sarsat messages are uniquely identified by specific Subject Indicator Types (SITs). The SIT specifies the format and category of content within the message. MCCs process messages automatically. Therefore it is mandatory that the structure of the message formats be adhered to, so that each MCC can route and / or take action as required by the message. Tables C.1, C.2 and C.3 detail the format of the text for all messages exchanged between the MCCs in terms of Message Fields (MFs) used.

Once the SIT is known for the desired message, the corresponding column identifies which Message Field number (MF#) is necessary to produce the message. Annex B is then used to find the format and the produced message will be similar to those given in the Appendix to this Annex.

2. SAMPLE MESSAGE TEXT

For SIT messages depicted in Tables C.1, C.2 and C.3, sample messages are given in Appendix 1 to this Annex. A sample for multi-SIT messages is also provided in Appendix 1. The sample messages in Appendix 1 also indicate the message line that contains the individual MF#.

TABLE C.1

MESSAGE CONTENT FOR ALERT MESSAGES

MESSAGE FORMAT	MF #	TITLE	SIT NUMBERS 121	122	123 124
MESSAGE HEADER	1	MESSAGE NUMBER	A	A	A (1)
	2	REPORTING MCC	A	A	A
	3	MESSAGE TRANSMIT TIME	A	A	A (2)
SIT HEADER	4	SIT	A	A	A
	5	DESTINATION MCC	A	A	A
	6	SPACECRAFT ID	A	A	A
	8	NUM. OF ALERTS WITH DOPPLER POSITIONS	A	.	.
	10	NUM. OF ALERTS WITHOUT DOPPLER POSITIONS (406 ONLY)	.	A	A
SOLUTION HEADER	11	SOURCE ID	A	A	A
	12	LOCAL/GLOBAL FLAG AND FREQ BAND	A	.	.
	13	BIAS, BSDEV AND DRIFT	X	X	X
	14	TCA	A	A	A
	15	WINDOW FACTOR	A	.	.
	16	NUMBER OF ITERATIONS	X	.	.
	17	CROSS TRACK ANGLE	A	.	.
	18	SECONDARY SOURCE ID	X	.	.
	19	NUMBER OF SIDEBANDS	X	.	.
	20	SWEEP PERIOD AND SPSDEV	X	.	.
	21	NUMBER OF POINTS (406 MHz)	.	A	A
	23	406 MESSAGE	.	A	A
A DATA	24	DDR/SERVICE AREA AND AR FLAG	A	.	.
	25	LATITUDE	A	.	.
	26	LONGITUDE	A	.	.
	27	ERROR ELLIPSE	A	.	.
	28	PROBABILITY	A	.	.
	29	NEXT TIME OF VISIBILITY	X	.	.
	30	CONFIDENCE FACTOR	A	.	.
	31	DATA RESIDUAL: SDEV AND TREND	X	.	.
B DATA		REPEAT MF #s 24 TO 31 AS REQUIRED BUT WITH DATA FOR B LOCATION	A	.	.
		REPEAT MF #s 11 TO 31 AS REQUIRED, BY MF # 8 OR 10 AND B DATA AS REQUIRED BY MF #8	A	A	A
SIT TRAILER	42	ENDSIT	A	A	A
MSG TRAILER	43	ENDMSG	A	A	A

Note 1: "A" - indicates actual values.
"X" - indicates default values are allowed.

Note 2: The underline "__" is an indication where the New Line (NL) code is to be inserted.

TABLE C.1 (Cont.)

MESSAGE CONTENT
FOR
ALERT MESSAGES

MESSAGE FORMAT	MF #	TITLE	SIT NUMBERS 125 126 127	132	133
MESSAGE HEADER	1	MESSAGE NUMBER	A	A	A (1)
	2	REPORTING MCC	A	A	A
	3	MESSAGE TRANSMIT TIME	A	A	A (2)
SIT HEADER	4	SIT	A	A	A
	5	DESTINATION MCC	A	A	A
	6	SPACECRAFT ID	A	A	A
	8	NUM. OF ALERTS WITH DOPPLER POSITIONS	A	.	A
	10	NUM. OF ALERTS WITHOUT DOPPLER POSITIONS (406 ONLY)	.	A	.
	11	SOURCE ID	A	A	A
	12	LOCAL/GLOBAL FLAG AND FREQ BAND	A	.	A
	13	BIAS, BSDEV AND DRIFT	X	X	X
	14	TCA	A	A	A
	15	WINDOW FACTOR	A	.	A
SOLUTION HEADER	16	NUMBER OF ITERATIONS	X	.	X
	17	CROSS TRACK ANGLE	X	.	X
	18	SECONDARY SOURCE ID	X	.	X
	19	NUMBER OF SIDEBANDS	.	.	.
	21	NUMBER OF POINTS (406 MHz)	A	A	A
	23	406 MESSAGE	A	A	A
	24	DDR/SERVICE AREA AND AR FLAG	A	.	A
	25	LATITUDE	A	.	A
	26	LONGITUDE	A	.	A
A DATA	27	ERROR ELLIPSE	A	.	A
	28	PROBABILITY	A	.	A
	29	NEXT TIME OF VISIBILITY	X	.	X
	30	CONFIDENCE FACTOR	A	.	A
	31	DATA RESIDUAL: SDEV AND TREND	X	.	X
B DATA		REPEAT MF #s 24 TO 31 AS REQUIRED BUT WITH DATA FOR B LOCATION	A	.	A
		REPEAT MF #s 11 TO 31 AS REQUIRED, BY MF# 8 OR 10 AND B DATA AS REQUIRED BY MF #8	A	A	A
SIT TRAILER	42	ENDSIT	A	A	A
MSG TRAILER	43	ENDMSG	A	A	A

Note 1: "A" - indicates actual values.
"X" - indicates default values are allowed.
Note 2: The underline "__" is an indication where the New Line (NL) code is to be inserted.

TABLE C.2

MESSAGE CONTENT
FOR
SYSTEM INFORMATION AND NARRATIVE MESSAGES

MESSAGE FORMAT	MF #	TITLE	SIT NUMBERS 415 417	416 515	425 525	435 535	445 545
MESSAGE HEADER	1	MESSAGE NUMBER	A	A	A	A	A
	2	REPORTING MCC	A	A	A	A	A
	3	MESSAGE TRANSMIT TIME	A	A	A	A	A
	4	SIT	A	A	A	A	A
SIT HEADER	5	DESTINATION MCC	A	A	A	A	A
	44	NUMBER OF SPACECRAFT	.	.	.	.	.
	6	SPACECRAFT ID	A	.	.	A	.
	7	ORBIT NUMBER	A	.	.	.	.
	22	BEACON ID	.	.	.	.	.
	32	NUMBER OF ORBIT VECTORS	.	.	.	.	.
	33	NUMBER OF PROCEDURE NAMES	.	.	.	A	.
	34	ORBIT TIME	.	.	.	.	.
	35	ORBIT POSITION	.	.	.	.	.
SIT BODY	36	ORBIT VELOCITY	.	.	.	.	.
	37	CALIBRATION TIME	A	.	.	.	.
	38	USO FREQUENCY	A	.	.	.	.
	39	COMMAND PROCEDURE NAME & PRIORITY	.	.	.	A	.
	40	EXECUTE TIME	.	.	.	A	.
	64	406 MHz SARR FREQ. CALIB. OFFSET	.	.	.	.	.
	65	406 MHz SARR FREQ. CALIB. DRIFT	.	.	.	.	.
	66	TIME OF 406 MHz SARR FREQ. CALIB.	.	.	.	.	.
		REPEAT MF #s 39 AND 40 FOR EACH PROCEDURE NAME (MF # 33)	.	.	.	A	.
		REPEAT MF #s 6 TO 66 AS REQUIRED BY MF # 44	.	.	.	.	.
	41	NARRATIVE TEXT	.	A	A	A	A
SIT TRAILER	42	ENDSIT	A	A	A	A	A
MSG TRAILER	43	ENDMSG	A	A	A	A	A

Notes: The narrative text is terminated as specified in MF# 41.
See section 4.1 for size specification.
The underline "__" is an indication where the New Line (NL) code is to be inserted.

TABLE C.2 (Cont.)

MESSAGE CONTENT FOR SYSTEM INFORMATION AND NARRATIVE MESSAGES

MESSAGE FORMAT	MF #	TITLE	SIT NUMBERS 216 215	510	605	915	925
MESSAGE	1	MESSAGE NUMBER	A	A	A	A	A
HEADER	2	REPORTING MCC	A	A	A	A	A
	3	MESSAGE TRANSMIT TIME	A	A	A	A	A
SIT	4	SIT	A	A	A	A	A
HEADER	5	DESTINATION MCC	A	A	A	A	A
	44	NUMBER OF SPACECRAFT	A	A	.	.	.
	6	SPACECRAFT ID	A	A	.	.	.
	7	ORBIT NUMBER	A	.	.	.	.
	22	BEACON ID	.	.	.	.	A
	32	NUMBER OF ORBIT VECTORS	A	.	.	.	.
	33	NUMBER OF PROCEDURE NAMES	.	.	.	.	.
	34	ORBIT TIME	A	.	.	.	.
	35	ORBIT POSITION	A	.	.	.	.
SIT BODY	36	ORBIT VELOCITY	A	.	.	.	.
	37	CALIBRATION TIME	.	.	.	.	.
	38	USO FREQUENCY	.	.	.	.	.
	39	COMMAND PROCEDURE NAME & PRIORITY	.	.	.	.	.
	40	EXECUTE TIME	.	.	.	.	.
	64	406 MHz SARR FREQ. CALIB. OFFSET	.	A	.	.	.
	65	406 MHz SARR FREQ. CALIB. DRIFT	.	X	.	.	.
	66	TIME OF 406 MHz SARR FREQ. CALIB.	.	A	.	.	.
		REPEAT MF #s 39 AND 40 FOR EACH PROCEDURE NAME (MF # 33)	.	.	.	.	.
		REPEAT MF #s 6 TO 66 AS REQUIRED BY MF # 44	A	A	.	.	.
	41	NARRATIVE TEXT	.	.	A	A	A
SIT TRAILER	42	ENDSIT	A	A	A	A	A
MSG TRAILER	43	ENDMSG	A	A	A	A	A

Notes: The narrative text is terminated as specified in MF# 41.
See section 4.1 for size specification.
The underline "__" is an indication where the New Line (NL) code is to be inserted.

TABLE C.3

MESSAGE CONTENT
FOR SIT 185 MESSAGES

PRINTED LINE #	MF #	TITLE	
1	45	MESSAGE TYPE	X
2	46	CURRENT MESSAGE NUMBER	X
	47	MCC REFERENCE	X
3	48	DETECTION TIME & SPACECRAFT ID	X
4	49	DETECTION FREQUENCY	X
5	50	COUNTRY OF BEACON REGISTRATION	X
6	51	USER CLASS OF BEACON	X
	52	IDENTIFICATION	X
7	53	EMERGENCY CODE	X
8	54	POSITIONS	X
9	54a	RESOLVED POSITION	X
10	54b	A POSITION & PROBABILITY	X
11	54c	B POSITION & PROBABILITY	X
12	54d	ENCODED POSITION AND TIME OF UPDATE	X
13	55	SOURCE OF ENCODED POSITION DATA	X
14	56	NEXT PASS TIMES	X
15	56a	NEXT TIME OF VISIBILITY OF RESOLVED POSITION	X
16	56b	NEXT TIME OF VISIBILITY A POSITION	X
17	56c	NEXT TIME OF VISIBILITY B POSITION	X
18	56d	NEXT TIME OF VISIBILITY OF ENCODED POSITION	X
19	57	BEACON HEX ID & HOMING SIGNAL	X
20	58	ACTIVATION TYPE	X
21	59	BEACON NUMBER	X
22	60	OTHER ENCODED INFORMATION	X
23+a	61	OPERATIONAL INFORMATION	X
24+a+b	62	REMARKS	X
25+a+b+c	63	END OF MESSAGE	X

where:

a = number of lines required for MF#61
b = number of lines required for MF#62
c = number of lines required for MF#63
The underline "_" is an indication where the New Line (NL) code is to be inserted.

APPENDIX C.1 TO ANNEX C

SAMPLE MESSAGES

1. GENERAL

This Appendix contains examples of messages formatted for transmission. The examples are shown double spaced for ease of reading. Each example is composed of 3 sections:

a. FORMAT FRAMES

b. MF #

c. CONTENT

1.1 Format Frames

The FORMAT FRAME corresponds to the required format given in Section 4 of the document. The INFO frame contains the text message and can therefore be formatted as required by Cospas-Sarsat. The HEADER and TRAILER frames are specified by the host network.

1.2 MF

This MF # provides the field number used within a particular message line and correspond to the MF # shown in Tables C.1, C.2 and C.3.

1.3 Content

This Section contains the actual information transmitted. Only the content in the examples is transmitted and not the FORMAT FRAME column and the MF #s column.

1.4 SIT 185

Because of its nature, examples for SIT 185 are presented differently than examples for other SIT messages and shows only the content as it would be printed at the receiving agency.

2. SAMPLES

Sample messages for each SIT format are provided in the following pages.

SAMPLE MESSAGE FOR

SIT 121

FORMAT FRAMES	MF#	CONTENT
HEADER		(as per communication network requirements if any)
	1,2,3	/01612 01600/3660/91 280 1705
	4-6,8	/121/3160/002/01
	11-15	/3663/+4/-03446.0 006.0 +11.00/91 280 1630 23.50/0
	16-20	/3/12.057/0000/01/0000 99
	24-31	/-366/+48.981/-113.906/052 011.8 003.2/52/91 280 1715/2/010.0 004.0
	24-31	/+316/+53.225/-090.102/160 019.7 009.7/48/91 280 1750/2/010.0 004.0
	42	/LASSIT
	43	/ENDMSG
TRAILER		(as per communication network requirements if any)

SAMPLE MESSAGE FOR

SIT 122, 123, 124, 132

FORMAT FRAMES	MF#	CONTENT
HEADER		(as per communication network requirements if any)
	1,2,3	/01614 00000/3660/80 005 1750
	4-6,10	/122/3160/102/02
	11,13,14,21	/3661/-03496.0 006.0 +11.00/80 005 1700 20.00/02
	23	/123456789ABCDEF012345600000000
INFO		
	11,13,14,21	/3661/-03496.0 006.0 +11.00/80 005 1700 20.00/02
	23	/23456789ABCDEF0123456700000000
	42	/LASSIT
	43	/ENDMSG
TRAILER		(as per communication network requirements if any)

Note: MF #4 must reflect SIT which is being used.

SAMPLE MESSAGE FOR

SIT 125, 126, 127, 133

FORMAT FRAMES	MF#	CONTENT
HEADER		(As per communication network requirements if any)
	1,2,3	/00127 00117/5120/91 280 1843
	4-6,8	/125/3660/004/02
	11-15	/5121/-4/-00405.0 001.0 -00.70/91 280 1516 16.00/1
	16-18,21	/0/15.859/0000/07
	23	/56E680AD19602009C7C7D000000000
	24-31	/+227/+22.811/-017.447/276 000.3 000.1/90/00 000 0000/3/010.0 000.0
INFO		
	24-31	/+366/+24.755/+017.906/074 003.5 001.6/10/00 000 0000/3/040.0 002.0
	11-15	/5121/-4/-00407.9 001.0 +00.40/91 280 1657 06.00/1
	16-18,21	/0/00.707/0000/18
	23	/56E680AD19602009C7C7D000000000
	24-31	/+227/+22.826/-017.686/077 001.5 000.1/51/00 000 0000/2/020.0 001.0
	24-31	/+366/+23.181/-016.104/077 001.5 000.1/49/00 000 0000/2/020.0 001.0
	42	/LASSIT
	43	/ENDMSG
TRAILER		(as per communication network requirements if any)

Note: MF #4 must reflect SIT which is being used.

SAMPLE MESSAGE FOR SIT 185

SAMPLE 406 MHz UNRESOLVED DOPPLER POSITION MATCH

(STANDARD LOCATION - EPIRB)

1. DISTRESS COSPAS-SARSAT UNRESOLVED DOPPLER POSITION MATCH

2. MSG NO: 00741 AUMCC REF: 1C04273BC0FFBFF

3. DETECTED AT: 19 MAR 09 0514 UTC BY SARSAT S08

4. DETECTION FREQUENCY: 406.0250 MHz

5. COUNTRY OF BEACON REGISTRATION: 224/ SPAIN

6. USER CLASS: STANDARD LOCATION - EPIRB
MMSI LAST 6 DIGIT: 080350

7. EMERGENCY CODE: NIL

8. POSITIONS:

RESOLVED - NIL
DOPPLER A - 41 07.1 N 001 12.7 E PROB 69 PERCENT
DOPPLER B - 36 48.4 N 022 20.2 E PROB 31 PERCENT
ENCODED - NIL
UPDATE TIME WITHIN 4 HOURS OF DETECTION TIME

9. ENCODED POSITION PROVIDED BY: EXTERNAL DEVICE

10. NEXT PASS TIMES:

RESOLVED - NIL
DOPPLER A - NIL
DOPPLER B - NIL
ENCODED - NIL

11. HEX ID:1C04273BC0FFBFF HOMING SIGNAL: 121.5 MHZ

12. ACTIVATION TYPE: NIL

13. BEACON NUMBER ON AIRCRAFT OR VESSEL: NIL

14. OTHER ENCODED INFORMATION: NIL

15. OPERATIONAL INFORMATION:

WARNING: AMBIGUITY IS NOT RESOLVED

16. REMARKS: NIL

END OF MESSAGE

SAMPLE MESSAGE FOR SIT 185

SAMPLE 406 MHz INITIAL ENCODED POSITION ALERT

(STANDARD LOCATION - EPIRB: SERIAL NUMBER)

1. DISTRESS COSPAS-SARSAT INITIAL ALERT

2. MSG NO: 00306 AUMCC REF: 12345

3. DETECTED AT: 17 APR 07 1627 UTC BY GOES 11

4. DETECTION FREQUENCY: 406.0250 MHz

5. COUNTRY OF BEACON REGISTRATION: 316/ CANADA

6. USER CLASS: STANDARD LOCATION - EPIRB
SERIAL NO: 05918

7. EMERGENCY CODE: NIL

8. POSITIONS:
RESOLVED - NIL
DOPPLER A - NIL
DOPPLER B - NIL
ENCODED - 05 00.00 S 178 00.00 E
UPDATE TIME WITHIN 4 HOURS OF DETECTION TIME

9. ENCODED POSITION PROVIDED BY: EXTERNAL DEVICE

10. NEXT PASS TIMES:
RESOLVED - NIL
DOPPLER A - NIL
DOPPLER B - NIL
ENCODED - NIL

11. HEX ID: 278C362E3CFFBFF HOMING SIGNAL: 121.5 MHZ

12. ACTIVATION TYPE: NIL

13. BEACON NUMBER ON AIRCRAFT OR VESSEL: NIL

14. OTHER ENCODED INFORMATION:
CSTA CERTIFICATE NO: 0108
BEACON MODEL - ACR, RLB-33
ENCODED POSITION UNCERTAINTY: PLUS-MINUS 30 MINUTES OF LATITUDE AND LONGITUDE

15. OPERATIONAL INFORMATION:
LUT ID: NZGEO1 WELLINGTON GEOLUT, NEW ZEALAND (GOES 11)
BEACON REGISTRATION AT [CMCC]

16. REMARKS: NIL

END OF MESSAGE

SAMPLE MESSAGE FOR SIT 185

SAMPLE 406 MHz UNLOCATED ALERT

(NATIONAL LOCATION - ELT)

1. DISTRESS COSPAS-SARSAT ALERT

2. MSG NO: 00141 SPMCC REF: 12345

3. DETECTED AT: 21 FEB 07 0646 UTC BY MSG-2

4. DETECTION FREQUENCY: 406.0249 MHz

5. COUNTRY OF BEACON REGISTRATION: 408/ BAHRAIN

6. USER CLASS: NATIONAL LOCATION - ELT
SERIAL NO: 000006

7. EMERGENCY CODE: NIL

8. POSITIONS:
RESOLVED - NIL
DOPPLER A - NIL
DOPPLER B - NIL
ENCODED - NIL
UPDATE TIME WITHIN 4 HOURS OF DETECTION TIME

9. ENCODED POSITION PROVIDED BY: EXTERNAL DEVICE

10. NEXT PASS TIMES:
RESOLVED - NIL
DOPPLER A - NIL
DOPPLER B - NIL
ENCODED - NIL

11. HEX ID: 331000033F81FE0 HOMING SIGNAL: 121.5 MHZ

12. ACTIVATION TYPE: NIL

13. BEACON NUMBER ON AIRCRAFT OR VESSEL: NIL

14. OTHER ENCODED INFORMATION: NIL

15. OPERATIONAL INFORMATION:
BEACON REGISTRATION AT WWW.406REGISTRATION.COM

16. REMARKS: NIL

END OF MESSAGE

SAMPLE MESSAGE FOR SIT 185

SAMPLE 406 MHz RESOLVED POSITION ALERT

(NATIONAL LOCATION - PLB)

1. DISTRESS COSPAS-SARSAT POSITION RESOLVED ALERT

2. MSG NO: 00812 AUMCC REF: 2DD747073F81FE0

3. DETECTED AT: 28 APR 07 0920 UTC BY SARSAT S11

4. DETECTION FREQUENCY: 406.0278 MHz

5. COUNTRY OF BEACON REGISTRATION: 366/ USA

6. USER CLASS: NATIONAL LOCATION - PLB
SERIAL NO: 167438

7. EMERGENCY CODE: NIL

8. POSITIONS:
RESOLVED - 33 27.1 N 038 56.2 E
DOPPLER A - 33 27.1 N 038 56.2 E
DOPPLER B - NIL
ENCODED - 33 25.93 N 038 55.67 E UPDATE TIME
WITHIN 4 HOURS OF DETECTION TIME

9. ENCODED POSITION PROVIDED BY: INTERNAL DEVICE

10. NEXT PASS TIMES:
RESOLVED - NIL
DOPPLER A - NIL
DOPPLER B - NIL
ENCODED - NIL

11. HEX ID: 2DD747073F81FE0 HOMING SIGNAL: 121.5 MHZ

12. ACTIVATION TYPE: NIL

13. BEACON NUMBER ON AIRCRAFT OR VESSEL: NIL

14. OTHER ENCODED INFORMATION: NIL

15. OPERATIONAL INFORMATION:
LUT ID: FRLUT2 TOULOUSE, FRANCE

16. REMARKS: NIL

END OF MESSAGE

SAMPLE MESSAGE FOR SIT 185

SAMPLE 406 MHz NOCR ENCODED POSITION ALERT

(NATIONAL LOCATION - PLB)

1. DISTRESS COSPAS-SARSAT NOTIFICATION OF COUNTRY OF BEACON REGISTRATION ALERT

2. MSG NO: 01737 AUMCC REF: 3EF6C34FBF81FE0

3. DETECTED AT: 20 MAR 07 0504 UTC BY SARSAT S08

4. DETECTION FREQUENCY: 406.0216 MHz

5. COUNTRY OF BEACON REGISTRATION: 503/ AUSTRALIA

6. USER CLASS: NATIONAL LOCATION - PLB
SERIAL NO: 099999

7. EMERGENCY CODE: NIL

8. POSITIONS:
RESOLVED - NIL
DOPPLER A - NIL
DOPPLER B - NIL
ENCODED - 28 06.00 S 153 40.00 E
UPDATE TIME WITHIN 4 HOURS OF DETECTION TIME

9. ENCODED POSITION PROVIDED BY: EXTERNAL DEVICE

10. NEXT PASS TIMES:
RESOLVED - NIL
DOPPLER A - NIL
DOPPLER B - NIL
ENCODED - 20 MAR 07 1417 UTC NZLUT WELLINGTON LUT NEW ZEALAND

11. HEX ID: 3EF6C34FBF81FE0
HOMING SIGNAL: OTHER (NOT 121.5 MHZ) OR NIL

12. ACTIVATION TYPE: NIL

13. BEACON NUMBER ON AIRCRAFT OR VESSEL: NIL

14. OTHER ENCODED INFORMATION:
ENCODED POSITION UNCERTAINTY:
PLUS-MINUS 4 SECONDS IN LATITUDE AND LONGITUDE

15. OPERATIONAL INFORMATION:
LUT ID: ASLUT CAPE TOWN, SOUTH AFRICA

16. REMARKS: NIL

END OF MESSAGE

SAMPLE MESSAGE FOR SIT 185

SAMPLE 406 MHz INITIAL POSITION ALERT

(STANDARD LOCATION – ELT: 24-BIT ADDRESS)

1. DISTRESS COSPAS-SARSAT INITIAL ALERT

2. MSG NO: 00741 AUMCC REF: 3266E2019CFFBFF

3. DETECTED AT: 22 APR 07 0912 UTC BY SARSAT S10

4. DETECTION FREQUENCY: 406.0247 MHz

5. COUNTRY OF BEACON REGISTRATION: 403/ SAUDI

6. USER CLASS: STANDARD LOCATION - ELT
AIRCRAFT 24 BIT ADDRESS: 7100CE

7. EMERGENCY CODE: NIL

8. POSITIONS:
RESOLVED - NIL
DOPPLER A - 32 49.1 N 081 54.2 E PROB 69 PERCENT
DOPPLER B - 24 18.1 N 041 18.*2* E PROB 31 PERCENT
ENCODED - NIL
UPDATE TIME WITHIN 4 HOURS OF DETECTION TIME

9. ENCODED POSITION PROVIDED BY: EXTERNAL DEVICE

10. NEXT PASS TIMES:
RESOLVED - NIL
DOPPLER A - NIL
DOPPLER B - NIL
ENCODED - NIL

11. HEX ID: 3266E2019CFFBFF HOMING SIGNAL: 121.5 MHZ

12. ACTIVATION TYPE: NIL

13. BEACON NUMBER ON AIRCRAFT OR VESSEL: NIL

14. OTHER ENCODED INFORMATION:
AIRCRAFT 24-BIT ADDRESS ASSIGNED TO: SAUDI ARABIA

15. OPERATIONAL INFORMATION:
LUT ID: INLUT1 BANGALORE, INDIA

16. REMARKS: NIL

END OF MESSAGE

SAMPLE MESSAGE FOR SIT 185

SAMPLE 406 MHz INVALID ALERT

(AS PER C/S A.001, SECTION III/B.1.1.3)

1. DISTRESS COSPAS-SARSAT INITIAL ALERT

2. MSG NO: 00506 AUMCC REF: 12345

3. DETECTED AT: 01 APR 07 0610 UTC BY SARSAT S08

4. DETECTION FREQUENCY: 406.0315 MHz

5. COUNTRY OF BEACON REGISTRATION: NIL

6. USER CLASS: NIL

7. EMERGENCY CODE: NIL

8. POSITIONS:
   RESOLVED - NIL
   DOPPLER A - 07 23.1 S 136 46.2 E PROB 92 PERCENT
   DOPPLER B - 03 00.1 S 155 08.2 E PROB 08 PERCENT
   ENCODED - NIL
   UPDATE TIME WITHIN 4 HOURS OF DETECTION TIME

9. ENCODED POSITION PROVIDED BY: NIL

10. NEXT PASS TIMES:
    RESOLVED - NIL
    DOPPLER A - NIL
    DOPPLER B - NIL
    ENCODED - NIL

11. HEX ID: 4C4B4E007688888

12. ACTIVATION TYPE: NIL

13. BEACON NUMBER ON AIRCRAFT OR VESSEL: NIL

14. OTHER ENCODED INFORMATION:

15. OPERATIONAL INFORMATION:
    THE B POSITION IS LIKELY TO BE AN IMAGE POSITION
    DATA DECODED FROM THE BEACON MESSAGE IS NOT RELIABLE

16. REMARKS: NIL

END OF MESSAGE

SAMPLE MESSAGE FOR SIT 185

SAMPLE 406 MHz RESOLVED UPDATE POSITION ALERT

(STANDARD LOCATION – SHIP SECURITY)

1. SHIP SECURITY COSPAS-SARSAT POSITION RESOLVED UPDATE ALERT

2. MSG NO: 00192 AUMCC REF: 2AB82AF800FFBFF

3. DETECTED AT: 03 MAY 07 0853 UTC BY SARSAT S09

4. DETECTION FREQUENCY: 406.0276 MHz

5. COUNTRY OF BEACON REGISTRATION: 341/ ST KITTS

6. USER CLASS: STANDARD LOCATION – SHIP SECURITY
MMSI LAST 6 DIGITS: 088000

7. EMERGENCY CODE: NIL

8. POSITIONS:
RESOLVED - 02 15.1 N 046 00.2 E
DOPPLER A - 02 25.1 N 046 06.2 E
DOPPLER B - NIL
ENCODED - 01 54.40 N - 045 37.53 E
UPDATE TIME WITHIN 4 HOURS OF DETECTION TIME

9. ENCODED POSITION PROVIDED BY: EXTERNAL DEVICE

10. NEXT PASS TIMES:
RESOLVED - NIL
DOPPLER A - NIL
DOPPLER B - NIL
ENCODED - NIL

11. HEX ID: 2AB82AF800FFBFF
HOMING SIGNAL: OTHER (NOT 121.5 MHZ) OR NIL

12. ACTIVATION TYPE: NIL

13. BEACON NUMBER ON AIRCRAFT OR VESSEL: 00

14. OTHER ENCODED INFORMATION: NIL

15. OPERATIONAL INFORMATION:
LUT ID: NZLUT WELLINGTON, NEW ZEALAND

16. REMARKS:
THIS IS A SHIP SECURITY ALERT.
PROCESS THIS ALERT ACCORDING TO RELEVANT SECURITY REQUIREMENTS

END OF MESSAGE

SAMPLE MESSAGE FOR SIT 185

SAMPLE 406 MHz DOPPLER POSITION CONFLICT ALERT

(SERIAL USER-LOCATION – ELT: 24-BIT ADDRESS)

1. DISTRESS COSPAS-SARSAT DOPPLER POSITION CONFLICT ALERT

2. MSG NO: 02698 AUMCC REF: C1ADE28809C0185

3. DETECTED AT: 06 APR 07 1440 UTC BY SARSAT S11

4. DETECTION FREQUENCY: 406.0246 MHz

5. COUNTRY OF BEACON REGISTRATION: 525/ INDONESIA

6. USER CLASS: SERIAL USER-LOCATION - ELT
AIRCRAFT 24-BIT ADDRESS: 8A2027

7. EMERGENCY CODE: NIL

8. POSITIONS:
RESOLVED - NIL
DOPPLER A - 07 00.1 S 098 42.2 E PROB 50 PERCENT
DOPPLER B - 05 42.1 S 107 20.2 E PROB 50 PERCENT
ENCODED - NIL
UPDATE TIME WITHIN 4 HOURS OF DETECTION TIME

9. ENCODED POSITION PROVIDED BY: INTERNAL DEVICE

10. NEXT PASS TIMES:
RESOLVED - NIL
DOPPLER A - 06 APR 07 1805 UTC AULUTW ALBANY LUT AUSTRALIA
DOPPLER B - 06 APR 07 1956 UTC AULUTW ALBANY LUT AUSTRALIA
ENCODED - NIL

11. HEX ID: C1ADE28809C0185 HOMING SIGNAL: 121.5 MHZ

12. ACTIVATION TYPE: NIL

13. BEACON NUMBER ON AIRCRAFT OR VESSEL: 00

14. OTHER ENCODED INFORMATION:
CSTA CERTIFICATE NO: 0097
BEACON MODEL - TECHTEST, UK: 503-1
AIRCRAFT 24-BIT ADDRESS ASSIGNED TO: INDONESIA

15. OPERATIONAL INFORMATION:
RELIABILITY OF DOPPLER POSITION DATA - SUSPECT
LUT ID: INLUT1 BANGALORE, INDIA

16. REMARKS:
THIS POSITION 51 KILOMETRES FROM PREVIOUS ALERT

END OF MESSAGE

SAMPLE MESSAGE FOR SIT 185

SAMPLE 406 MHz INITIAL ALERT

(SERIAL USER – EPIRB: NON-FLOAT FREE)

1. DISTRESS COSPAS-SARSAT INITIAL ALERT

2. MSG NO: 01087 AUMCC REF: ADCE402FA80028D

3. DETECTED AT: 20 MAY 07 1613 UTC BY SARSAT S08

4. DETECTION FREQUENCY: 406.0266 MHz

5. COUNTRY OF BEACON REGISTRATION: 366/ USA

6. USER CLASS: SERIAL USER – EPIRB (NON-FLOAT FREE)
SERIAL NO: 0003050

7. EMERGENCY CODE: NIL

8. POSITIONS:
RESOLVED - NIL
DOPPLER A - 36 38.1 S 168 58.2 E PROB 50 PERCENT
DOPPLER B - 36 39.1 S 169 01.2 E PROB 50 PERCENT
ENCODED - NIL

9. ENCODED POSITION PROVIDED BY: NIL

10. NEXT PASS TIMES:
RESOLVED - NIL
DOPPLER A - 21 MAY 07 0812 UTC
DOPPLER B - 21 MAY 07 0812 UTC
ENCODED - NIL

11. HEX ID: ADCE402FA80028D HOMING SIGNAL: 121.5 MHZ

12. ACTIVATION TYPE: MANUAL

13. BEACON NUMBER ON AIRCRAFT OR VESSEL: NIL

14. OTHER ENCODED INFORMATION:
CSTA CERTIFICATE NO: 0163
BEACON MODEL - MCMURDO LTD: G5 OR E5 SMARTFIND

15. OPERATIONAL INFORMATION:
RELIABILITY OF DOPPLER POSITION DATA - SUSPECT
LUT ID: AULUTW ALBANY, AUSTRALIA

16. REMARKS: NIL

END OF MESSAGE

SAMPLE MESSAGE FOR SIT 185

SAMPLE 406 MHz RESOLVED ALERT

(AVIATION USER - AIRCRAFT REGISTRATION)

1. DISTRESS COSPAS-SARSAT POSITION RESOLVED ALERT

2. MSG NO: 00932 AUMCC REF: 9D064BED62EAFE1

3. DETECTED AT: 10 MAY 07 0654 UTC BY SARSAT S11

4. DETECTION FREQUENCY: 406.0246 MHz

5. COUNTRY OF BEACON REGISTRATION: 232/ G. BRITAIN

6. USER CLASS: ELT USER
AIRCRAFT REGISTRATION: VP-CGK

7. EMERGENCY CODE: NIL

8. POSITIONS:
RESOLVED - 25 13.1 N 055 22.2 E
DOPPLER A - 25 17.1 N 055 23.2 E
DOPPLER B - NIL
ENCODED - NIL

9. ENCODED POSITION PROVIDED BY: NIL

10. NEXT PASS TIMES:
RESOLVED - NIL
DOPPLER A - NIL
DOPPLER B - NIL
ENCODED - NIL

11. HEX ID: 9D064BED62EAFE1 HOMING SIGNAL: 121.5 MHZ

12. ACTIVATION TYPE: MANUAL

13. BEACON NUMBER ON AIRCRAFT OR VESSEL: 0

14. OTHER ENCODED INFORMATION: NIL

15. OPERATIONAL INFORMATION: NIL

16. REMARKS: NIL

END OF MESSAGE

SAMPLE MESSAGE FOR

SIT 215, 216

FORMAT FRAMES	MF#	CONTENT
HEADER		(as per communication network requirements if any)
	1,2,3	/00011 00005/3660/91 280 1844
	4,5,44	/215/3160/02
	6,7,32	/002/35144/01
	34	/91 281 0000 00.000
	35,36	/+1624.4912 -8839.7195 -1719.9279/-001.28323 -002.07614 +007.11246
INFO		
	6,7,32	/106/02872/01
	34	/91 281 0000 00.000
	35,36	/-5287.2876 +4838.8309 +1711.7118/-001.55450 +000.87006 -007.08719
	42	/LASSIT
	43	/ENDMSG
TRAILER		(as per communication network requirements if any)

SAMPLE MESSAGE FOR

SIT 415

FORMAT FRAMES	MF#	CONTENT
HEADER		(as per communication network requirements if any)
INFO	1,2,3	/00022 00015/3660/80 100 1630
	4-7,37,38	/415/3160/101/01135/80 161 1856 24.239/1234567.123
	42	/LASSIT
	43	/ENDMSG
TRAILER		(as per communication network requirements if any)

SAMPLE MESSAGE FOR

SIT 416, 425, 445, 515, 525, 545, 605, 915

FORMAT FRAMES	MF#	CONTENT
HEADER		(as per communication network requirements if any)
	1,2,3	/00030 00015/3660/80 160 1550
	4,5	/416/3160
	41	/THE NARRATIVE TEXT IN PRINTABLE CHARACTERS IS PLACED HERE, WITH NO MORE THAN 69 CHARACTERS PER LINE.
INFO		QQQQ
	42	/LASSIT
	43	/ENDMSG
TRAILER		(as per communication network requirements if any)

Note: MF #4 must reflect SIT which is being used.

SAMPLE MESSAGE FOR

SIT 417

FORMAT FRAMES	MF#	CONTENT
HEADER		(as per communication network requirements if any)
INFO	1,2,3	/00022 00015/3660/80 100 1630
	4-7,37,38a	/417/3160/011/01135/80 161 1856 24.239/12345678.123
	42	/LASSIT
	43	/ENDMSG
TRAILER		(as per communication network requirements if any)

SAMPLE MESSAGE FOR

SIT 435, 535

FORMAT FRAMES	MF#	CONTENT
HEADER	(as per communication network requirements if any)	
INFO	1,2,3	/79566 00000/3160/08 191 1348
	4,5,6,33	/535/3660/008/02
	39,40	/DISC121A R/08 211 0000 00.00
	39,40	/DISC243A R/08 211 0000 00.00
	41	/TO: USMCC FM: CTEC SATELLITE S8 NOAA 16 COMMANDS TO BE SENT AT THE SOCC CONVENIENCE ON 29 JULY 2008 QQQQ
	42	/LASSIT
	43	/ENDMSG
TRAILER	(as per communication network requirements if any)	

Note: MF#4 must reflect the SIT being used.

SAMPLE MESSAGE FOR

SIT 510

FORMAT FRAMES	MF#	CONTENT
HEADER		(as per communication network requirements if any)
INFO	1,2,3	/66289 00000/3160/01 147 2249
	4,5,44	/510/3160/04
	6,64,65,66	/008/-0039.238/+57.201/01 147 1936
	6,64,65,66	/007/-0038.325/+99.999/01 147 1520
	6,64,65,66	/004/-0007.357/-52.301/01 147 1641
	6,64,65,66	/006/-0001.000/+99.999/01 147 2056
	42	/LASSIT
	43	/ENDMSG
TRAILER		(as per communication network requirements if any)

SAMPLE MESSAGE FOR REPORTING
SATELLITE PAYLOAD STATUS
USING SIT 605

FORMAT FRAMES	MF#	CONTENT
HEADER		(as per communication network requirements if any)
_____		
	1,2,3	/12345 00000/3660/97 123 1234
	4,5	/605/5030
	41	/ TO: ALL MCCS FROM: USMCC SUBJECT: INITIAL OPERATIONAL CAPABILITY FOR SARSAT-6 SAR PAYLOAD DATA CONSIDERED OPERATIONAL IN COSPAS-SARSAT (WWW.COSPAS-SARSAT.ORG) ---------- 406 SARR: OPERATIONAL 406 SARP (LOCAL): NOT OPERATIONAL 406 SARP (GLOBAL): NOT OPERATIONAL PSEUDO MODE: NOT APPLICABLE
INFO		STATUS OF SAR PAYLOAD (WWW.COSPAS-SARSAT.ORG) ---------- L-BAND DOWNLINK: NORMAL 406 SARR: NORMAL 406 SARR GAIN CONTROL: AUTOMATIC 406 SARP (LOCAL): UNUSABLE 406 SARP (GLOBAL): UNUSABLE PSEUDO MODE: NOT APPLICABLE BANDWIDTH: NOT APPLICABLE COMMENTS ---------- SARP FAILED AFTER LAUNCH QQQQ
	42	/LASSIT
	43	/ENDMSG
_____		
TRAILER		(as per communication network requirements if any)

SAMPLE MESSAGE FOR REPORTING
SATELLITE PAYLOAD STATUS
USING SIT 605

FORMAT FRAMES	MF#	CONTENT
HEADER		(as per communication network requirements if any)
_____		
	1,2,3	/12345 00000/2730/97 123 1234
	4,5	/605/5030
	41	/ TO: ALL MCCS FROM: CMC SUBJECT: DECLARATION OF OPERATION FOR COSPAS-6 SAR PAYLOAD DATA CONSIDERED OPERATIONAL IN COSPAS-SARSAT (WWW.COSPAS-SARSAT.ORG) ---------- 406 SARR: NOT APPLICABLE 406 SARP (LOCAL): OPERATIONAL 406 SARP (GLOBAL): OPERATIONAL PSEUDO MODE: NOT APPLICABLE
INFO		STATUS OF SAR PAYLOAD (WWW.COSPAS-SARSAT.ORG) ---------- L-BAND DOWNLINK: NORMAL 406 SARR: NOT APPLICABLE 406 SARR GAIN CONTROL: NOT APPLICABLE 406 SARP (LOCAL): DEGRADED 406 SARP (GLOBAL): DEGRADED PSEUDO MODE: NOT APPLICABLE BANDWIDTH: NOT APPLICABLE COMMENTS ---------- FAILURE IN ONE OF THE ON-BOARD DRUS QQQQ
	42	/LASSIT
	43	/ENDMSG
_____		
TRAILER		(as per communication network requirements if any)

SAMPLE MESSAGE FOR REPORTING SATELLITE PAYLOAD STATUS USING SIT 605

FORMAT FRAMES	MF#	CONTENT
HEADER		(as per communication network requirements if any)
	1,2,3	/12345 00000/3160/97 123 1234
	4,5	/605/3660
	41	/ TO: ALL MCCS FROM: CMCC SUBJECT: CHANGE IN STATUS FOR SARSAT-4 SAR PAYLOAD DATA CONSIDERED OPERATIONAL IN COSPAS-SARSAT (WWW.COSPAS-SARSAT.ORG) ---------- 406 SARR: NOT OPERATIONAL 406 SARP (LOCAL): OPERATIONAL 406 SARP (GLOBAL): OPERATIONAL PSEUDO MODE: NOT APPLICABLE STATUS OF SAR PAYLOAD (WWW.COSPAS-SARSAT.ORG) ----------
INFO		L-BAND DOWNLINK: NORMAL 406 SARR: UNUSABLE 406 SARR GAIN CONTROL: NOT APPLICABLE 406 SARP (LOCAL): NORMAL 406 SARP (GLOBAL): NORMAL PSEUDO MODE: NOT APPLICABLE BANDWIDTH: NOT APPLICABLE COMMENTS ---------- THE 406 SARR IS NO LONGER USABLE, IT SHOULD NOW BE CONSIDERED NOT OPERATIONAL QQQQ
	42	/LASSIT
	43	/ENDMSG
TRAILER		(as per communication network requirements if any)

SAMPLE MESSAGE FOR REPORTING
SATELLITE PAYLOAD STATUS
USING SIT 605

FORMAT FRAMES	MF#	CONTENT
HEADER		(as per communication network requirements if any)
_____	1,2,3	/12345 00000/2730/97 123 1234
	4,5	/605/5030
	41	/ TO: ALL MCCS FROM: CMC SUBJECT: DECOMMISSIONING OF COSPAS-5 SAR PAYLOAD DATA CONSIDERED OPERATIONAL IN COSPAS-SARSAT (WWW.COSPAS-SARSAT.ORG) ---------- 406 SARR: NOT APPLICABLE 406 SARP (LOCAL): NOT OPERATIONAL 406 SARP (GLOBAL): NOT OPERATIONAL PSEUDO MODE: NOT APPLICABLE STATUS OF SAR PAYLOAD (WWW.COSPAS-SARSAT.ORG) ---------- L-BAND DOWNLINK: UNUSABLE 406 SARR: NOT APPLICABLE 406 SARR GAIN CONTROL: NOT APPLICABLE 406 SARP (LOCAL): UNUSABLE 406 SARP (GLOBAL): UNUSABLE PSEUDO MODE: NOT APPLICABLE BANDWIDTH: NOT APPLICABLE COMMENTS ---------- COSPAS-5 DECOMMISSIONED ON FEBRUARY 5 1996 QQQQ
INFO		
	42	/LASSIT
	43	/ENDMSG
_____		
TRAILER		(as per communication network requirements if any)

SAMPLE MESSAGE FOR REPORTING
SATELLITE PAYLOAD STATUS
USING SIT 605

FORMAT FRAMES	MF#	CONTENT
HEADER		(as per communication network requirements if any)
	1,2,3	/12345 00000/3660/97 123 1234
	4,5	/605/5030
	41	/ TO: ALL MCCS FROM: USMCC SUBJECT: DECLARATION OF OPERATION FOR GOES-9 SAR PAYLOAD DATA CONSIDERED OPERATIONAL IN COSPAS-SARSAT (WWW.COSPAS-SARSAT.ORG) ---------- 406 SARR: OPERATIONAL
INFO		STATUS OF SAR PAYLOAD (WWW.COSPAS-SARSAT.ORG) ---------- 406 SARR: NORMAL 406 SARR GAIN CONTROL: AUTOMATIC BANDWIDTH: 406.005 - 406.045 POSITION: 135 W DOWNLINK FREQUENCY/TYPE: 1544.5 MHZ / BROAD COMMENTS ---------- GOES-9 SHOULD BE CONSIDERED OPERATIONAL AS OF 5 MAY 1995 QQQQ
	42	/LASSIT
	43	/ENDMSG
TRAILER		(as per communication network requirements if any)

SAMPLE MESSAGE FOR

SIT 925

FORMAT FRAMES	MF#	CONTENT
HEADER		(as per communication network requirements if any)
	1,2,3	/12345 00000/3160/94 194 2200
	4,5	/925/3660
	22	/A78D00597040401
INFO	41	/
		FROM: CMCC
		TO: USMCC
		SUBJECT: BEACON REGISTRATION INFORMATION
		BEACON INFO:
		FF 0/PF 1/CC 316/UC SER/ID 0005724/MODEL MAR/HS121/EC/AUT/00
		HEX A78D0 05970 40401/LAT :::::/LNG :::::::/:::/::::/:::/::/::
		OWNER INFO:
		LAST NAME: COAST GUARD-M FIRST NAME: N/A
		COMPANY NAME: CCG DARTMOUTH BASE
		ADDRESS: P.O. BOX 1000
		CITY: DARTMOUTH PROVINCE: NS
		COUNTRY: CANADA POSTAL CODE: B2Y SZ8
		HOME PHONE: 902 426 6030 OFFICE PHONE: 902 426 3707
		EXTENSION:
		PREFERRED LANGUAGE: ENGLISH
		COMMENTS: HOME NO: OPERATIONS NOTSHIP DESK (426 6030)
		BUSS NO: FLEET SUPERINTENDENT (426 3707)
		SEW WORKSHOP NO: (426 7017)
INFO		VESSEL INFO:
		NAME: CCGS SIR WILLIAM ALE
		REGISTRATION/LICENCE NUMBER: 807685
		HOME PORT: DARTMOUTH
		CALL SIGN: CGUM VESSEL LENGTH: 83 METERS
		CLASS: COLOUR:
		VESSEL TYPE: GOVERNMENT HULL: RED
		HULL: SINGLE HULL SAIL: N/A
		PROPULSION: POWER INBOARD SUPER STRUCTURE: WHITE
		DISTINCTIVE FEATURE:
		HELO DECK AND HANGAR; LIGHT ICEBREAKER/BUOY TENDER
		COMMENTS: 1-28FT F.G. BOAT
		1-28FT SELF-PROPELLED STEEL BARGE
		1-15FT ZODIAC; 1-6 MAN LIFERAFT
		CELLULAR: 902 456 9281
		QQQQ
	42	/LASSIT
	43	/ENDMSG
TRAILER		(as per communication network requirements if any)

Note: MF #41 THE NARRATIVE TEXT IN PRINTABLE CHARACTERS IS PLACED HERE, WITH NO MORE THAN 69 CHARACTERS PER LINE.

- END OF ANNEX C –

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ANNEX D

USEFUL INFORMATION

(Standard Message Formats between MCC and RCC)

1. Acknowledgment of distress alert message:

FM: RCC
TO: MCC

DISTRESS ALERT REPORT (NUMBER)

A. MESSAGE RECEIVED

2. Request to repeat message:

FM: RCC
TO: MCC

DISTRESS ALERT REPORT (NUMBER)

A. REPEAT REQUESTED

3. SAR operation completed:

FM: RCC
TO: MCC

DISTRESS ALERT REPORT (NUMBER)

A. CASE CLOSED (SUSPENDED)
B. BEACON TURNED OFF

4. Request to "listen to" particular geographic area:

FM: RCC
TO: MCC

REQUEST FOR ALERT DATA

A. GEOGRAPHIC LOCATION
B. FREQUENCY
C. CANCELLATION DATE/TIME

5. Request for SAR data associated with satellite beacon:

FM: RCC
TO: MCC

REQUEST FOR ADDITIONAL INFORMATION FROM BEACON REGISTER

A. BEACON IDENTIFICATION CODE

- END OF ANNEX D -

ANNEX E

COSPAS-SARSAT PROTOCOL FOR THE TRANSMISSION OF SIT MESSAGES VIA THE X.25 NETWORK

E.1 X.25 MESSAGE TRANSMISSION PROTOCOL

MCCs exchange messages in order to distribute information within the Cospas-Sarsat System.

The X.25 network (also referred to as the Public Switched Data Network or PSDN) is a general-purpose global data communication network supporting point-to-point electronic data communications. The X.25 network provides raw data communication capabilities.

The Cospas-Sarsat protocol for the transmission of SIT messages via the X.25 network builds upon the recommendations of the CCITT. These recommendations can be found in the publication "CCITT Blue Book, (Volume VIII – Fascicle VIII.2) Data Communication Networks: Services and Facilities, Interfaces Recommendations X.1-X.32".

Within the Cospas-Sarsat ground segment, the X.25 network may be used for the transmission of message data from one MCC to another. While the X.25 network allows MCCs to establish real-time data links, the CCITT recommendations themselves do not specify how messages should be exchanged over these links.

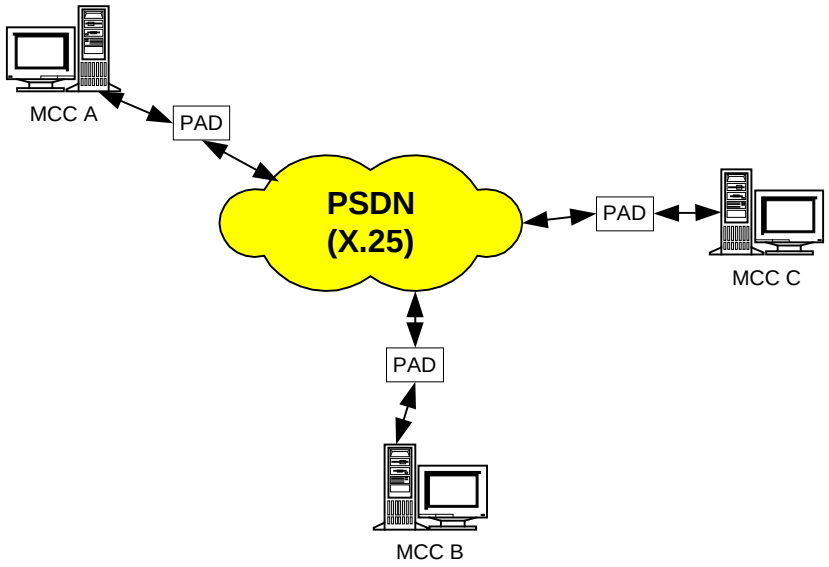
MCCs must exchange messages efficiently and reliably without data corruption or loss. There is a possibility for data loss within the X.25 network if the correct data exchange procedures are not observed. Therefore, it is mandatory that each MCC conduct message exchange in accordance with an agreed protocol.

This Annex specifies a basic message transmission protocol to be used by MCC computers when exchanging messages over the X.25 network.

E.2 X.25 NETWORK BASICS

The X.25 network is a global data network that allows computers to establish connections and exchange data. Data and control signals are conveyed across the X.25 network in discrete units called packets.

The following diagram shows the basic configuration of MCCs and the X.25 network.



An MCC computer is connected to the X.25 network via a Packet Assembler/Disassembler (PAD).

A PAD converts the continuous stream of message bytes output from an MCC into discrete packets for transmission on the X.25 network. The destination PAD converts the arriving packets back to a continuous stream of message bytes for processing by the receiving MCC.

The X.25 network can support permanent, semi-permanent and transient connections between MCCs. This document only describes procedures that relate to transient connections.

A transient X.25 connection is similar to a telephone call. The calling MCC uses its local PAD to place an X.25 call to the called MCC. The calling MCC must provide the X.25 network address (or number) of the called MCC. The PAD of the called MCC accepts the X.25 call thereby establishing a data connection between the two MCCs.

Once the connection has been established, the two MCC exchange data until one of the MCCs instructs its local PAD to clear the call. The X.25 connection is then complete. Within the Cospas-Sarsat System, most connections last only a few seconds.

E.3 X.25 RELATED PUBLICATIONS

A comprehensive technical description of the standards relating to the X.25 network are contained in publications of the International Telecommunications Union's (ITU) International Telegraph and Telephone Consultative Committee (CCITT) "Blue Book, (Volume VIII – Fascicle VIII.2) Data Communication Networks: Services and Facilities, Interfaces Recommendations X.1-X.32".

In particular the following recommendations are of direct relevance to MCCs which use the X.25 network:

a) Recommendation X.25 – Interface between terminals and the packet mode public data networks;

b) Recommendation X.28 – Interface between terminal equipment accessing a PAD in a public data network; and

c) Recommendation X.29 – Procedures for the exchange of control information and data between PADs or a PAD and a packet mode terminal.

These publications are available via the ITU web site at **http://www.itu.int/**.

E.4 BASIC REQUIREMENTS FOR AN MCC CONNECTED TO THE X.25 NETWORK

This section describes the basic requirements that must be met by an MCC with respect to its X.25 network connection.

a) an MCC connected to the X.25 network shall comply with the applicable CCITT recommendations;

b) unless otherwise stated in this protocol, each MCC shall use default values for all parameters associated with the X.25 network and associated connections. All MCCs shall be capable of establishing an X.25 connection using the following parameters:

Packet size	128 bytes
Window size	2 packets

These and other default values are specified in the CCITT recommendations. On a bilateral basis, MCCs can use other values for these parameters;

c) each MCC shall be capable of processing multiple simultaneous inbound and outbound X.25 connections; and

d) each MCC shall be able to send data to another MCC on a connection it opened concurrent with receiving data on a connection opened by the other MCC.

E.5 X.25 CONNECTIONS

Figure E.1 depicts the phases of an X.25 connection.

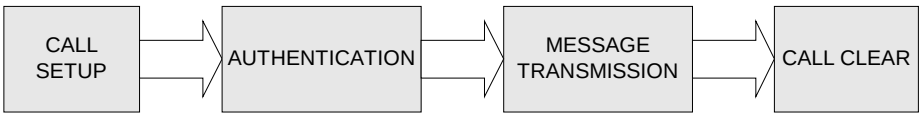


Figure E.1: Phases of an X.25 Connection

Figure E.2 shows the timing of packet flow in a typical X.25 connection.

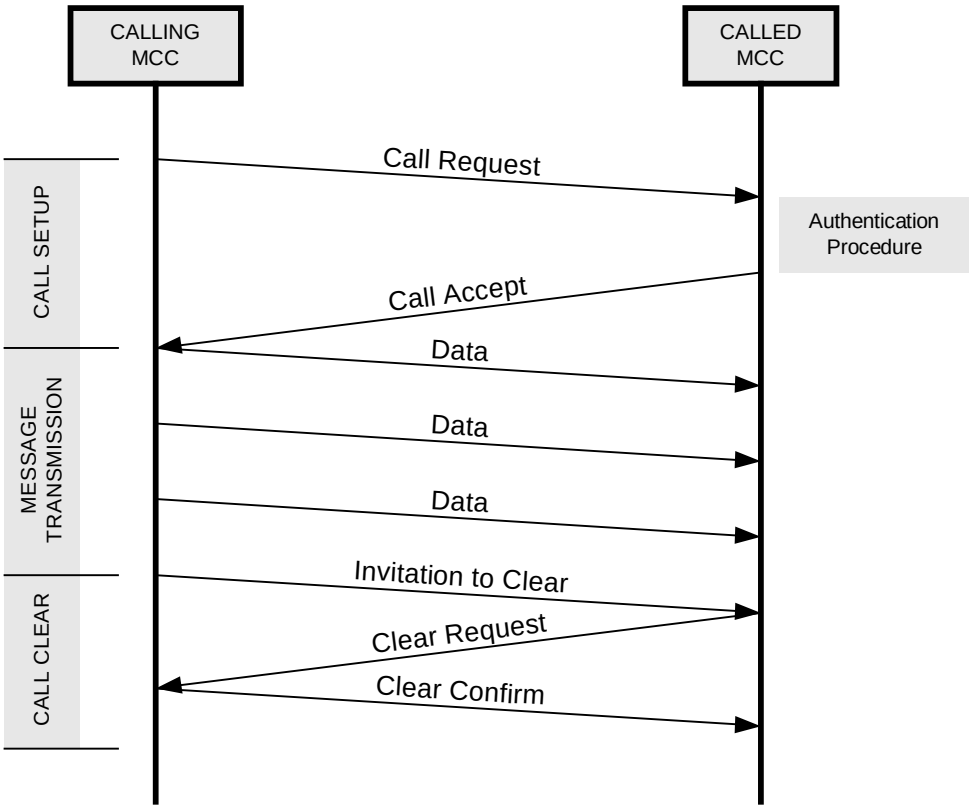


Figure E.2: Packet Flow in a Typical X.25 Connection

The following sections describe procedures that shall apply during each phase of the X.25 connection.

E.5.1 X.25 CALL SET-UP

The calling MCC initiates a connection via its local PAD which responds by issuing a **Call Request Packet**. Upon detecting the incoming call, the called MCC shall execute its authentication procedure to accept or reject the call. Subsequently, the called PAD will issue a **Call Accept Packet** or **Clear Request Packet**.

The exchange of the various control packets by the PADs is conducted according to the CCITT recommendations. In addition to the CCITT recommendations, MCCs must observe the following protocol:

a) an MCC with message data to transmit (the calling MCC) shall initiate the X.25 connection to the destination MCC (the called MCC);

b) the calling MCC shall provide sufficient information in the **Call Request Packet** to satisfy the called MCC's authentication procedure;

c) an MCC shall only initiate one connection at a time to another MCC; and

d) the calling MCC shall consider the call set-up procedure to be successful only upon receipt of a **Call Accept Packet**. Any other result shall be regarded as a failure of the X.25 connection.

E.5.2 AUTHENTICATION PROCEDURE

An MCC shall enforce the following authentication procedure to ensure that only authorised MCCs are permitted to establish X.25 connections. The authentication procedure makes use of the following information to verify the identity of the calling MCC:

- the authorised X.25 called address;
- the X.25 calling address (referred to as caller ID or CID); and
- call user data (CUD), a maximum of 16 bytes of agreed "password" data.

This above information shall be provided by the calling MCC in the **Call Request Packet**.

The following protocol shall be observed:

a) Specific X.25 called address, CID and CUD values shall be determined by MCCs on a bilateral basis.

b) The called MCC shall reject the call request if the required information is absent or inaccurate. Rejection of the call request shall be signalled by clearing the connection.

E.5.3 MESSAGE TRANSMISSION

The following procedure shall apply to the message transmission phase:

a) immediately after call set-up is completed, the calling MCC shall transmit all of its message data;

b) the calling MCC may send more than one SIT message during a single connection;

c) when sending a SIT message via X.25, an MCC shall set the "M" bit in every packet except the last packet, to indicate that the series of data packets comprise one SIT message;

d) once all data has been transmitted the calling MCC shall commence the call clear procedure by issuing an "invitation to clear (ITC)";

e) after sending an ITC, the calling MCC shall send no more data on the X.25 connection; and

f) the called MCC shall not transmit any data packets (data packets received by the calling MCC shall be deemed to be a failure of the X.25 connection).

E.5.4 CALL CLEAR PROCEDURE

Message data may be lost in the X.25 network if the connection is not correctly cleared. The following procedure shall be implemented to clear the X.25 connection:

a) The calling MCC shall issue an ITC once all message data has been transmitted.

b) Upon receiving an ITC, the called MCC shall immediately clear the connection by sending no diagnostic or by sending a clear diagnostic of 0.

c) After sending an ITC, the calling MCC shall set a timer to ensure that the called MCC responds with a clear. If this timer expires, the calling MCC shall initiate a clear immediately and shall regard this event as a failure of the call clear procedure and of the X.25 connection. The period of this timer shall be 30 seconds. If the calling MCC clears the connection due to a timeout, it should set the clear diagnostic to 50.

d) On accepting a connection, the called MCC shall set an idle timer. Whenever data is received the called MCC shall reset the idle timer. If this timer expires, the called MCC shall clear the connection immediately. The period of this timer shall be 45 seconds. If the called MCC clears the connection due to a timeout, it should set the clear diagnostic to 49.

e) The calling MCC shall deem the call clear procedure to be successful only if, after issuing an ITC, it receives a Clear Indication with a clear cause of 0 or 128 - 255 (which indicates a clear originating at the called MCC) and a diagnostic of 0. If the connection is cleared in any other way the calling MCC shall deem the call clear procedure and the connection to have failed.

f) The called MCC shall attempt to process all message data received on the X.25 connection irrespective of the manner in which the connection is cleared.

Figure E.3 depicts the clearing of the connection by the calling MCC should the called MCC fail to respond to the ITC for any reason.

Figure E.4 depicts the clearing of the connection by the called MCC should the connection remain open for any reason.

E.6 SUCCESSFUL TRANSMISSION AND RETRIES

The calling MCC shall deem a connection to be successful only if each phase of the X.25 connection (Call Set-up, Authentication, Message Transmission and Call Clear) is successfully completed.

In the event of a connection failure, the calling MCC shall consider all messages sent during the connection to be undelivered.

To cater for transient problems in the X.25 network (e.g. network congestion, remote party busy) the calling MCC may repeat (retry) an X.25 connection in the event of the failure of a connection. The time interval between retries shall not be less than 15 seconds.

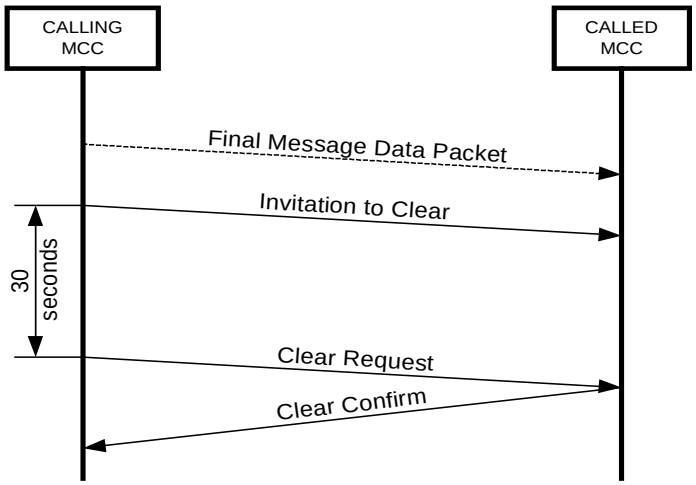


Figure E.3: Clearing Procedure if ITC Fails

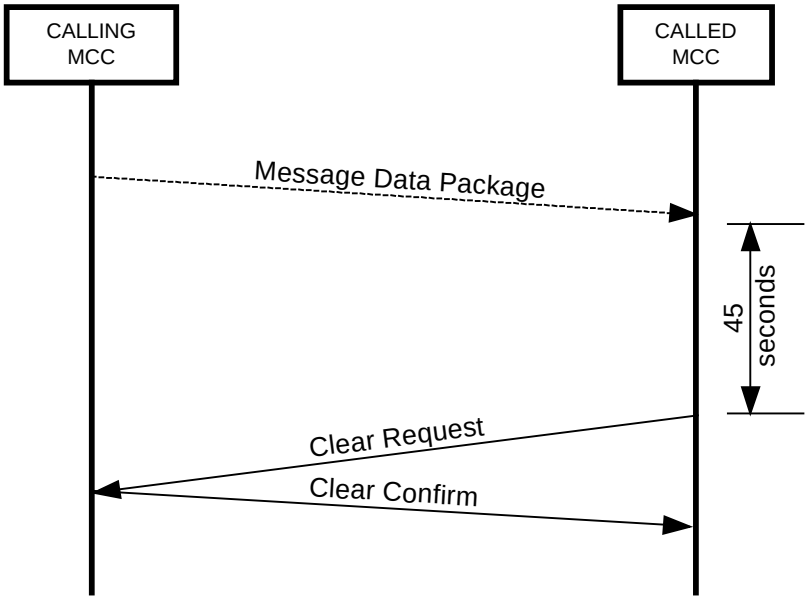


Figure E.4: Clearing Procedure by Called MCC

APPENDIX E.1 TO ANNEX E

X.25 CONNECTION PROCEDURES

The following flowcharts depict the basic procedures to be followed when transmitting or receiving a message via the X.25 network.

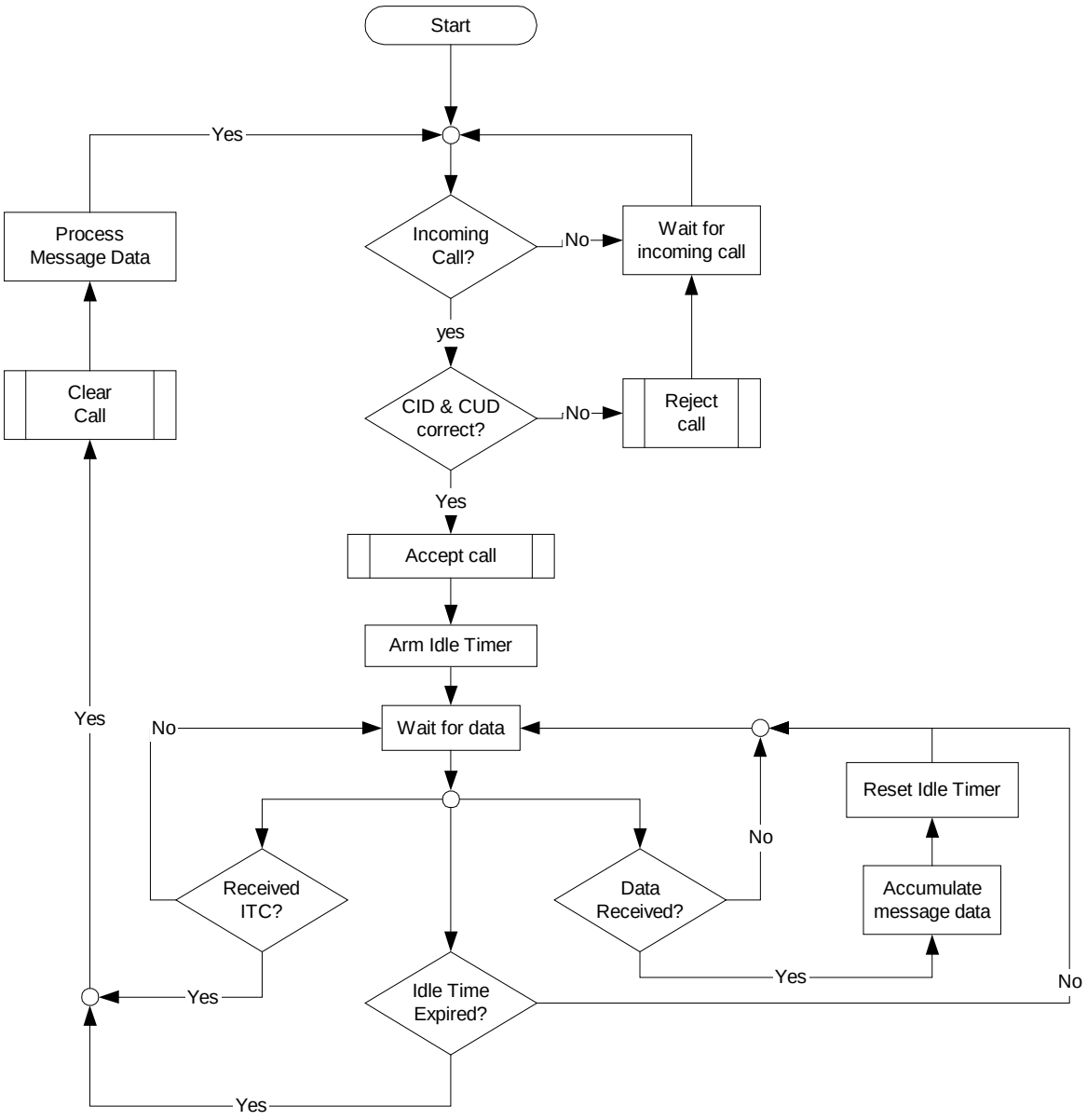


Figure E.5: X.25 Network Message Reception Procedure for the Called MCC

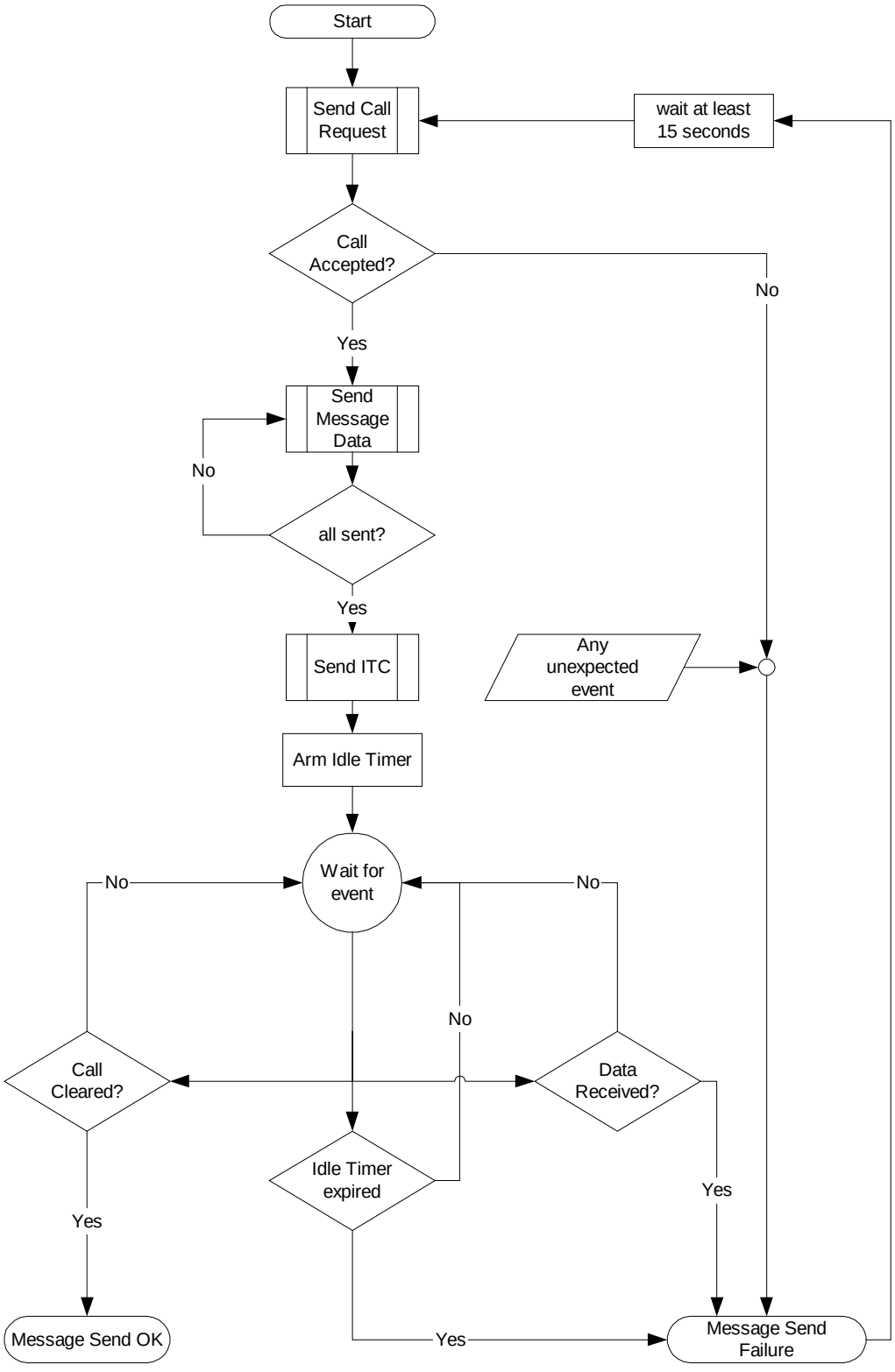


Figure E.6: X.25 Network Message Transmission Procedure for the Calling MCC

APPENDIX E.2 TO ANNEX E

DEFINITION OF X.25 TERMS

CALL REQUEST	An X.25 control packet used by a PAD to establish an X.25 connection to a remote PAD.
CALL ACCEPT	An X.25 control packet issued by a PAD when accepting an incoming X.25 call.
CALL REJECT	An X.25 control packet issued by a PAD when rejecting an incoming X.25 call. The packet contains "cause" and "diagnostic" codes indicating the reason for the rejection. For further information refer to the CCITT specification.
CALLING MCC	The MCC initiating the X.25 connection to the called MCC for the purpose of transmitting SIT message(s) to the called MCC.
CALLED MCC	The MCC accepting an incoming X.25 connection for the purpose of receiving SIT messages from the calling MCC.
CLEAR CONFIRM	An X.25 control packet issued by a PAD acknowledging the receipt of a Clear Request packet.
CLEAR REQUEST	An X.25 control packet issued by a PAD to inform the remote PAD that the connection has been terminated.
CLEAR INDICATION	A signal from an X.25 PAD indicating that the X.25 connection to the remote party has been cleared.
CID	Caller ID. The X.25 address advertised by the calling MCC and sent to the calling MCC in the call request packet. The CID field is defined in CCITT recommendation X.25 section 5.2.1.
CUD	Call User Data provided by the calling MCC to allow the called MCC to verify the identity of the caller. Maximum length is 16 bytes. The CUD field is defined in CCITT recommendation X.25 section 5.2.2.5.
ITC	Invitation to Clear. An X.25 control packet issued by the calling MCC, inviting the called MCC to clear the X.25 connection. The format of the ITC is defined in CCITT recommendation X.29 section 4.4.8.

M BIT	"More Data bit". When set (ON), indicates that the current message is continued in the next packet. When reset (OFF) indicates the end of the current message. The M bit is defined in CCITT recommendation X.25 section 5.3.1.4.
PAD	Packet Assembler/Disassembler. Termination unit for an X.25 network. A PAD in the X.25 network is analogous to a telephone handset in the public telephone network.
PACKET	A collection of data and/or control information transported as a discrete unit across an X.25 network connection. A packet may contain up to 128 bytes of data.

- END OF ANNEX E -

ANNEX F

COSPAS-SARSAT STANDARD FOR THE TRANSMISSION OF SIT MESSAGES VIA FTP

F.1 FILE TRANSFER PROTOCOL (FTP) COMMUNICATIONS

Each MCC communicating via FTP shall comply with the applicable standards described in the Internet Engineering Task Group document RFC 959 - File Transfer Protocol, which can be found at the following web address: www.ietf.org.

F.1.1 FILE NAMING CONVENTION

An MCC shall send a SIT message by writing a file on the FTP server of the receiving MCC. Each file shall contain exactly one SIT message.

The FTP file name format shall be "?SRCE_?DEST_?CUR#.TXT", where:

- "?SRCE" is theSourceMCCName (per www.cospas-sarsat.org: >>System>>Detailed System Description>>MCCs),
- "?DEST" is theDestinationMCC Name (per www.cospas-sarsat.org: >>System>>Detailed System Description>>MCCs), and
- "?CUR#" is the Current Message Number (Message Field 1).

The FTP file name shall contain only upper case characters. For example, a file with the name "USMCC_CMCC_02345.TXT" contains Current Message Number 02345 sent by the USMCC to the CMCC.

Any MCC that wants to receive data via FTP shall provide the Host Name and/or Internet Protocol (IP) Address, User Name, Password, and Message Directory Name in Table F.1, to enable other MCCs to place data on the FTP server of the receiving MCC. On a bilateral basis, the receiving and sending MCC should agree on passwords and other security measures. It is the responsibility of the receiving MCC to provide adequate security for its FTP server.

The sending MCC shall write a file with a file name extension of ".TMP" on the FTP server of the receiving MCC. A file is given a temporary name to prevent the receiving MCC from processing a file before it is complete. Once the file transfer is complete, the sending MCC shall rename the file with an extension ".TXT". Once the file has been renamed, the sending MCC shall not manipulate the file. The receiving MCC shall not process files with an extension of ".TMP". The receiving MCC shall be responsible for disposing of files placed on its FTP server. If the receiving MCC detects an anomalous condition in the FTP file transfer, it shall notify the transmitting MCC.

If a FTP file transfer fails for any reason the transmitting MCC shall try to resend the message, and notify the receiving MCC if the failure persists.

Each MCC communicating via FTP shall operate in binary transfer mode.

F.2 FILE TRANSFER PROTOCOL (FTP) INFORMATION LIST

A list of information used to send messages to an MCC via FTP is provided in this section. This list is composed of 6 items:

1. Receiving MCC
2. Host Name
3. IP Address
4. User Name
5. Password
6. Message Directory Path

F.2.1 Receiving MCC

The name of the MCC to receive data via FTP. This name matches the MCC Identification Code (see www.cospas-sarsat.org; >>Contacts>>Cospas-Sarsat MCCs).

F.2.2 Host Name

This is the FTP Host Name of the receiving MCC. *** indicates that the Host Name is provided on a need to know basis.

F.2.3 Internet Protocol (IP) Address

This is the Internet Protocol Address referenced to reach the receiving MCC. *** indicates that the IP Address is provided on a need to know basis.

F.2.4 User Name

The User Name required to login to the FTP server of the receiving MCC. If the value is "Sending MCC Name", then the user name is the name of the sending MCC, per Table B.2. *** indicates that the User Name is provided on a need to know basis.

F.2.5 Password

The password required to access the FTP server of the receiving MCC. *** indicates that the Password is provided on a need to know basis.

F.2.6 Message Directory Path

The path of the directory into which message files shall be written. <MCCname> indicates that each MCC will put messages in a sub-directory per MCC, where the sub-directory name is the name of the sending MCC, per Table II/A.1 at Annex II/A to C/S A.001.

F.3 SECURITY

All MCCs with an Internet connection must be protected by firewall technology.

F.3.1 Passwords

MCCs shall formulate passwords using security best practices. The passwords shall have the following characteristics:

- Contain at least 8 characters
- Not have any characters that are “blank”
- Six of the characters shall occur once in the password
- At least one of the characters must be a number (0-9) or a special character (~,!,$,#,%,*) – see Table F.2
- At least one of the characters must be from the alphabet (upper or lower case)
- Passwords shall not include:

    - words found in any dictionary (English or other language), spelled forward or backward
    - system User Ids
    - addresses or birthdays
    - common character sequences (e.g., 123, ghijk, 2468)
    - vendor-supplied default passwords (e.g., SYSTEM, Password, Default, USER, Demo)
    - words that others might guess

MCCs shall change passwords at least semi-annually.

To protect passwords from unauthorized disclosure MCCs shall exchange passwords by telephone or facsimile if allowed by security authorities at each MCC. MCCs shall coordinate the exchange of new passwords during the last full work week of April and October of each year. MCCs exchanging passwords shall agree on an implementation date that is not later than the end of the week during which new passwords are exchanged.

Table F.1: FTP Password Special Characters

SYMBOL	NAME
~	TILDE
!	EXCLAMATION POINT
@	AT SYMBOL
#	OCTOTHORPE
$	DOLLAR SIGN
%	PERCENT
^	CHAPEAU / HAT
&	AMPERSAND
*	ASTERIX
)	CLOSE PARENTHESES
(	OPEN PARENTHESES
`	APOSTROPHE
-	HYPHEN
“	QUOTATION
/	VIRGULE

F.3.2 Access

Access permissions on all directories and files on the FTP server shall follow the principle of “least permissions” to ensure that no unauthorized access is allowed. “Least permissions” means that each user is granted the minimum access required to perform their assigned tasks.

MCCs shall check IP addresses to limit server access only to authorized users.

MCCs shall allow access to their FTP servers only through ports 20 and 21. All other ports that are not being used shall be closed.

F.3.3 Anonymous FTP

MCCs shall not use anonymous FTP.

F.3.4 Encryption of Critical Information

MCCs shall implement methodologies to encrypt FTP login names (userids) and passwords during file transmission to prevent unauthorized disclosure. These methodologies include FTP over Internet VPN. Standards for the use of hardware VPN are contained in Annex G.

F.3.5 Monitoring for a Potential Security Breach

MCCs shall monitor the FTP servers for abnormal activity. If a breach of security is found, MCCs shall notify all FTP correspondents as soon as possible to minimize exposure.

Examples of items that should be monitored on a FTP server include:

Event logs
- Should be set and checked for failed login attempts
- Gaps in time and date stamps
- Attempts to elevate privileges

Disk Space
- Unexplained loss of disk space
- Unexplained disk access

Unexplained events
- Large number of failures (system or programs crash)
- Unexplained process or programs running
- New users added
- Virus protection has been disabled

F.3.6 Security Patches

MCCs shall apply the latest software and security patches to their FTP servers as soon as possible.

- END OF ANNEX F -

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ANNEX G

COSPAS-SARSAT STANDARD FOR THE TRANSMISSION OF SIT MESSAGES VIA HARDWARE VPN

G.1 INTRODUCTION

A Virtual Private Network (VPN) provides a secure method to transmit information over the Internet. A tunnelling technology such as Internet Protocol IPSec is used to set up private connections between separate sites. A tunnel provides a means for forwarding data across a network from one site to another, as if they were directly connected.

Prior to an MCC setup/installation an MCC installer should ensure that the IP address range selected for the MCC's network does not conflict with the IP range of all other MCCs with which it may potentially connect.

IP conflicts will not stop the creation of the VPN tunnel but will prevent the transfer of data using FTP between the hosts.

This aspect is especially relevant when a new ground segment is being installed.

G.2 STANDARDS

G.2.1 Tunnelling

MCCs that use VPN to transmit data via the Internet shall use IPSec. IPSec is a framework of open standards developed by the Internet Engineering Task Force (IETF). IPSec provides security for transmission of sensitive information over the Internet. IPSec acts at the network layer, protecting and authenticating IP packets between participating IPSec devices ("peers"), such as Cisco routers.

IPSec provides the following network security services:

- Data Confidentiality - The IPSec sender can encrypt packets before transmitting them across a network.
- Data Integrity - The IPSec receiver can authenticate packets sent by the IPSec sender to ensure that the data has not been altered during transmission.
- Data Origin Authentication - The IPSec receiver can authenticate the source of the IPSec packets sent. This service is dependent upon the data integrity service.
- Anti-Replay - The IPSec receiver can detect and reject replayed packets.

G.2.2 Mutual Confirmation Method

This step performs the function of a negotiator. It will allow two IPSec nodes to decide which algorithms they will use for authentication and encryption, as well as how long this session will last. The Cospas-Sarsat standard is the PreShared Key Internet Key Exchange (IKE) method.

G.2.3 Code Algorithm (Crypto Algorithm)

This step applies a mathematical formula to the information to be encrypted. MCCs should implement the highest level of encryption that is available on a bilateral basis. Possible choices include:

DES
3DES
CAST128
Blowfish

G.2.4 Confirmation Algorithm

This step applies an algorithm that is used to validate that both ends of a session (MCCs) are in fact who they claim to be. The Cospas-Sarsat standard is the MD5 confirmation algorithm.

G.2.5 Perfect Forward Security

Perfect Forward Security (PFS) should be set to group 1, 2, or 3.

G.2.6 Lifetime

Specify lifetime at an agreed standard time (e.g. 120 minutes).

G.3 HARDWARE CONFIGURATION

Hardware VPN is defined as any piece of commercial or industrial-grade hardware that supports international and non-proprietary VPN standards, for example IPSec. Some possible hardware VPN devices include, but are not limited to Routers, Concentrators, VPN appliances and Firewalls, in any combination.

These devices provide the security called for in section F.3.4 of the FTP standard (Annex F).

G.4 CONFIGURING FTPV BETWEEN MCCs

The following two templates can be used when configuring FTPVbetween two MCCs. The two MCCs are shown as XXMCC and YYMCC.

The first template,Table G.1, is used for configuring the VPN concentrators at each end of the VPN.The second column lists all parameters configured on the XXMCC VPN concentrator. The third column lists all parameters configured on the YYMCC VPN concentrator. The IKE Peer Address on the XXMCC VPN concentrator is provided by YYMCC.The IKE Peer Address on the YYMCC VPN concentrators is provided by XXMCC. All other IKE and IPSEC parameters are the same on both VPN concentrators and must be negotiated by the two MCCs.

FTP-VPN Configuration		
	As Configured on the XXMCC VPN Concentrator	**As Configured on the YYMCC VPN Concentrator**
Peer Site ID	YYMCC	XXMCC
IKE Details		
IKE Peer Address		
IKE Encryption		
IKE Authentication		
IKE Key Exchange		
IKE Pre-Shared Key		
IKE Time Lifetime		
IKE Data Lifetime		
IPSEC Details		
IPSEC Encryption		
IPSEC Authentication		
IPSEC PFS		
IPSEC Data Lifetime		
IPSEC NAT-T		
IPSEC Encapsulation Mode		
IPSEC Connection Type		

Table G.1 : Template for VPN Concentrator Parameters

The second template, Table G.2, lists the information required by eachMCC to establish a FTP connection and to transmit SIT messages.The information in the second column lists all information required by XXMCC to transmit SIT messages to YYMCC.The information in the second column is provided by YYMCC for use by XXMCC.The third column lists all information required by YYMCC to transmit SIT messages toXXMCC. The information in the third column is provided by XXMCC for use by YYMCC.

FTP Server Logon Information		
	Used by XXMCC to Log onto YYMCC FTP Server	**Used by YYMCC to Log onto XXMCC FTP Server**
Remote Primary FTP Address		
Remote Secondary FTP Address		
FTP Username		
FTP Password		
Incoming Directory		
Data Transfer		

Table G.2 : Template for FTP Server Logon Information

Examples of the templates are shown in theTables G.3 and G.4 that list parameters and information that could be used by AUMCC and INMCC.

FTP-VPN Configuration		
	As Configured on the AUMCC VPN Concentrator	**As Configured on the INMCC VPN Concentrator**
Peer Site ID	INMCC	AUMCC
IKE Details		
IKE Peer Address	220.228.67.145	203.20.107.66
IKE Encryption	3DES-168	3DES-168
IKE Authentication	MD5/HMAC-128	MD5/HMAC-128
IKE Key Exchange	DH Group 2	DH Group 2
IKE Pre-Shared Key	***	***
IKE Time Lifetime	28800	28800
IKE Data Lifetime	10000	10000
IPSEC Details		
IPSEC Encryption	3DES-168	3DES-168
IPSEC Authentication	ESP/MD5/HMAC-128	ESP/MD5/HMAC-128
IPSEC PFS	Group 2	Group 2
IPSEC Data Lifetime	86400	86400
IPSEC NAT-T	Not Enabled	Not Enabled
IPSEC Encapsulation Mode	Tunnel	Tunnel
IPSEC Connection Type	Bi-directional	Bi-directional

Table G.3 : Example of Template of VPN Concentrator Parameters

FTP Server Logon Information		
	Used by AUMCC to Log onto INMCC FTP Server	**Used by INMCC to Log onto AUMCC FTP Server**
Remote Primary FTP Address	106.104.13.110	203.119.16.99
Remote Secondary FTP Address	106.104.13.115	
FTP Username	***	***
FTP Password	***	***
Incoming Directory	.	.
Data Transfer	Binary	Binary

Table G.4 : Example of Template of FTP Server Logon Information

Note that the IKE Pre-Shared Key, FTPUsername and FTP Password are shown as "***" in the above tables as the information must be kept secure. Exchange of these details must be undertaken via fax or telephone only. Other details may be transmitted by email.

- END OF ANNEX G -

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ANNEX H

COSPAS-SARSAT STANDARD FOR THE TRANSMISSION OF SIT MESSAGES VIA AFTN

1. INTRODUCTION

The aeronautical fixed telecommunications network (AFTN) is a worldwide system of aeronautical fixed circuits provided, as part of the aeronautical fixed service, for the exchange of messages, and/or digital data between aeronautical fixed stations having the same or compatible communications characteristics. Communication procedures for the AFTN are detailed in Annex 10 to the Convention on International Civil Aviation, Volume II, Communication Procedures, which can be downloaded from the ICAO web site.

AFTN provides a store-and-forward messaging service for the conveyance of text messages, which supports the entire character set authorised for use in Cospas-Sarsat SIT messages.

All AFTN messages include a Transmission Identification (TI) of the form “MSO003” where the TI is comprised of the Channel Identifier (CI) = “MSO” and the Channel Sequence Number (CSN)=”003”.

Channel checks (heartbeat) are undertaken between an AFTN station and its AFTN communication centre to ensure the link is available and for synchronising of message numbers. These checks are usually undertaken every twenty minutes on the hour and will contain a unique Channel Sequence Number (CSN).

Although the AFTN communications centre ensures that messages are received correctly in terms of the “heading, address, origin and ending syntax” the system does not perform checks to validate the message text. Some MCCs have reported corruption in AFTN messages. The corruption can be quite severe and obvious to the recipient, however at other times they may be extremely difficult to detect.

The ICAO AFTN standard requires long term retention of AFTN traffic records to be maintained for 30 days. The AFTN standard for retaining messages does not obviate the MCC archiving requirement specified in document C/S A.005 (MCC specification).

2. CATEGORIES AND PRIORITIES OF MESSAGES

The AFTN supports the following categories of messages:

a) distress messages;
b) urgency messages;

c) flight safety messages;
d) meteorological messages;
e) flight regularity messages;
f) aeronautical information services (AIS) messages;
g) aeronautical administrative messages; and
h) service messages.

Each AFTN message type has an associated message priority. Section 5 provides recommendations in respect of message priorities for the various SIT message types. The highest priority used in the AFTN is SS followed by DD.

Distress messages (priority indicator SS)

This message category comprises those messages sent by mobile stations reporting that they are threatened by grave and imminent danger and all other messages relative to the immediate assistance required by the mobile station in distress.

AFTN requires that messages transmitted with an SS priority be acknowledged using the format defined by ICAO. MCCs should ensure that SS priority messages are acknowledged by the MCC itself.

Urgency messages (priority indicator DD)

This category comprises messages concerning the safety of a ship, aircraft or other vehicles, or of some person on board or within sight.

3. AFTN MESSAGE FORMAT

The AFTN message formats for the International Telegraph Alphabet No.2 (ITA2) and International Alphabet No.5 (IA5) formats are provided in Figures 1 and 2. AFTN messages are comprised of a header, message body (SIT MESSAGE), and trailer. The SIT message is to be inserted into the fields identified as “Message Text” indicated in Figures 1 and 2.

AFTN messages cannot exceed 2100 characters in total, and the content of the SIT message inserted into an AFTN message cannot exceed 1800 characters.

3.1 AFTN Address Indicator

An AFTN address comprises 8 characters of the form:

a) four-letter location indicator listed in ICAO document, Doc 7910, e.g. YSAR for the Australian RCC/AUMCC, Canberra;

b) three-letter designator as listed in ICAO document, Doc 8585 e.g., ZSZ (which has been allocated for Sarsat Centre) for the French MCC and YCY for the Norwegian MCC; and

c) an additional letter which can represent a department, division or process within the organization/function of the originator. The letter X shall be used to complete the eight-letter address when explicit identification is not required.

3.2 Multiple Address Distribution

AFTN includes a facility for distributing messages to multiple addresses. The use of this capability is not recommended for MCC to MCC communications since it reduces the effectiveness of message number sequence checking.

4. EXAMPLES OF AFTN MESSAGES

The following are examples of AFTN messages using the IA5 format:

a) Example of an SS Priority AFTN Message transmitted by the UKMCC to the FMCC:

```
UKZ003                          < Transmission Identification >
SS LFIAZSZX
050021 EGQPZSZX
/55325 00000/2320/04 065 0021
/126/2270/008/01
/2321/-4/+00108.0 001.0 -12.20/04 064 2156 11.05/0
/5/18.756/0000/18
/5116209D1E00104FF6F59000000000
/+273/+56.342/+119.438/000 002.7 001.2/77/00 000 0000/4/001.0 001.0
/+273/+70.036/+037.655/000 007.3 003.1/23/00 000 0000/3/004.0 003.0
/LASSIT
/ENDMSG
```

b) Example of an SS Priority Acknowledgement Message from FMCC to UKMCC:

```
FRZ457
SS EGQPZSZX
050022 LFIAZSZX
R 050021 EGQPZSZX
```

c) Example of a DD Priority AFTN Message transmitted by the SPMCC to the NMCC:

```
SPZ101
DD ENBOYCYX
260934 GCMPZSZX
/66934 00000/2240/04 054 0934
/115/2570/004/01
/2241/+2/+02400.0 018.2 -25.21/04 054 0919 07.00/0
/3/02.856/0000/01/0247 99
/+257/+55.394/+012.072/088 008.1 004.5/50/04 054 0956/3/005.4 030.8
/+232/+52.975/-013.808/118 008.2 004.6/50/04 054 0956/3/005.2 029.8
/LASSIT
/ENDMSG
```

5. RECOMMENDED SIT MESSAGE AFTN PRIORITIES

Table 1 provides the suggested AFTN priorities for the various SIT message types. MCCs may, on a bilateral basis, use different priorities from those suggested.

Table H.1: Suggested AFTN Priority for SIT Messages

SIT Number	Type	Suggested Priority	Comments
121	406 INTERFERER NOTIFICATION	DD	
122	406 INCIDENT (NO DOPPLER)	SS	
123	406 POSITION CONFLICT (ENCODED ONLY)	SS	
124	406 AMBIGUITY RESOLUTION (ENCODED ONLY)	SS	
125	406 INCIDENT	SS	
126	406 POSITION CONFLICT	SS	
127	406 AMBIGUITY RESOLUTION	SS	
132	406 NOTIFICATION OF COUNTRY OF REGISTRATION (ENCODED ONLY)	DD / SS	
133	406 NOTIFICATION OF COUNTRY OF REGISTRATION	DD / SS	
185	COSPAS-SARSAT DISTRESS ALERTS TO RCCs/SPOCs	DD / SS	
215	ORBIT VECTORS	DD	
415	SARP CALIBRATION	DD	
510	406 MHz SARR FREQUENCY CALIBRATION OFFSET	DD	
605	SYSTEM STATUS TO ALL MCCs	SS / DD	Operator to decide dependent upon content
915	NARRATIVE MESSAGES FOR MCCs	SS / DD	Operator to decide dependent upon content
925	406 BEACON REGISTRATION INFORMATION	DD / SS	

Message part		*Component of the message part*	*Element of the component*	*Teletypewriter signal*
HEADING (*see* 4.4.2.1)		Start-of-Message Signal	—	ZCZC
		Transmission Identification	a) One SPACE b) Transmitting-terminal letter c) Receiving-terminal letter d) Channel-Identification letter e) One FIGURE SHIFT f) Channel-sequence number (3 digits) (*Example:* NRA062)	→...↑...
		(If necessary) Additional Service Indication	a) One SPACE b) No more than 10 characters (*Example:* 270930)	
		Spacing Signal	Five SPACES One LETTER SHIFT	→→→→→↓
ADDRESS (*see* 4.4.3)	THE PERMANENT PART OF A MESSAGE	Alignment Function	One CARRIAGE RETURN, one LINE FEED	<≡
		Priority Indicator	The relevant 2-letter group	..
		Addressee Indicator(s)	One SPACE An 8-letter group given in sequence for each addressee (*Example:* → **EGLLZRZX→EDLLYKYX→EGLLACAM**)	
		Alignment Function(s)	One CARRIAGE RETURN, one LINE FEED	<≡
ORIGIN (*see* 4.4.4)		Filing Time	One FIGURE SHIFT The 6-digit date-time group specifying when the message was filed for transmission One LETTER SHIFT	↑ ..... ↓
		Originator Indicator	One SPACE The 8-letter group identifying the message originator	→ .....
		Priority Alarm *(used only in tele-typewriter operation for Distress Messages)*	One FIGURE SHIFT Five Signal No. 10 of Telegraph Alphabet No. 2 One LETTER SHIFT	↑ Attention ↓ Signal(s)
		Alignment Function	One CARRIAGE RETURN, one LINE FEED	<≡
TEXT (*see* 4.4.5)		Beginning of the Text	Specific identification of Addressee(s) *(if necessary) with* each followed by one CARRIAGE RETURN, one LINE FEED *(if necessary)* The English word FROM *(if necessary)* (*see* 4.4.5.2.3) Specific identification of Originator *(if necessary)* The English word STOP followed by one CARRIAGE RETURN, one LINE FEED *(if necessary)* (*see* 4.4.5.2.3); *and/or* Originator's reference *(if used)*	
		Message Text	Message Text with one CARRIAGE RETURN, one LINE FEED at the end of each printed line of the Text except for the last one (*see* 4.4.5.3)	
		Confirmation *(if necessary)*	a) One CARRIAGE RETURN, one LINE FEED b) The abbreviation CFM followed by the portion of the Text being confirmed	
		Correction *(if necessary)*	a) One CARRIAGE RETURN, one LINE FEED b) The abbreviation COR followed by the correction of an error made in the preceding Text	
		End-of-Text Signal	a) One LETTER SHIFT b) One CARRIAGE RETURN, one LINE FEED	↓<≡
ENDING (*see* 4.4.6)		Page-Feed Sequence	Seven LINE FEEDS	≡≡≡≡≡≡≡
		End-of-Message Signal	Four of the letter case of N (Signal No. 14)	NNNN
		Message-Separation Signal *(used only on message traffic transmitted to a "torn-tape" station)*	Twelve LETTER SHIFTS	↓↓↓↓↓↓↓↓↓↓↓↓
		Tape Feed (*see* 4.4.7)	Additional LETTER SHIFTS will appear at this point in instances where prior arrangements have been made for tape-feed transmissions to be employed on an incoming circuit (*see* 4.4.7).	

Legend: ↑ FIGURE SHIFT *(Signal No. 30)* ≡ LINE FEED *(Signal No. 28)* ↓ LETTER SHIFT *(Signal No. 29)*
→ SPACE *(Signal No. 31)* < CARRIAGE RETURN *(Signal No. 27)*

Figure H.1: Message Format International Telegraph Alphabet No.2 (ITA2)

Message part		*Component of the message part*	*Elements of the component*	*Teletypewriter character*
THE HEADING	HEADING LINE (*see* 4.4.15.1.1)	Start-of-Heading Character	One Character (0/1)	SOH
		Transmission Identification	a) Transmitting-terminal letter b) Receiving-terminal letter c) Channel-identification letter d) Channel-sequence number (*Example*: NRA062)	.....
		(If necessary) Additional Service Indication	a) One SPACE b) No more than the remainder of the line (*Example:* 270930)	→
	ADDRESS (*see* 4.4.15.2.1)	Alignment Function	One CARRIAGE RETURN, one LINE FEED	<≡
		Priority Indicator	The relevant 2-letter group	..
		Addressee Indicator(s)	One SPACE An 8-letter group (given in sequence for each addressee) (*Example*:→**EGLLZRZX→EGLLYKYX→EGLLACAD**)	
		Alignment Function(s)	One CARRIAGE RETURN, one LINE FEED	<≡
	ORIGIN (*see* 4.4.15.2.2)	Filing Time	6-digit date-time group specifying when the message was filed for transmission	.....
		Originator Indicator	a) One SPACE b) 8-letter group identifying the message originator	→.....
		Priority Alarm (used only in teletypewriter operation for Distress Messages)	Five characters (0/7)(BEL)	
		Optional Heading Information	Additional data not to exceed the remainder of the line. *See* 4.4.15.2.2.6.	
		Alignment Function	One CARRIAGE RETURN, one LINE FEED	<≡
		Start-of-Text Character	One character (0/2)	STX
TEXT (*see* 4.4.15.3)		Beginning of the Text	Specific identification of Addressee(s) *(if necessary)* *with* each followed by one CARRIAGE RETURN, one LINE FEED *(if necessary)* The English word FROM *(if necessary)* (*see* 4.4.15.3.5) Specific identification of Originator *(if necessary)* The English word STOP followed by one CARRIAGE RETURN, one LINE FEED *(if necessary)* (*see* 4.4.15.3.5) *and/or* Originator's reference *(if used)*	
		Message Text	Message Text with one CARRIAGE RETURN, one LINE FEED at the end of each printed line of the Text except for the last one (*see* 4.4.15.3.6)	
		Confirmation *(if necessary)*	a) One CARRIAGE RETURN, one LINE FEED b) The abbreviation CFM followed by the portion of the Text being confirmed	
		Correction *(if necessary)*	a) One CARRIAGE RETURN, one LINE FEED b) The abbreviation COR followed by the correction of an error made in the preceding Text	
ENDING (*see* 4.4.15.3.12.1)		Alignment Function	One CARRIAGE RETURN, one LINE FEED	<≡
		Page-feed Sequence	One character (0/11)	VT
		End-of-Text character	One character (0/3)	ETX

Figure H.2: Message Format International Alphabet No.5 (IA5)

- END OF ANNEX H -

ANNEX I

IMPLEMENTATION PLAN FOR NEW COMMUNICATION LINKS

I.1 IMPLEMENTATION PHASES

I.1.1 Phase I - Internal Development and Testing

In order to implement a new communication link, each MCC must begin with a phase of internal development and testing. This may require the procurement of communication equipment, specialized hardware, physical connections and/or other communication provider services.

The key purpose of this phase is to ensure that the new communication link is properly installed, configured and coded. Ideally, a capability should be available within the MCC environment to facilitate near "real world" testing. Completion of comprehensive development and testing is essential before proceeding to subsequent phases.

I.1.2 Phase II - Nodal Level Testing and Activation

Nodal MCCs operate as central entities or "hubs" in the Cospas-Sarsat Network and should be capable of handling any new communication link or protocol. There is limited benefit for an MCC within a DDR to implement a protocol that the nodal MCC does not yet support.

Nodal MCCs can in effect validate the new communication link while also establishing it at the core level of the Cospas-Sarsat System Network. Lessons learned and resulting adjustments made can be passed along to other MCCs to minimize costs resulting from redundant efforts. During this phase each nodal MCC coordinates bilaterally, first testing and then activating each link.

I.1.3 Phase III - DDR Level Testing and Activation

This phase provides for establishing a new communication protocol between the nodal MCC and each of the MCCs within its DDR. When this phase starts, the nodal MCC will have operational links with most other nodal MCCs, and the experience gained should facilitate efforts under Phase III.

I.1.4 Phase IV - System Wide Testing and Activation

This phase provides for establishing links between MCCs as well as between MCCs and SPOCs (or RCCs) as appropriate. The intent is to test and activate all links outside the standard nodal configuration, most importantly the connections between additional MCC pairings to support the transmission of Cospas-Sarsat narrative traffic. Communication agreements between neighbouring MCCs shall be addressed during this phase.

I.2 IMPLEMENTATION PLAN TO ADDRESS TERMINATION OF X.25

I.2.1 Introduction

Although the details vary for each MCC, the X.25 protocol will no longer be commercially available in many locations beyond 2005. For example, the USMCC anticipates the phase-out of X.25 by 1 September 2005. In order to ensure the reliability and integrity of the Cospas-Sarsat System, it is necessary to address this situation with a specific and complete implementation plan which follows the phases outlined above. The following plan addresses the implementation of AFTN and FTP over Internet VPN (FTPV) by MCCs.

I.2.2 Implementation Plan Structure

Each MCC should have at least two functional communication links, a primary and a backup, for every other MCC with which they must communicate. This implementation plan requires that two links be identified, other than X.25, as the primary and secondary links between the various MCC pairings. Each of the identified protocols must be fully implemented and thoroughly tested according to the schedule defined in the tables provided below.

Implementation schedules in Tables I.1 and I.2 indicate planned dates for nodal level testing and activation of AFTN and FTPV, per Phase II of the implementation plan. Target implementation dates of April 2005 for FTPV and April 2006 for AFTN are observed.

Implementation schedules for activation and testing AFTN and FTPV within each DDR (Phase III) follow in Tables I.3 through I.7. It should be noted that Phase III could begin before Phase II is completed.

I.2.3 Schedule

Notes: FTPV = FTP over Internet VPN
AFTN = Aeronautical Fixed Telecommunication Network

Table I.1 : Nodal to Nodal Communications Activation / Verification Check List

MCC	CMC	FMCC	JAMCC	USMCC	SPMCC
AUMCC	FTPV (in place)	FTPV (in place)	FTPV (in place)	FTPV (in place)	FTPV (in place)
	AFTN (in place)	AFTN (in place)	AFTN (in place)	AFTN (in place)	AFTN (in place)
	Email* T.B.D.		Email* T.B.D.	Email* T.B.D.	Email* T.B.D.
CMC		FTPV (in place)	FTPV (in place)	FTPV (in place)	FTPV (in place)
		AFTN (in place)	AFTN (in place)	AFTN (in place)	AFTN (in place)
FMCC			FTPV (in place)	FTPV (in place)	FTPV (in place)
			AFTN (in place)	AFTN (in place)	AFTN (in place)
JAMCC				FTPV (in place)	FTPV (in place)
				AFTN (in place)	AFTN (in place)
USMCC					FTPV (in place)
					AFTN (in place)

Note: * Contingency means of communications (for less than 30 minutes only).

Table I.2 : Target Implementation Dates for Nodal MCC Communications

MCC	AFTN	FTPV
AUMCC	In place	In place
CMC	In place	In place
FMCC	In place	In place
JAMCC	In place	In place
SPMCC	In place	In place
USMCC	In place	In place

Table I.3 - Phase III : Western DDR Communications Activation / Verification Check List

MCC	USMCC
ARMCC	FTPV - in place
	AFTN - in place
	Link3 - N/A
BRMCC	FTPV - in place
	AFTN - in place
	Link 3 - N/A
CHMCC	FTPV - in place
	AFTN - in place
	Link 3 - N/A
CMCC	FTPV - in place
	AFTN - in place
	Link 3 - N/A
PEMCC	FTPV - in place
	AFTN - in place
	Link3 dd mmm

Note: All Link3 entries are optional.

Table I.4 - Phase III : Central DDR Communications Activation / Verification Check List

MCC	GRMCC	ITMCC	NMCC	TRMCC	UKMCC
FMCC	FTPV – in place	FTPV - in place	FTPV - in place	AFTN - in place	AFTN - in place
	AFTN - in place	AFTN - in place	AFTN - in place	FTPV - in place	FTPV - in place
	Link3 - N/A	Link3 – N/A	Link3 – N/A	Link3 – N/A	Link3 – N/A
GRMCC		FTPV - in place	FTPV - in place	FTPV - in place	FTPV - in place
		AFTN - in place	AFTN - in place	AFTN - in place	AFTN - in place
		Link3 - N/A	Link3 - N/A	Link3 - N/A	Link3 - N/A
ITMCC			FTPV - in place	FTPV - in place	FTPV - in place
			AFTN - in place	AFTN - in place	AFTN - in place
			Link3 - N/A		
NMCC				FTPV - in place	AFTN - in place
				AFTN - in place	FTPV - in place
				Link3 - N/A	Link3 - N/A
TRMCC					FTPV - in place
					AFTN - in place
					X.25 - in place

Notes: All Link3 entries are optional.

Table I.5 - Phase III : Eastern DDR Communications Activation / Verification Check List

MCC	CMC
INMCC	AFTN - in place
	FTPV - in place
	Link3 dd mmm
PAMCC	FTPV - in place
	AFTN - in place
	Link3 dd mmm

Note: All Link3 entries are optional.

Table I.6 - Phase III : South West Pacific DDR Communications Activation / Verification Check List

MCC	AUMCC
ASMCC	FTPV - in place
	AFTN - in place
	Email* - TBD
IDMCC	FTPV - in place
	AFTN -in place
	Email* - TBD
SIMCC	FTPV - in place
	AFTN - in place
	Email* - TBD
THMCC	FTPV - in place
	AFTN - in place
	Email* - TBD

Note: All Link3 entries are optional.
* Contingency means of communications (for less than 30 minutes only).

Table I.7 - Phase III : North West Pacific DDR Communications Activation / Verification Check List

MCC	JAMCC
CNMCC	FTPV - in place
	AFTN - in place
	Link3 dd mmm
HKMCC	FTPV - in place
	AFTN - in place
	Link3 dd mmm
KOMCC	FTPV - in place
	AFTN - TBD
	Link3 dd mmm
TAMCC	FTPV - in place
	AFTN - in place
	Link3 dd mmm
VNMCC	FTPV - in place
	AFTN - in place
	Link3 dd mmm

Note: All Link3 entries are optional.

Table I.8 - Phase III : South Central DDR Communications Activation/Verification Check List

MCC	SPMCC
AEMCC	FTPV - in place
	AFTN - in place
	Email* - in place
ALMCC	FTPV - in place
	AFTN - in place
	Link3 dd mmm
NIMCC	FTPV - in place
	AFTN - in place
	Link3 dd mmm
SAMCC	FTPV - in place
	AFTN - in place
	Email* - in place

Notes: All Link3 entries are optional.
* Contingency means of communications (for less than 30 minutes only).

- END OF ANNEX I -

ANNEX J

PROTOCOL FOR THE TRANSMISSION OF SIT MESSAGES VIA ELECTRONIC MAIL (EMAIL)

J.1 EMAIL COMMUNICATIONS

J.1.1 Electronic mail is a store-and-forward method of composing, sending, receiving and storing messages over Internet or other networks.

J.1.2 Email is an optional means of communication that shall be adopted on a bilateral contingency basis. Email should be used during the period it takes to implement MCC backup procedures (less than 30 minutes) when AFTN and FTP-VPN have failed or are unavailble.

J.1.3 Email communication shall be organized via mail Servers announced by MCCs. In the main, these mail Servers are the ones used for general purpose unformatted communications between MCCs.

J.1.4 Mail Boxes shall be created at Mail Servers exclusively for exchange by SIT information.

J.1.5 An MCC shall create and send messages with SIT data which would be transmitted via Internet to Mail Box of the receiving MCC. The receiving MCC shall be responsible for disposing the messages received in its Mail Box to the SIT processing programs of MCC.

J.I.6 Where a front-end communications server is used for Email transmissions it shall adhere to the national Administration's Email security provisions. The following Cospas-Sarsat Email security provisions outlined in section J.3 may be used as a guide by national Administrations in addition to any government security measures.

J.2 MESSAGE FORMING CONVENTION

J.2.1 Each message shall contain exactly one SIT message. The message is formed of the following parts:

1. Receiving MCC Address (To),
2. Subject field,
3. Message Body.

J.2.2 Receiving MCC Address (To) is formed as Recipient-Name@Domain-Name and is received from corresponding MCC on need-to-know basis. Example: sit-reception-?777@marsat.ru,

J.2.3 Subject field format shall include "?SRCE_?DEST_?CUR#.", where:
- "?SRCE" is the Source MCC Name (per www.cospas-sarsat.org: >>System>>Detailed System Description>>MCCs),
- "?DEST" is the Destination MCC Name (per www.cospas-sarsat.org: >>System>>Detailed System Description>>MCCs), and
- "?CUR#" is the Current Message Number (Message Field 1).

The Subject field shall contain only upper case characters. For example, a file with the name "USMCC_CMCC_02345" contains Current Message Number 02345 sent by the USMCC to the CMCC.

J.2.4 Message Body shall be created using SIT conventions so only text mode will be used. No attachments should be included in the message.

J.3 SECURITY

J.3.1 To ensure security of the Cospas-Sarsat System MCCs using Email for SIT messages transmission must be protected by firewall. The computer used for email communications should be protected inside a demilitarized zone (DMZ).

J.3.2 The Software Firewall used shall be limited to highest level of security.

J.3.3 Message shall be encrypted to prevent corruption.

J.3.4 Adequate filters shall be implemented (on Email address, electronic signature, IP address, etc.). These controls shall be made before the messages are processed by MCC system.

J.3.5 The identity of the sender shall be determined via a system check or via operational coordination.

J.3.6 Initial check of message formats (SIT format, filename, etc.) shall be undertaken prior to processing of the message by the MCC. Any non-conforming message shall be rejected and an alarm raised to allow operator intervention.

J.3.7 Receipt of multiple redundant messages shall result in a alarm being raised to allow for operator intervention.

J.3.8 Routine Cospas-Sarsat message number checks shall be adopted to identify any message loss including operational checks during periods of low message traffic exchange.

J.3.9 All transmitted messages shall be archived.

- END OF ANNEX J -

ANNEX K

LIST OF ABBREVIATIONS AND ACRONYMS USED IN C/S A.002

AFTN	Aeronautical Fixed Telecommunication Network
AM	amplitude modulation
AMHS	Aeronautical Message Handling System
AVI	aviation
CCITT	International Telecommunication Union's (ITU) International Telegraph and Telephone Consultative Committee
CI	channel identifier
CID	caller identification
COSPAS	space system for the search of vessels in distress
CR	carriage return
CSC	Cospas-Sarsat Council
CSN	channel sequence number
CTA	cross track angle
CUD	call user data
DD	priority indicator
DTG	date time group
E	east
ELT	emergency locator transmitter
EPIRB	emergency position indicating radio beacon
FTP	file transfer protocol
HEX	hexadecimal
HRS	hours
Hz	hertz
ID	identification
INFO	information
IA5	international alphabet No.5
IP	Internet protocol
IPSec	Internet protocol security
ITA2	international telegraph alphabet No.2
ITC	invitation to clear
JC	Cospas-Sarsat Joint Committee
km	kilometer
LAT	latitude
LF	line feed
LONG	longitude
LOS	loss of signal
LUT	local user terminal

MAR	maritime
MCC	mission control centre
MF	message field
MHz	megahertz (1,000,000 hertz)
MID	maritime identification digits
MIN(S)	minute(s)
mSec	millisecond
MSG	message
mW	milliwatt
N	north
NL	new line
NOCR	notification of country of beacon registration
PAD	packet assembler/disassembler
PLB	personal locator beacon
PROB	probability
PSDN	public switched data network
RCC	rescue co-ordination centre
S	south
SAR	search and rescue
SARP	search and rescue processor
SARR	search and rescue repeater
SARSAT	search and rescue satellite aided tracking
SEC(S)	second(s)
SER	serial
SID	Standard Interface Description
SIT	subject indicator type
SPEC	specification
SPOC	SAR point of contact
SRR	Search and Rescue Region
SS	priority indicator
TCA	time of closest approach
TI	transmission identification
TX	transmitted
USO	ultra-stable oscillator
UTC	co-ordinated universal time
VPN	virtual private network
W	west
X.25	ITU-T specification and protocols for public packet-switched networks

- END OF ANNEX K -

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