

**EUROCONTROL Specification
for Surveillance Data Exchange
ASTERIX Part 17 Category 004
Safety Net Messages**

DOCUMENT IDENTIFIER : EUROCONTROL-SPEC-0149-17

Edition Number	:	1.10
Edition Date	:	13/08/2018
Status	:	Released
Intended for	:	General Public
Category	:	EUROCONTROL Specification

DOCUMENT CHARACTERISTICS

TITLE			
EUROCONTROL Specification for Surveillance Data Exchange – ASTERIX Part 17 Category 004: Safety Net Messages			
		Publications Reference:	SPEC-0149-17
		ISBN Number:	978-2-87497-028-3
Document Identifier		Edition Number:	1.10
EUROCONTROL-SPEC-0149-17		Edition Date:	13/08/2018
Abstract			
This document describes the application of ASTERIX to the transmission of messages originating from Safety Net Systems			
Keywords			
Data Exchange	Reports	SAC	SIC
Data Category	Data Field	Data Block	Data Item
ASTERIX	UAP	Safety Net Messages	
Contact Person(s)		Tel	Unit
Alexander Engel		+32-2-729 3355	DECMA/STAN

STATUS, AUDIENCE AND ACCESSIBILITY					
Status	Intended for			Accessible via	
Working Draft	<input type="checkbox"/>	General Public	<input checked="" type="checkbox"/>	Intranet	<input type="checkbox"/>
Draft	<input type="checkbox"/>	EUROCONTROL	<input type="checkbox"/>	Extranet	<input type="checkbox"/>
Proposed Issue	<input checked="" type="checkbox"/>	Restricted	<input type="checkbox"/>	Internet (www.eurocontrol.int)	<input checked="" type="checkbox"/>
Released Issue	<input type="checkbox"/>				

DOCUMENT APPROVAL

This document has been approved by the ASTERIX Maintenance Group (AMG).

For management approval of the complete set of ASTERIX documentation refer to Part 1.

DOCUMENT CHANGE RECORD

The following table records the complete history of the successive editions of the present document.

EDITION	DATE	REASON FOR CHANGE	SECTIONS PAGES AFFECTED
0.10	February 2003	Creation	
0.20	September 2003	Extension of Category 004 with additional items	
0.21	March 2004	Editorial modifications Creation of items I004/151, I004/152, I004/153, I004/155, I004/156, I004/157, I004/158 Modification of I004/045	
0.22	December 2004	Modification of section 5.2.2 'Crossing and divergence" Modification of I004/045 Modification of the definition of I004/074 Modification of the name and of the definition of I004/075 Coding rules defined for I004/100 Modification of I004/120 Modification of I004/130 Modification of the format and the content of I004/151 Creation of I004/154 Modification of the format and the content of I004/156 Creation of I004/159	5.2.2 6.2.8 6.2.15 6.2.16 6.2.21 6.2.23 6.2.24 6.2.27 6.2.30 6.2.32 6.2.35
0.23	February 2005	Editorial update New Message Types 008 and 009 New Item I004/076 Resolution changed for I004/070 Resolution changed for I004/071 Name of I004/100 changed Resolution changed for I004/150 Resolution changed for I004/155 Ground Vehicle Identification added in I004/151 Ground Vehicle Identification added in I004/156 UAP adapted	Almost all 6.2.1 6.2.17 6.2.11 6.2.12 6.2.22 6.2.27 6.2.32 6.2.28 6.2.33 6.3

0.24	March 2005	Editorial update Document Identification Sheet updated Document Approval Page updated Abbreviation for EOC added Message Type End of Conflict added Definitions for crossing traffic changed New Message Types 010 - 017 Name for item I004/010 changed Definition of item I004/015 changed Layout of item I004/070 and LSB changed LSB for item I004/071 changed Item I004/074 LSB changed Layout of item I004/075 and LSB changed New Item I004/101 New Items I004/102, I004/103, I004/104 Item I004/120 Structure description changed Items I004/041 and I004/105 added New Items I004/166, I004/167, I004/168 UAP adapted	Almost all ii iii 3.2 4.5.1.17 5.2.2 6.2.1 6.2.2 6.2.3 6.2.15 6.2.16 6.2.19 6.2.20 6.2.28 6.2.29–6.2.31 6.2.34 6.2.8, 6.2.32 6.2.48–6.2.50 6.3
0.25	12 April 2005	Definition of Separation Infringements Definition of Divergence Definition of Conflict Severity Editorial update Format description item I004/060 corrected Format description item I004/120 corrected Format description item I004/070 corrected Format description item I004/075 corrected Description of items I004/090, I004/095 and I004/105 corrected Update of Item I004/130	5.2.1 5.2.2 5.3 6.2.5, 6.2.6 6.2.14 6.2.33 6.2.15 6.2.20 6.2.24, 6.2.25 6.2.31 6.2.34
0.26	27 June 2005	Remark added to chapter 5.3 New Compound Dataitem I004/070 New Compound Dataitem I004/100 New Compound Dataitem I004/120 New Compound Dataitem I004/170 New Compound Dataitem I004/171 Items Moved to Compound Items: I004/030, I004/035, I004/041, I004/050 to I004/053, I004/070 to I004/073, I004/080, I004/085, I004/090, I004/095, I004/100 to I004/105, I004/120, I004/130, I004/140, I004/150 to I004/160, I004/166 to I004/168 Note in I004/030 and I004/035 modified Format of I004/045 modified Item I004/120, subfield 2: STCA-Table updated List of Standard Data Items updated Composition Tables of Messages updated User Application Profile Updated Definitions Updated	5.3 Chapter 6.2 6.2.5 & 6.2.6 6.2.8 6.2.16 6.1 6.2.1 6.3 3.1

0.27	22 September 2005	Footer on title page updated Telephone number in Document Id-Sheet updated Header restored Reference Documents updated Additional Explanation added, name changed Composition of message types updated Subfield #2 of I004/120 renamed Conflict Severity added to I004/120 Note added to subfield #2 of I004/120 Definition of subfield #3 of I004/170 updated Definition of subfield #8 of I004/170 updated Definition of subfield #3 of I004/171 updated Definition of subfield #8 of I004/171 updated UAP updated	page 8 5.3 6.2.1 6.2.16 6.2.16 6.2.16 6.2.17 6.2.17 6.2.18 6.2.18 6.3
1.0	18 November 2005	Status updated to "Proposed Issue" Editorial corrections Item I004/015 changed to Repetitive data item	5.2.2 6.2.3
1.1	21 March 2006	Item I004/070: Correction of description of subfield 4 Item I004/170: Correction in naming of bit 13 Length of item I004/110 corrected in UAP	6.2.10 6.2.17 Page 69
1.2	27 March 2007	Signature Page updated Editorial "Clean-Up" Status changed to "Released Issue"	iii
1.3	12 March 2009	Adaptation to MRVA	4.5.1.4 6.2.9 6.2.16
1.4	05 Oct. 2010	Signature Page updated Error conditions added to I004/060	iii 6.2.9
1.5	June 2011	Reserved for SESAR Project 15.4.3	
1.6	January 2012	Signature page updated List of reference documents updated List of Acronyms/Abbreviations updated Definition of Message Types 018 and 019 Data Item I004/000 updated (Message Types 018 and 019 plus tables) Data Item I004/060 updated Hmin/Hmax in I004/170, SF#3 updated Range Hmin/Hmax in I004/170, SF#4 added Hmin/Hmax in I004/171, SF#3 updated Range Hmin/Hmax in I004/171, SF#4 added Clarify definition of subfield 1 of I004/100	iii 2.2 3.2 4.5.1 6.2.1 6.2.9 6.2.17 6.2.17 6.2.18 6.2.18 6.2.14
1.7	June 2012	Signature page updated Message types 001 & 017 updated Clarification of format in I004/170 sf #10 Clarification of format in I004/171 sf #10	Page iii 6.2.1 6.2.17 6.2.18

1.8	August 2014	New EUROCONTROL Specification template Editorial update in data item I004/120 SF#1 Editorial update in data item I004/171 SF#1 Editorial update in data item I004/171 SF#5	
1.9	August 2017	Add Safety Net and Monitoring Aids Messages for DBPSM, SAM, OCAT, VRAM, VCD, LTW, HVI, AIW, DSAM, CHAM, HAM, and VPM. List of Acronyms/Abbreviations updated Definition of new Message Types Composition of message types updated Encoding Rule for I004/120 in message type 19 changed from "M" to "O" Data Item I004/060 updated Data Item I004/120, SF#1 updated Data Item I004/120, SF#2 updated This edition is to be applied together with edition 1.1 of the specification for the Reserved Expansion Field.	3.2 4.5.1 6.2.1 6.2.1 6.2.9 6.2.16 6.2.16
1.10	August 2018	Editorial Corrections	2.2 6.2.9 6.2.14 6.2.17 6.2.18

Publications

EUROCONTROL Headquarters
96 Rue de la Fusée
B-1130 BRUSSELS

Tel: +32 (0)2 729 4715

Fax: +32 (0)2 729 5149

E-mail: publications@eurocontrol.int

TABLE OF CONTENTS

DOCUMENT CHARACTERISTICS	ii
DOCUMENT APPROVAL	iii
DOCUMENT CHANGE RECORD	iv
1. INTRODUCTION	1
1.1 Scope	1
2. REFERENCES	3
2.1 General	3
2.2 Reference Documents	3
3. Definitions, acronyms and abbreviations	5
3.1 Definitions	5
3.2 Acronyms and Abbreviations	6
4. GENERAL PRINCIPLES	8
4.1 General	8
4.2 Time Management	8
4.3 Unused Bits in Data Items	8
4.4 Definitions and Addressing Concepts	9
4.4.1 Addressing Concepts: Assigning SAC/SIC Codes	9
4.5 Safety Net Messages	9
4.5.1 Types of Safety Net Messages	9
4.5.2 User Application Profile and Data Block.....	14
4.6 Composition of Messages	14
5. SAFETY NETS CONCEPTS and FURTHER READING	15
6. LAYOUT OF SAFETY NET MESSAGES	16
6.1 Standard Data Items	16
6.2 Description of Standard Data Items	17
6.2.1 Data Item I004/000, Message Type	17
6.2.2 Data Item I004/010 Data Source Identifier	23
6.2.3 Data Item I004/015 SDPS Identifier	24
6.2.4 Data Item I004/020 Time of Message	24
6.2.5 Data Item I004/030 Track Number 1	25
6.2.6 Data Item I004/035 Track Number 2	25
6.2.7 Data Item I004/040 Alert Identifier.....	26

6.2.8	Data Item I004/045 Alert Status	26
6.2.9	Data Item I004/060 Safety Net Function & System Status	27
6.2.10	Data Item I004/070, Conflict Timing and Separation	31
6.2.11	Data Item I004/074, Longitudinal Deviation.....	35
6.2.12	Data Item I004/075, Transversal Distance Deviation.....	35
6.2.13	Data Item I004/076, Vertical Deviation	36
6.2.14	Data Item I004/100, Area Definition	37
6.2.15	Data Item I004/110, FDPS Sector Control Identification.....	44
6.2.16	Data Item I004/120, Conflict Characteristics	45
6.2.17	Data Item I004/170, Aircraft Identification & Characteristics 1	53
6.2.18	Data Item I004/171, Aircraft Identification & Characteristics 2	62
6.3	User Application Profile for Category 004	71

This page is intentionally left blank

1. INTRODUCTION

1.1 Scope

This document describes the message structure for the transmission of messages from a Safety Net function.

This page is intentionally left blank

2. REFERENCES

2.1 General

The following Documents and Standards contain provisions, which, through references in this text, constitute provisions of this EUROCONTROL Standard Document.

At the time of publication of this EUROCONTROL Standard Document, the editions indicated for the referenced documents and standards were valid.

Any revision of the referenced ICAO Documents shall be immediately taken into account to revise this EUROCONTROL Standard Document.

Revisions of the other referenced documents shall not form part of the provisions of this EUROCONTROL Standard Document until they are formally reviewed and incorporated into this EUROCONTROL Standard Document.

In case of a conflict between the requirements of this EUROCONTROL Standard Document and the contents of the other referenced documents, this EUROCONTROL Standard Document shall take precedence.

2.2 Reference Documents

1. EUROCONTROL Specification SPEC-0149, edition 2.4, 24 October 2016 "EUROCONTROL Specification for Surveillance Data Exchange – Part 1 All Purpose Structured EUROCONTROL Surveillance Information Exchange – ASTERIX" ..
2. Operational Requirements Document for EATCHIP Phase III. ATM Added Functions. Volume 2: Safety Nets. Edition 2.0. EUROCONTROL, 25/01/1999. Document Number : OPR.ET1.ST04.DEL01.2.
3. ICAO Annex 10, Vol.IV Fourth Edition
4. ICAO Annex 5
5. EUROCONTROL Specification SPEC-0142, edition 1.0 15/07/2010 "EUROCONTROL Specification for Monitoring Aids"

This page is intentionally left blank

3. DEFINITIONS, ACRONYMS AND ABBREVIATIONS

3.1 Definitions

For the purposes of this EUROCONTROL Document, the following definitions shall apply:

- | | | |
|---------------|----------------------------------|--|
| 3.1.1 | Catalogue of Data Items: | List of all the possible Data Items of each Data Category describing the Data Items by their reference, structure, size and units (where applicable). |
| 3.1.2 | Data Block: | Unit of information seen by the application as a discrete entity by its contents. A Data Block contains one or more Record(s) containing data of the same Category. |
| 3.1.3 | Data Category: | Classification of the data in order to permit inter alia an easy identification. |
| 3.1.4 | Data Field: | Physical implementation for the purpose of communication of a Data Item, it is associated with a unique Field Reference Number and is the smallest unit of transmitted information. |
| 3.1.5 | Data Item: | The smallest unit of information in each Data Category. |
| 3.1.6 | Record: | A collection of transmitted Data Fields of the same Category preceded by a Field Specification field, signalling the presence/absence of the various Data Fields |
| 3.1.7 | User Application Profile: | The mechanism for assigning Data Items to Data Fields, and containing all necessary information which needs to be standardised for the successful encoding and decoding of the messages. |
| 3.1.8 | Transversal | The word " <u>transversal</u> " is used in this document as the contrary of " <u>longitudinal</u> " |
| 3.1.9 | Lateral | The word " <u>lateral</u> " is used in this document as the contrary of " <u>vertical</u> " |
| 3.1.10 | Time to Conflict | Remaining time until the prescribed separation minima (e.g. 3 NM or 5NM) will be actually violated |
| 3.1.11 | Time to Closest Approach | Remaining time until the targets in a conflict will have reached the point of their closest proximity. |

3.2 Acronyms and Abbreviations

For the purposes of this EUROCONTROL Document the following shall apply:

ACAS	Airborne Collision Avoidance System
ACASRA	ACAS Resolution Advisory
AFDA	Approach Funnel Deviation Alert
AIW	Airspace Infringement Warning
ALM	Arrival / Landing Monitor
AM	Alive Message
AMG	ASTERIX Maintenance Group
APM	Approach Path Monitor
APW	Area Proximity Warning
ARR	ARRival
ASCII	American national Standard Code for Information Interchange
ASTERIX	All Purpose STructured EUROCONTROL suRveillance Information Exchange
ATM	Air Traffic Management
CAT	Data Category
CFL	Cleared Flight Level
CHAM	Cleared Heading Adherence Monitor
CLAM	Clearance Level Adherence Monitor
CRM	Cleared Rate Monitor
CWP	Controller Working Position
DBPSM	Downlinked Barometric Pressure Setting Monitor
DEP	DEParture
DSAM	Downlinked Selected Altitude Monitor
EATM	European Air Traffic Control Management
EOC	End of Conflict
FIS-B	Flight Information Service – Broadcast
FDPS	Flight Data Processing System
FRN	Field Reference Number
FSPEC	Field Specification
FX	Field Extension Indicator
HAM	Holding Adherence Monitor
HVI	Holding Volume Infringement
ICAO	International Civil Aviation Organisation
LEN	Length Indicator
LSB	Least Significant Bit
LTW	Lost Track Warning
MLT	Multilateration
MSAW	Minimum Safe Altitude Warning
MSSR	Monopulse Secondary Surveillance Radar
MTD	Moving Target Detection
NM	Nautical Mile, unit of distance (1852 metres)

NTCA	Near Term Conflict Alert
OCAT	Outside Controlled Airspace Tool
OTA	Opposite Traffic Alert
pAIW	Primary Airspace Infringement Warning
PSR	Primary Surveillance Radar
RA	Resolution Advisory
RAMHD	Route Adherence Monitor Heading Deviation
RAMLD	Route Adherence Monitor Longitudinal Deviation
RCM	Runway / Taxiway Crossing Monitor
RDEFG	Radar Data Exchange Focus Group
RDM	RIMCAS Departure Monitor
RDP	Radar Data Processing (System)
RDPC	Radar Data Processing Chain
RE	Reserved Expansion Indicator
REP	Field Repetition Indicator
RIMCA(S)	Runway Incursion Monitor and Conflict Alert (System)
RVSM	Reduced Vertical Separation Minima
s	second, unit of time
SAC	System Area Code
SAM	Speed Adherence Monitor
SBOA	Stop-Bar Overrun Alert
SDP(S)	Surveillance Data Processing (system)
SESAR	Single European Sky ATM Research
SIC	System Identification Code
SID	Standard Instrument Departure
SP	Special Purpose Indicator
SSR	Secondary Surveillance Radar
STAR	Standard Instrument Arrival
STCA	Short Term Conflict Alert
TL	Transition Level
TSM	Taxiway Separation Monitor
UAP	User Application Profile (see Definitions)
UTC	Coordinated Universal Time
UTMM	Unauthorised Taxiway Movement Monitor
VCD	Vertical Conflict Detection
VOM	Vertical Overshoot Monitor
VPM	Vertical Path Monitor
VRAM	Vertical Rate Adherence Monitor
VRM	Vertical Rate Monitor
VTM	Vertical Tracker Monitor
WGS	World Geodetic System
WRA	Wrong Runway Alert

4. GENERAL PRINCIPLES

4.1 General

4.2 Time Management

The time stamping shall comply with the Coordinated Universal Time (UTC) as specified in ICAO Annex 5.

4.3 Unused Bits in Data Items

Decoders of ASTERIX data **shall never assume and rely on** specific settings of spare or unused bits. However in order to improve the readability of binary dumps of ASTERIX records, it is recommended to set all spare bits to zero.

4.4 Definitions and Addressing Concepts

4.4.1 Addressing Concepts: Assigning SAC/SIC Codes

By convention a dedicated and unambiguous SAC/SIC code shall be assigned to every Safety Net Server.

4.5 Safety Net Messages

4.5.1 Types of Safety Net Messages

31 types of safety net messages have been identified:

- Alive Message
- Route Adherence Monitor Longitudinal Deviation (RAMLD)
- Route Adherence Monitor Heading Deviation (RAMHD)
- Minimum Safe Altitude Warning (MSAW)
- Area Proximity Warning (APW)
- Clearance Level Adherence Monitor (CLAM)
- Short Term Conflict Alert (STCA)
- Approach Path Monitor (APM)
- RIMCAS – Arrival / Landing Monitor (ALM)
- RIMCAS – Arrival / Departure Wrong Runway Alert (WRA)
- RIMCAS – Arrival / Departure Opposite Traffic Alert (OTA)
- RIMCAS – Departure Monitor (RDM)
- RIMCAS – Runway / Taxiway Crossing Monitor (RCM)
- RIMCAS – Taxiway Separation Monitor (TSM)
- RIMCAS – Unauthorized Taxiway Movement Monitor (UTMM)
- RIMCAS – Stop Bar Overrun Alert (SBOA)
- End of Conflict (EOC)
- ACAS Resolution Advisory (ACASRA)
- Near Term Conflict Alert (NTCA)
- Downlinked Barometric Pressure Setting Monitor (DBPSM)
- Speed Adherence Monitor (SAM)
- Outside Controlled Airspace Tool (OCAT)
- Vertical Conflict Detection (VCD)
- Vertical Rate Adherence Monitor (VRAM)
- Cleared Heading Adherence Monitor (CHAM)
- Downlinked Selected Altitude Monitor (DSAM)
- Holding Adherence Monitor (HAM)
- Vertical Path Monitor (VPM)
- Lost Track Warning (LTW)
- Holding Volume Infringement (HVI)
- Airspace Infringement Warning (AIW)

Note: RIMCAS denotes a Runway Incursion Monitoring and Conflict Alert System installed at airports.

4.5.1.1 Alive Message

This message type is sent periodically by the Safety Net Server. It will report the status of the Safety Net server and its functions.

4.5.1.2 Route Adherence Monitor Longitudinal Deviation

The Route Adherence Monitor Longitudinal Deviation is the Safety Net function responsible to alert in situations when an aircraft is ahead or behind its planned position. This RAMLD is performed by calculating the longitudinal distance the flight has from its planned position at the present time. When the longitudinal distance is greater than a threshold, an alert is generated.

4.5.1.3 Route Adherence Monitor Heading Deviation

The Route Adherence Monitor Heading Deviation is the Safety Net function responsible to alert in situations when an aircraft is deviating from its planned heading. This RAMHD is performed by calculating the transversal distance the flight has from its planned position at the present time. When the lateral deviation distance is greater than a threshold, an alert is generated.

4.5.1.4 Minimum Safe Altitude Warning

The Minimum Safe Altitude Warning (MSAW) is the Safety Net function responsible to alert in situations when an aircraft is, or is predicted to be, flying at an altitude below a defined threshold, and consequently there is the possibility of collision with an obstacle (Terrain, Building, etc...).

A specific case of MSAW is the infringement of the Minimum Radar Vectoring Altitude (MRVA). This will be signaled by setting bit 6 in the first extension of the first subfield of item I004/120.

4.5.1.5 Area Proximity Warning

The Area proximity Warning is the Safety Net function responsible to alert in situations when an aircraft is, or is predicted to be, crossing the border of a reserved area.

4.5.1.6 Clearance Level Adherence Monitor

The Clearance Level Adherence Monitor is the Safety Net function responsible to alert in situations when an aircraft is deviating from its Cleared Flight level by a value greater than a threshold.

4.5.1.7 Short Term Conflict Alert

The Short Term Conflict Alert is the Safety Net function responsible to detect, predict and report cases of conflicts (separation violations) for one or more pair of tracks. A conflict is a violation of the prescribed separation minima, both vertically and horizontally.

4.5.1.8 Approach Path Monitor

The Approach Path Monitor (sometimes also known as Approach Funnel Deviation Alert System (AFDAS)) is the Safety Net function responsible for alerting in situations when an aircraft deviates from the nominal approach path, either laterally or vertically. APM is a more generic term than AFDA or AFDAS, and is therefore adopted by this specification.

4.5.1.9 RIMCAS Arrival / Landing Monitor (ALM)

The Arrival / Landing monitor is designed to raise an alarm if during arrival or after landing of an aircraft a potential conflict with another target is detected.

4.5.1.10 RIMCAS Arrival / Departure Wrong Runway Alert (WRA)

This function raises an alert if it is detected that an aircraft that is in the approach phase or is accelerating for departure moves in a direction other than for the runway it has been cleared for.

4.5.1.11 RIMCAS Arrival / Departure Opposite Traffic Alert (OTA)

This alert is generated when it has been detected that during approach two aircraft are approaching the same runway from opposite directions. In case of departures this alert is raised if it is detected that two departures use the same runway in opposite directions.

4.5.1.12 RIMCAS Departure Monitor (RDM)

This function supervises the departure area and raises an alarm if another target is detected inside this area.

4.5.1.13 RIMCAS Runway / Taxiway Crossing Monitor (RCM)

This function monitors the crossing between two runways or between a runway and a taxiway. If the system detects two targets approach the respective crossing area with a potential collision between the two targets, an alert is generated.

4.5.1.14 RIMCAS Taxiway Separation Monitor (TSM)

The controllers are alerted by this function if the prescribed separation minima between two targets on a taxiway are endangered.

4.5.1.15 RIMCAS Unauthorized Taxiway Movement Monitor (UTMM)

The taxiways are monitored for aircraft heading towards each other on the same taxiway, for targets entering the taxiway against the prescribed direction and for targets violating the prescribed speed-limit on the taxiway.

4.5.1.16 RIMCAS Stop-Bar Overrun Alert (SBOA)

A stop-bar is a point on the airport surface where targets are required to stop. An alert is raised if it is detected that a target is passing an active stop-bar.

4.5.1.17 End Of Conflict (EOC)

This message is transmitted if the conflicting situation no longer exists.
This message is used to terminate all types of alerts.

4.5.1.18 ACAS Resolution Advisory (ACASRA)

The ACAS Resolution Advisory is the function to report RA events between two or more aircraft. It utilizes the ACAS messages defined in ICAO Annex 10.

4.5.1.19 Near Term Conflict Alert (NTCA)

The NTCA is a conflict detection tool with a tactical scope. Following the STCA concept, it provides a common set of conflicts to all CWP, i.e. no CWP requests are sent to the NTCA. NTCA is based on the use of uncertainty cones, in the vertical and horizontal plane, to determine potentially conflicting pairs of aircraft.

4.5.1.20 Downlinked Barometric Pressure Setting Monitor (DBPSM)

The Downlinked Barometric Pressure Setting Monitor (DBPSM) alerts in situations where aircraft barometric pressure setting deviates from the expected pressure setting by a value greater than a threshold.

There are three separate DBPSM safety nets usually referred to as DBPSM ARR (DBPSM on ARRivals), DBPSM DEP (DBPSM on DEPartures) and DBPSM above TL (DBPSM above the Transition Level) which alert suspected altimetry errors by the pilot.

4.5.1.21 Speed Adherence Monitor (SAM)

The Speed Adherence Monitor (SAM) alerts in situations where an aircraft is deviating from its expected airspeed by a value greater than a threshold.

The expected airspeed can be the cleared speed entered by the ATCO or a speed limit as defined per phases inside a volume.

4.5.1.22 Outside Controlled Airspace Tool (OCAT)

The Outside Controlled Airspace Tool (OCAT) alerts in situations where an aircraft exits the controlled airspace.

4.5.1.23 Vertical Conflict Detection (VCD)

The Vertical Conflict Detection (VCD) alerts in situations where crossing or merging traffic in predefined airspace structures, such as point merge arcs, share contentious vertical profiles.

4.5.1.24 Vertical Rate Adherence Monitor (VRAM)

The Vertical Rate Adherence Monitor (VRAM) alerts in situations where an aircraft is deviating from its expected vertical rate by a value greater than a threshold.

There are three separate VRAM safety nets usually referred to as:

- CRM (Cleared Rate Monitor), which alerts when deviating from its expected cleared rate.
- VTM (Vertical Tracker Monitor), which alerts when an aircraft has an exceptionally high vertical rate, close to or outside the limits of the surveillance service.

- VRM (Vertical Rate Monitor), which alerts when an aircraft is descending or climbing at a vertical rate that suggests it will level off before reaching its expected level.

4.5.1.25 Clearance Heading Adherence Monitor (CHAM)

The Clearance Heading Adherence Monitor is the Safety Net function responsible to alert in situations when an aircraft is deviating from its cleared heading by a value greater than a threshold.

4.5.1.26 Downlinked Selected Altitude Monitor (DSAM)

The Downlinked Selected Altitude Monitor is the Safety Net function responsible to alert in situations when an aircraft final state selected altitude is deviating from its expected level by a value greater than a threshold that suggests it will level off before or after reaching its expected level.

4.5.1.27 Holding Adherence Monitor (HAM)

The Holding Adherence Monitor is the Safety Net function responsible to alert in situations when an aircraft is deviating from its cleared holding area (possibly in terms of level, lateral position and rate of climb/descent).

There are three separate HAM safety nets usually referred to as:

- HAM HD (Heading deviation), which alerts when an aircraft is located laterally outside its cleared Holding volume.
- HAM VD (Vertical deviation), which alerts when an aircraft is located vertically outside its cleared Holding volume.
- HAM RD (Rate Deviation), which alerts when an aircraft is descending or climbing at a vertical rate that suggests it will level off before or after reaching its anticipated level.

4.5.1.28 Vertical Path Monitor (VPM)

The Vertical Path Monitor is the Safety Net function responsible to alert in situations when an aircraft is deviating vertically from its SID/STAR vertical constraints.

4.5.1.29 Lost Track Warning (LTW)

The Lost Track Warning is the Safety Net function responsible to alert in situations when a track is terminated or becomes too old where it is not expected to happen.

4.5.1.30 Holding Volume Infringement (HVI)

The Holding Volume Infringement is the Safety Net function responsible to alert in situations when an aircraft enters or is predicted to enter a Holding Volume for which it does not have the clearance to hold.

4.5.1.31 Airspace Infringement Warning (AIW)

The Airspace Infringement Warning warns the controller if an aircraft deviates into a sector it should not be passing through.

The pAIW (primary AIW) sub-function specifically applies to primary-only tracks.

4.5.2 User Application Profile and Data Block

A single UAP has been standardised and shall be used to transmit messages from a Safety Net to user systems.

Data Blocks containing Safety Net messages shall have the following layout:

CAT = 004	LEN	FSPEC	Items of the first record		FSPEC	Items of the last record
------------------	------------	--------------	---------------------------	--	--------------	--------------------------

Where:

- * CAT = 004 is a one-octet field indicating that the Data Block contains safety net messages;
- * LEN is a two-octet field indicating the total length in octets of the Data Block, including the CAT and LEN fields;
- * FSPEC is the Field Specification.

4.6 Composition of Messages

4.6.1 Messages shall be composed of Data Items assembled in the order defined by the Field Reference Number (FRN) in the associated UAP.

4.9.2 When sent, items shall always be transmitted in a Record with the corresponding FSPEC bits set to one.

5. SAFETY NETS CONCEPTS AND FURTHER READING

Sometimes, the safest systems fail. That is why safety nets are needed - to provide additional System Safety Defences.

STCA directly assists in preventing collision between aircraft whilst APW does so indirectly by predicting or detecting violations of traffic segregation rules. Minimum Safe Altitude Warning (MSAW) and Approach Path Monitor (APM) assist in preventing controlled flight into terrain accidents.

The features of Safety Nets systems are in continual development and over the decades the systems have evolved to meet the needs of Air Navigation Service Providers in diverse operational environments.

High level specifications and comprehensive guidance material for STCA, MSAW, APM and APW can be found on the EUROCONTROL safety nets web pages: <http://www.eurocontrol.int/safety-nets>.

6. LAYOUT OF SAFETY NET MESSAGES

6.1 Standard Data Items

The standardised Data Items, which shall be used for the transmission of safety net messages, are defined in Table 2 and described in the following pages.

Table 1 : Standard Data Items of Category 004

Data Item Ref. No.	Description	System Units
I004/000	Message Type	N.A.
I004/010	Data Source Identifier	N.A.
I004/015	SDPS Identifier	N.A.
I004/020	Time of Message	1/128 sec
I004/030	Track Number 1	N.A.
I004/035	Track Number 2	N.A.
I004/040	Alert Identifier	N.A.
I004/045	Alert Status	N.A.
I004/060	Safety Net Function & System Status	N.A.
I004/070	Conflict Timing and Separation	N.A.
I004/074	Longitudinal Deviation	32m
I004/075	Transversal Distance Deviation	0.5m
I004/076	Vertical Deviation	25 ft
I004/100	Area Definitions	N.A.
I004/110	FDPS Sector Control Positions	N.A.
I004/120	Conflict Characteristics	N.A.
I004/170	Aircraft Identification & Characteristics 1	N.A.
I004/171	Aircraft Identification & Characteristics 2	N.A.

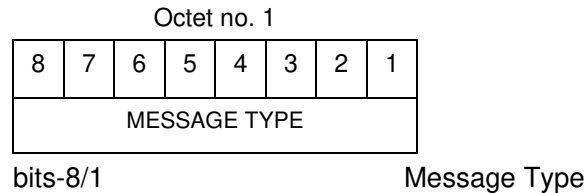
6.2 Description of Standard Data Items

6.2.1 Data Item I004/000, Message Type

Definition : This Data Item allows for a more convenient handling of the messages at the receiver side by further defining the type of transaction.

Format : One-octet fixed length Data Item.

Structure:



Encoding Rule:

This data item shall be present in every ASTERIX record.

NOTES

1. In applications where transactions of various types are exchanged, the Message Type Data Item facilitates the proper message handling at the receiver side.
2. All Message Type values are reserved for common standard use.
3. The following set of Message Types are standardised for Category 004 records:
 - * 001 Alive Message (AM)
 - * 002 Route Adherence Monitor Longitudinal Deviation (RAMLD)
 - * 003 Route Adherence Monitor Heading Deviation (RAMHD)
 - * 004 Minimum Safe Altitude Warning (MSAW)
 - * 005 Area Proximity Warning (APW)
 - * 006 Clearance Level Adherence Monitor (CLAM)
 - * 007 Short Term Conflict Alert (STCA)
 - * 008 Approach Path Monitor (APM)
 - * 009 RIMCAS Arrival / Landing Monitor (ALM)
 - * 010 RIMCAS Arrival / Departure Wrong Runway Alert (WRA)
 - * 011 RIMCAS Arrival / Departure Opposite Traffic Alert (OTA)
 - * 012 RIMCAS Departure Monitor (RDM)
 - * 013 RIMCAS Runway / Taxiway Crossing Monitor (RCM)
 - * 014 RIMCAS Taxiway Separation Monitor (TSM)
 - * 015 RIMCAS Unauthorized Taxiway Movement Monitor(UTMM)
 - * 016 RIMCAS Stop Bar Overrun Alert (SBOA)
 - * 017 End Of Conflict (EOC)
 - * 018 ACAS Resolution Advisory (ACASRA)
 - * 019 Near Term Conflict Alert (NTCA)
 - * 020 Downlinked Barometric Pressure Setting Monitor (DBPSM)
 - * 021 Speed Adherence Monitor (SAM)
 - * 022 Outside Controlled Airspace Tool (OCAT)

- * 023 Vertical Conflict Detection (VCD)
- * 024 Vertical Rate Adherence Monitor (VRAM)
- * 025 Cleared Heading Adherence Monitor (CHAM)
- * 026 Downlinked Selected Altitude Monitor (DSAM)
- * 027 Holding Adherence Monitor (HAM)
- * 028 Vertical Path Monitor (VPM)
- * 097 Lost Track Warning (LTW)
- * 098 Holding Volume Infringement (HVI)
- * 099 Airspace Infringement Warning (AIW)

4. The list of items present for the 31 types of messages is defined in the following 4 tables.

M stands for mandatory, O for optional, X for never present.

Type Item	001 Alive Message	002 RAMLD	003 RAMHD	004 MSAW	005 APW	006 CLAM	007 STCA	008 APM
I004/000	M	M	M	M	M	M	M	M
I004/010	M	M	M	M	M	M	M	M
I004/015	O	O	O	O	O	O	O	O
I004/020	M	M	M	M	M	M	M	M
I004/030	X	M	M	M	M	M	M	M
I004/035	X	X	X	X	X	X	M	X
I004/040	X	M	M	M	M	M	M	M
I004/045	X	O	O	O	O	O	O	O
I004/060	M	X	X	X	X	X	X	X
I004/070	X	X	X	O	O	X	O	X
I004/074	X	M	X	X	X	X	X	X
I004/075	X	X	M	X	X	X	X	M
I004/076	X	X	X	X	X	O	X	O
I004/100	X	X	X	X	M	X	X	O
I004/110	X	O	O	O	O	O	O	O
I004/120	X	X	X	M	M	X	M	X
I004/170	X	O	O	O	O	O	O	O
I004/171	X	X	X	X	X	X	O	X
I004/RE	O	O	O	O	O	O	O	O

Table 2 : Message Types 001 - 008

Type	009	010	011	012	013	014	015	016
Item	ALM	WRA	OTA	RDM	RCM	TSM	UTMM	SBOA
I004/000	M	M	M	M	M	M	M	M
I004/010	M	M	M	M	M	M	M	M
I004/015	O	O	O	O	O	O	O	O
I004/020	M	M	M	M	M	M	M	M
I004/030	M	M	M	M	M	M	M	M
I004/035	M	X	M	M	M	M	O	X
I004/040	M	M	M	M	M	M	M	M
I004/045	O	O	O	O	O	O	O	O
I004/060	X	X	X	X	X	X	X	X
I004/070	O	X	O	O	O	O	O	X
I004/074	X	X	X	X	X	X	X	X
I004/075	X	X	X	X	X	X	X	X
I004/076	X	X	X	X	X	X	X	X
I004/100	M	M	M	M	M	M	M	M
I004/110	O	O	O	O	O	O	O	O
I004/120	M	M	M	M	M	O	O	O
I004/170	O	O	O	O	O	O	O	O
I004/171	O	X	O	O	O	O	O	X
I004/RE	O	O	O	O	O	O	O	O

Table 3 : Message Types 009 – 016

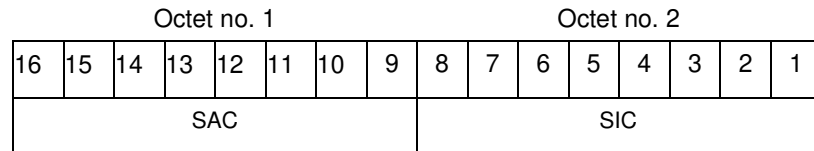
Type	017	018	019	020	021	022	023	024
Item	EOC	ACASRA	NTCA	DBPSM	SAM	OCAT	VCD	VRAM
I004/000	M	M	M	M	M	M	M	M
I004/010	M	M	M	M	M	M	M	M
I004/015	O	O	O	O	O	O	O	O
I004/020	M	M	M	M	M	M	M	M
I004/030	O	X	M	M	M	M	M	M
I004/035	O	X	M	X	X	X	M	X
I004/040	M	M	M	M	M	M	M	M
I004/045	O	O	O	O	O	O	O	O
I004/060	X	X	X	X	X	X	X	X
I004/070	X	O	O	X	X	O	O	X
I004/074	X	X	X	X	X	X	X	X
I004/075	X	X	X	X	X	X	X	X
I004/076	X	X	X	X	X	X	X	O
I004/100	X	X	X	O	O	M	M	O
I004/110	X	X	O	O	O	O	O	O
I004/120	X	X	O	M	O	M	M	O
I004/170	X	M	O	O	O	O	O	O
I004/171	X	O	O	X	X	X	O	X
I004/RE	O	M	O	O	O	O	O	O

Table 4 : Message types 017 – 024

Type	025	026	027	028	097	098	099
Item	CHAM	DSAM	HAM	VPM	LTW	HVI	AIW
I004/000	M	M	M	M	M	M	M
I004/010	M	M	M	M	M	M	M
I004/015	O	O	O	O	O	O	O
I004/020	M	M	M	M	M	M	M
I004/030	M	M	M	M	M	M	M
I004/035	X	X	X	X	X	X	X
I004/040	M	M	M	M	M	M	M
I004/045	O	O	O	O	O	O	O
I004/060	X	X	X	X	X	X	X
I004/070	X	X	X	X	O	O	O
I004/074	X	X	O	X	X	X	X
I004/075	X	X	X	X	X	X	X
I004/076	X	O	O	O	X	X	X
I004/100	O	O	O	O	O	O	O
I004/110	O	O	O	O	O	O	O
I004/120	O	O	O	X	O	O	O
I004/170	O	O	O	O	O	O	O
I004/171	X	X	X	X	X	X	X
I004/RE	O	O	O	O	M	O	O

Table 5 : Message types 025 – 028 and 097 – 099

NOTE - Message types 097-099 were chosen because they are already assigned in an existing system.

6.2.2 Data Item I004/010 Data Source Identifier**Definition :** Identification of the Safety Nets server sending the message.**Format :** Two-octet fixed length Data Item.**Structure:**

bits-16/9 (SAC) System Area Code

bits-8/1 (SIC) System Identification Code

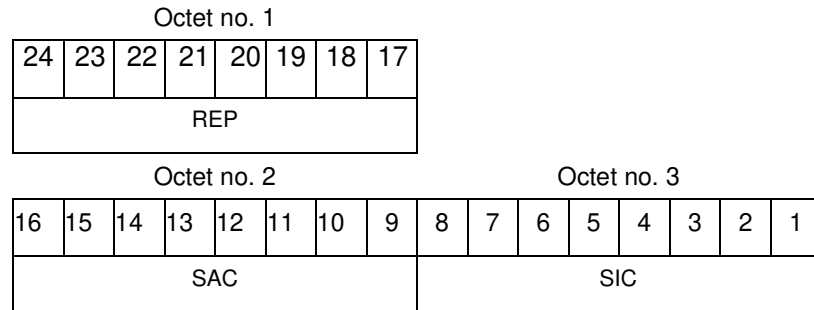
NOTE - The up-to-date list of SACs is published on the EUROCONTROL Web Site (<http://www.eurocontrol.int/asterix>).

6.2.3 Data Item I004/015 SDPS Identifier

Definition : Identification of the SDPS providing data to the safety nets server.

Format : Repetitive Data Item starting with one-octet Field Repetition Indicator (REP) followed by at least one SDPS Identifier.

Structure:



bits-24/17	(REP)	Repetition Factor
bits-16/9	(SAC)	System Area Code
bits-8/1	(SIC)	System Identification Code

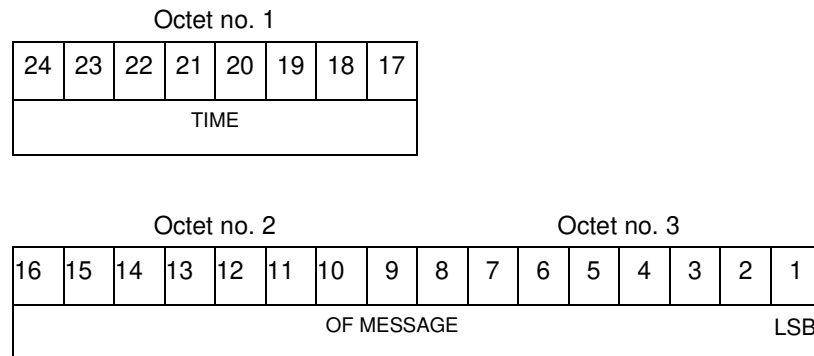
NOTE - The up-to-date list of SACs is published on the EUROCONTROL Web Site (<http://www.eurocontrol.int/asterix>).

6.2.4 Data Item I004/020 Time of Message

Definition : Absolute time stamping of the message in the form of elapsed time since last midnight

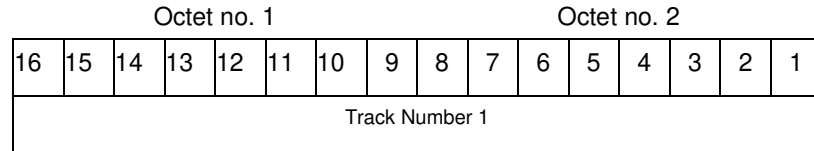
Format : Three-octet fixed length Data Item.

Structure:



bit-1 (LSB) = (2^{-7}) sec = 1/128 sec

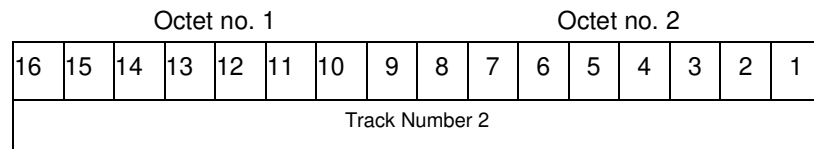
This time is given at an application level (e.g. time at which a message is filled), and not at the communication level (i.e. not the time at which the data-block containing the message is sent).

6.2.5 Data Item I004/030 Track Number 1**Definition :** Identification of a track number related to conflict**Format :** Two-octet fixed length Data Item.**Structure:**

bits 16/1 (TRACK NUMBER) : 0 to 65535

NOTES

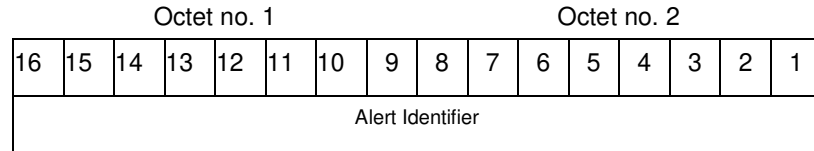
1. This is the track number of the first track involved in the conflict in case of an STCA or a RIMCA or the track involved in case of one of the other Safety Net functions.
2. This track number is distributed in this field exactly as it was received from the Radar Processor Unit (identified by I004/015) and its range is depending on the range used by that unit

6.2.6 Data Item I004/035 Track Number 2**Definition :** Together with I004/030, this item defines the track pair in conflict.**Format :** Two-octet fixed length Data Item.**Structure:**

bits 16/1 (TRACK NUMBER) : 0 to 65535

NOTES

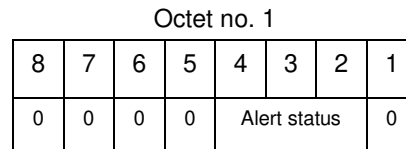
1. This is the track number of the second track involved in the conflict in case of an STCA, a RIMCA, a NTCA or a VCD.
2. For the other Safety Net functions, this item is not used.
3. This track number is distributed in this field exactly as it was received from the Radar Processor Unit and its range is depending on the range used by that unit

6.2.7 Data Item I004/040 Alert Identifier**Definition :** Identification of an alert (Alert number)**Format :** Two-octet fixed length Data Item.**Structure:**

bits 16/1 (Alert Identifier) : 0 to 65535

NOTES

1. This item is the Alert Identification of the conflict in the system
2. This number shall be assigned, by the Safety Net Server, incrementally to every new alert and restart on zero after reaching the maximum value (65535)

6.2.8 Data Item I004/045 Alert Status**Definition :** Information concerning status of the alert**Format :** One-octet fixed length Data Item.**Structure:**

bits-8/5 Spare bits set to 0

bits-4/2 (STAT) Status of the alert

bit-1 Spare bit set to 0

The content of this item is implementation dependent.

6.2.9 Data Item I004/060 Safety Net Function & System Status**Definition :** Status of the Safety Nets functions handled by the system**Format :** Variable length Data Item comprising a first part of one octet, followed by one-octet extents as necessary.**Structure:**

Octet no. 1

8	7	6	5	4	3	2	1
MRVA	RAML	RAMHD	MSAW	APW	CLAM	STCA	FX

bit-8	(MRVA)	= 0	Default
		= 1	MRVA function
bit-7	(RAMLD)	= 0	Default
		= 1	RAML function
bit-6	(RAMHD)	= 0	Default
		= 1	RAMHD function
bit-5	(MSAW)	= 0	Default
		= 1	MSAW function
bit-4	(APW)	= 0	Default
		= 1	APW function
bit-3	(CLAM)	= 0	Default
		= 1	CLAM function
bit-2	(STCA)	= 0	Default
		= 1	STCA function
bit-1	(FX)	= 0	No extension
		= 1	Extension

Structure of First Extent:

Octet no. 2

8	7	6	5	4	3	2	1
APM	RIMCA	ACASRA	NTCA	DG	OF	OL	FX

bit-8	(APM)	= 0	Default
		= 1	APM function
bit-7	(RIMCA)	= 0	Default
		= 1	RIMCA function
bit-6	(ACASRA)	= 0	Default
		= 1	ACAS RA function
bit-5	(NTCA)	= 0	Default
		= 1	NTCA function
bit 4	(DG)	= 0	Default
		= 1	System degraded
bit-3	(OF)	= 0	Default
		= 1	Overflow error
bit-2	(OL)	= 0	Default
		= 1	Overload error
bit-1	(FX)	= 0	No extension
		= 1	Extension

Structure of Second Extent:

Octet no. 3

8	7	6	5	4	3	2	1
AIW	pAIW	OCAT	SAM	VCD	CHAM	DSAM	FX

bit-8	(AIW)	=0	Default
		=1	AIW function
bit-7	(pAIW)	=0	Default
		=1	pAIW function
bit-6	(OCAT)	= 0	Default
		=1	OCAT function
bit 5	(SAM)	=0	Default
		=1	SAM function
bit 4	(VCD)	=0	Default
		=1	VCD function
bit-3	(CHAM)	=0	Default
		=1	CHAM function
bit-2	(DSAM)	=0	Default
		=1	DSAM function
bit-1	(FX)	= 0	No extension
		= 1	Extension

Structure of Third Extent:

Octet no.4

8	7	6	5	4	3	2	1
DBPSM ARR	DBPSM DEP	DBPSM TL	VRAM CRM	VRAM VTM	VRAM VRM	HAM HD	FX

bit-8	(DBPSM ARR)	=0 Default =1 DBPSM ARR sub-function
bit-7	(DBPSM DEP)	=0 Default =1 DBPSM DEP sub-function
bit-6	(DBPSM TL)	=0 Default =1 DBPSM TL sub-function
bit-5	(VRAM CRM)	=0 Default =1 VRAM CRM sub-function
bit-4	(VRAM VTM)	=0 Default =1 VRAM VTM sub-function
bit-3	(VRAM VRM)	=0 Default =1 VRAM VRM sub-function
bit-2	(HAM HD)	=0 Default =1 HAM HD sub-function
bit-1	(FX)	= 0 No extension = 1 Extension

Structure of Fourth Extent:

Octet no. 5

8	7	6	5	4	3	2	1
HAM RD	HAM VD	HVI	LTW	VPM	0	0	FX

bit-8	(HAM RD)	=0 Default =1 HAM RD sub-function
bit-7	(HAM VD)	=0 Default =1 HAM VD sub-function
bit-6	(HVI)	=0 Default =1 HVI function
bit-5	(LTW)	=0 Default =1 LTW function
bit-4	(VPM)	=0 Default =1 VPM function
bit-3/2	spare bits, set to "0"	
bit-1	(FX)	= 0 No extension = 1 Extension

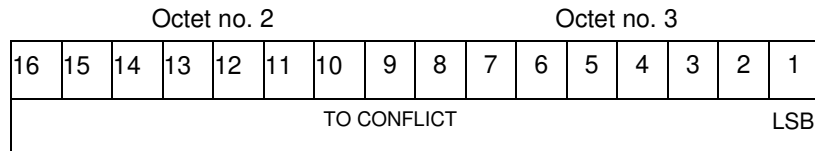
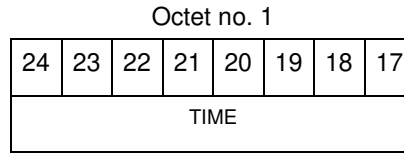
NOTES

1. This item only sent in “alive messages” to describe the status of the Safety Net functions, handled by the system
2. Value 0 means either that the function is not managed by the system or has failed.
3. Value 1 means that the function is managed by the system and is running well
4. “Overflow” is defined as a situation where the number of alerts in the system has exceeded the threshold for safe operation. Potential prioritization of the alerts may lead to a loss of information.
5. “Overload” is defined as a system status in which the number of alerts does not allow for a reliable performance. A correct calculation and transmission cannot be guaranteed.
6. “System degraded” means that information from one or more sensors is lost.

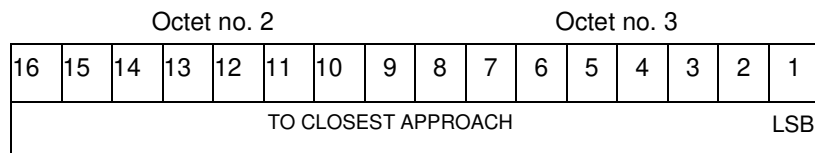
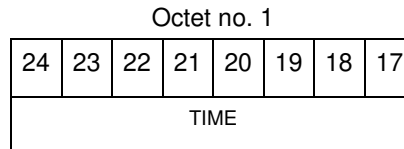
6.2.10 Data Item I004/070, Conflict Timing and Separation**Definition :** Information on Timing and Aircraft Separation**Format :** Compound Data Item, comprising a primary subfield of one octet, followed by the indicated subfields.**Structure of Primary Subfield:**

Octet no. 1							
8	7	6	5	4	3	2	1
TC	TCA	CHS	MHS	CVS	MVS	0	FX

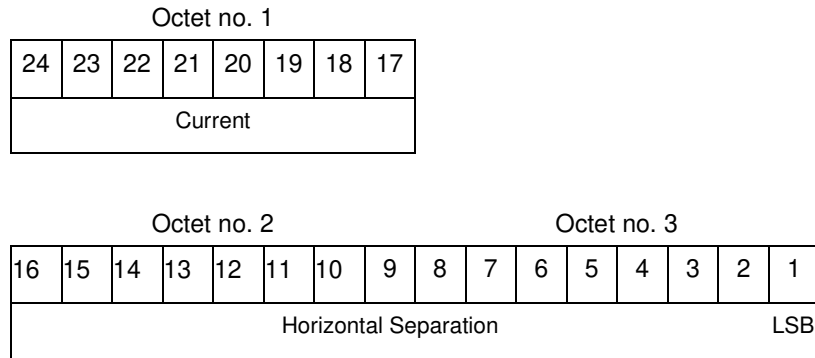
bit-8	(TC)	Subfield #1: Time to Conflict = 0 Absence of Subfield #1 = 1 Presence of Subfield #1
bit-7	(TCA)	Subfield #2: Time to Closest Approach = 0 Absence of Subfield #2 = 1 Presence of Subfield #2
bit-6	(CHS)	Subfield #3: Current Horizontal Separation = 0 Absence of Subfield #3 = 1 Presence of Subfield #3
bit-5	(MHS)	Subfield #4: Estimated Minimum Horizontal Separation = 0 Absence of Subfield #4 = 1 Presence of Subfield #4
bit-4	(CVS)	Subfield #5: Current Vertical Separation = 0 Absence of Subfield #5 = 1 Presence of Subfield #5
bit-3	(MVS)	Subfield #6: Estimated Minimum Vertical Separation = 0 Absence of Subfield #6 = 1 Presence of Subfield #6
bit-2		Spare Bit, Set to 0
bit-1	(FX)	Extension Indicator = 0 no extension = 1 extension

Structure of Subfield #1:**Time to Conflict:****Definition :** Time remaining to actual conflict situation**Format :** Three-octet fixed length Data Item.**Structure:**

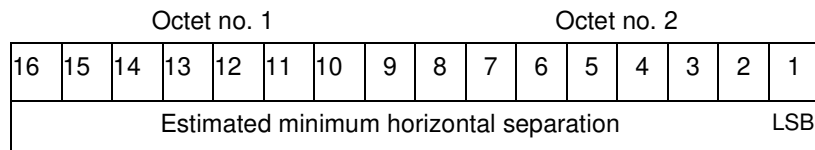
$$\text{bit-1 (LSB)} = (2^{-7}) \text{ sec} = 1/128 \text{ sec}$$

Structure of Subfield #2:**Time to Closest Approach****Definition :** Time to closest proximity between entities in conflict**Format :** Three-octet fixed length Data Item.**Structure:**

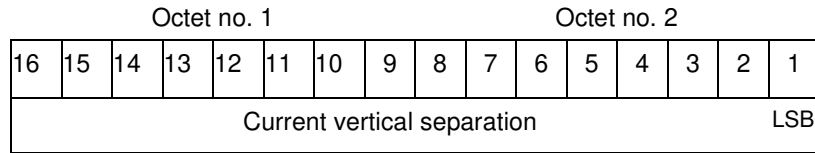
$$\text{bit-1 (LSB)} = (2^{-7}) \text{ sec} = 1/128 \text{ sec}$$

Structure of Subfield #3:**Current Horizontal Separation****Definition :** Current horizontal separation**Format :** Three-octet fixed length Data Item.**Structure:**

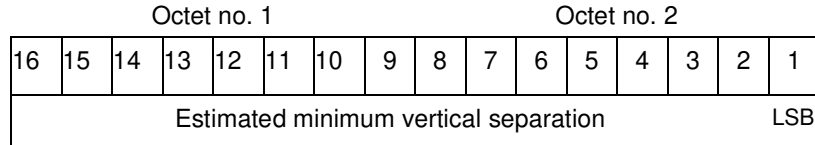
bits 24/1 (Current horizontal separation)
 LSB = 0.5m

Structure of Subfield #4:**Estimated Minimum Horizontal Separation****Definition :** Estimated minimum horizontal separation.**Format :** Two-octet fixed length Data Item.**Structure:**

bits 16/1 (Estimated minimum horizontal separation)
 LSB = 0.5m

Structure of Subfield #5:**Current Vertical Separation****Definition :** Current vertical separation**Format :** Two-octet fixed length Data Item.**Structure:**

bits 16/1 (Current vertical separation)
 LSB = 25 ft

Structure of Subfield #6:**Estimated Minimum Vertical Separation****Definition :** Estimated minimum vertical separation.**Format :** Two-octet fixed length Data Item.**Structure:**

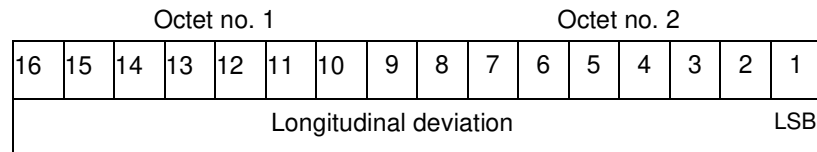
bits 16/1 (Estimated minimum vertical separation)
 LSB = 25 ft

6.2.11 Data Item I004/074, Longitudinal Deviation

Definition : Longitudinal deviation for Route Adherence Monitoring, in two's complement form.

Format : Two-octet fixed length Data Item.

Structure:



bits 16/1 (Longitudinal deviation)
LSB = 32m

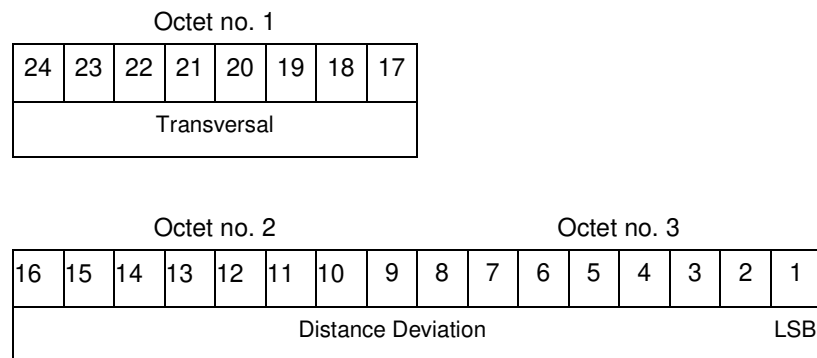
NOTE - Longitudinal deviation will be positive if the aircraft is ahead of its planned position.
Longitudinal deviation will be negative if the aircraft is behind its planned position.

6.2.12 Data Item I004/075, Transversal Distance Deviation

Definition : Transversal distance deviation for Route Adherence Monitoring, in two's complement form.

Format : Three-octet fixed length Data Item.

Structure:



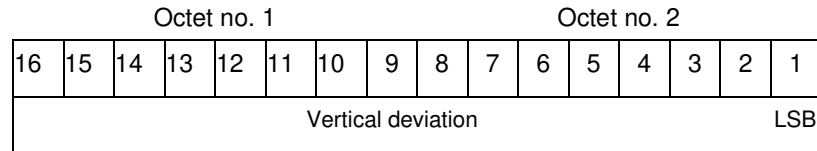
bits 24/1 (Current horizontal separation)
LSB = 0.5m

NOTE - Deviation to the right of the track will be coded as a positive value.
Deviation to the left of the track will be coded as a negative value

6.2.13 Data Item I004/076, Vertical Deviation

Definition : Vertical Deviation from planned altitude, in two's complement form.

Format : Two-octet fixed length Data Item.



bits 16/1 (Vertical deviation)
LSB = 25 ft

NOTE - Positive value if aircraft is above planned altitude
Negative value if aircraft is below planned altitude

6.2.14 Data Item I004/100, Area Definition**Definition :** Definition of Areas involved in a Safety Net Alert**Format :** Compound Data Item, comprising a primary subfield of one octet, followed by the indicated subfields.**Structure of Primary Subfield:**

Octet no. 1							
8	7	6	5	4	3	2	1
AN	CAN	RT1	RT2	SB	G	0	FX

bit-8	(AN)	Subfield #1: Area Name = 0 Absence of Subfield #1 = 1 Presence of Subfield #1
bit-7	(CAN)	Subfield #2: Crossing Area Name = 0 Absence of Subfield #2 = 1 Presence of Subfield #2
bit-6	(RT1)	Subfield #3: Runway/Taxiway Designator 1 = 0 Absence of Subfield #3 = 1 Presence of Subfield #3
bit-5	(RT2)	Subfield #4: Runway/Taxiway Designator 2 = 0 Absence of Subfield #4 = 1 Presence of Subfield #4
bit-4	(SB)	Subfield #5: Stop Bar Designator = 0 Absence of Subfield #5 = 1 Presence of Subfield #5
bit-3	(G)	Subfield #6: Gate Designator = 0 Absence of Subfield #6 = 1 Presence of Subfield #6
bit-2		Spare Bit, Set to 0
bit-1	(FX)	Extension Indicator = 0 no extension = 1 extension

Structure of Subfield #1:**Area Name:****Definition:** Name of the area involved in a Safety Net alarm**Format:** Six-octet fixed length Data Item.**Structure:**

Octet no. 1						Octet no. 2									
48	47	46	45	44	43	42	41	40	39	38	37	36	35	34	33
Character 1						Character 2						Character 3			

Octet no. 3								Octet no. 4							
32	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17
Character 4								Character 5							

Octet no. 5								Octet no. 6							
16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1
Character 6				Character 7								Character 8			

bits-48/1 Characters 1-8 (coded on 6 Bits each) defining the name of the area. Coding rules are provided in [3] Section 3.1.2.9

NOTE - The area name is always left adjusted. If needed, the remaining characters are filled with space character.

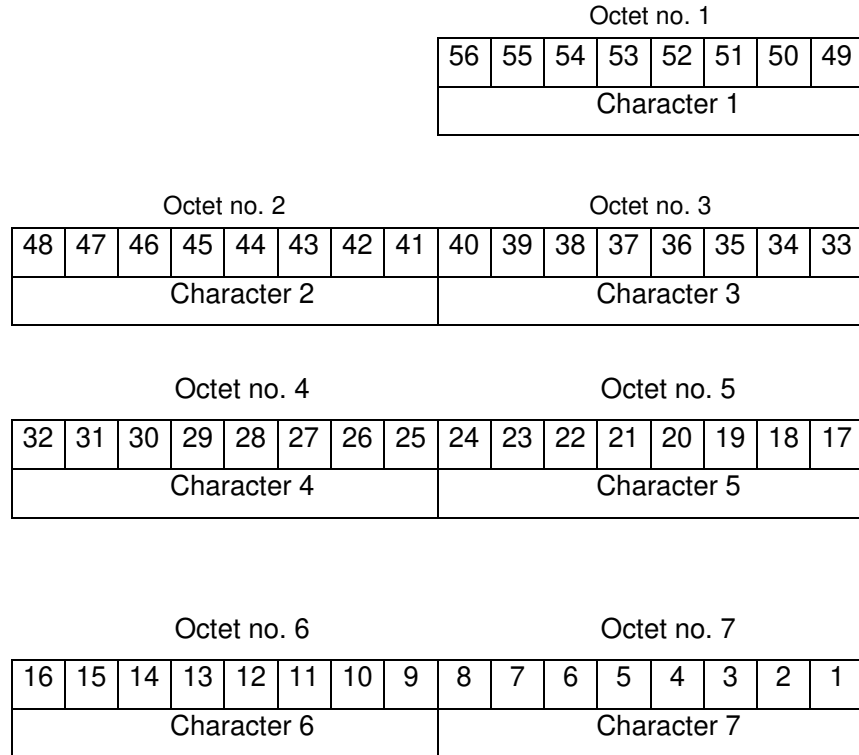
Structure of Subfield #2:

Crossing Area Name

Definition: Name of Crossing Area Involved in a RIMCA

Format: Seven-octet fixed length Data Item.

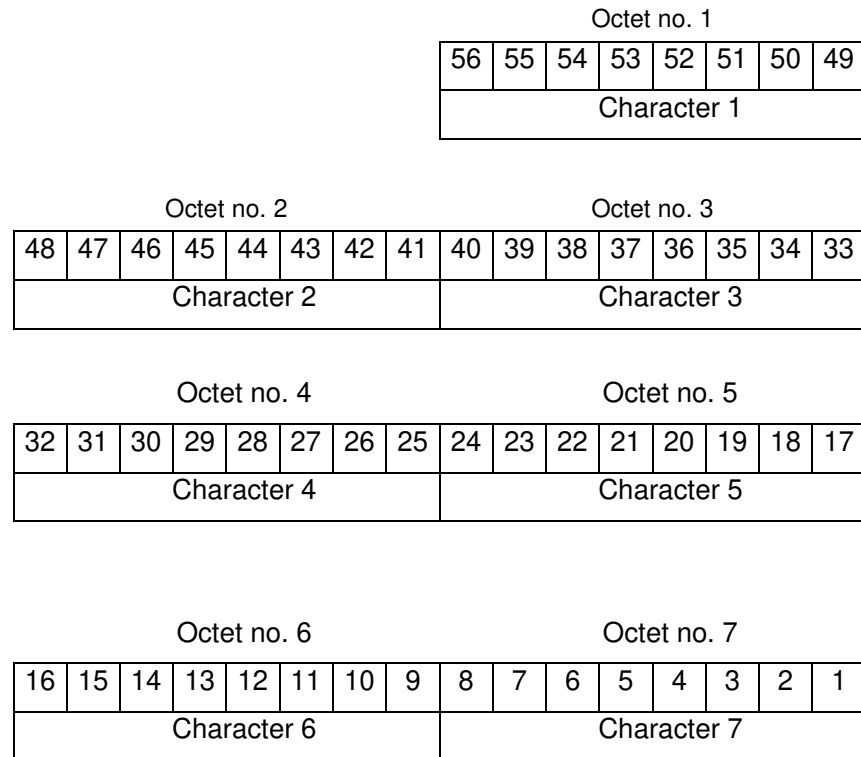
Structure:



bits-56/1

Each octet is an ASCII character defining the name of the crossing area involved in a runway/taxiway crossing alert (message type 013)

NOTE - The name of the crossing area is always left adjusted. If needed, the remaining characters are filled with space characters.

Structure of Subfield #3:**Runway/Taxiway Designator 1****Definition:** Designator of Runway/Taxiway 1 Involved in a RIMCA**Format:** Seven-octet fixed length Data Item.**Structure:**

bits-56/1 Each octet is an ASCII character defining the runway designator

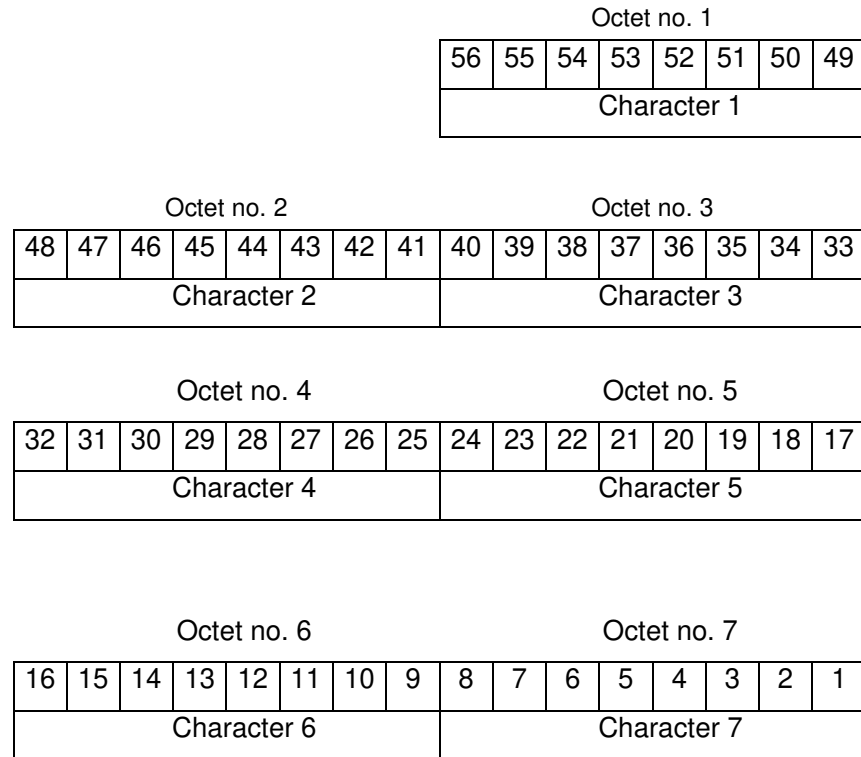
NOTE - The runway designator is always left adjusted. If needed, the remaining characters are filled with space characters.
 The runway is encoded as follows: Location indicator, runway direction, left or right.
 Example: EGLL09L means London Heathrow (EGLL), Runway 09 (direction 090 degrees) left runway

**Structure of Subfield #4:
Runway/Taxiway Designator 2**

Definition: Designator of Runway/Taxiway 2 Involved in a RIMCA

Format: Seven-octet fixed length Data Item.

Structure:



bits-56/1

Each octet is an ASCII character defining the runway designator

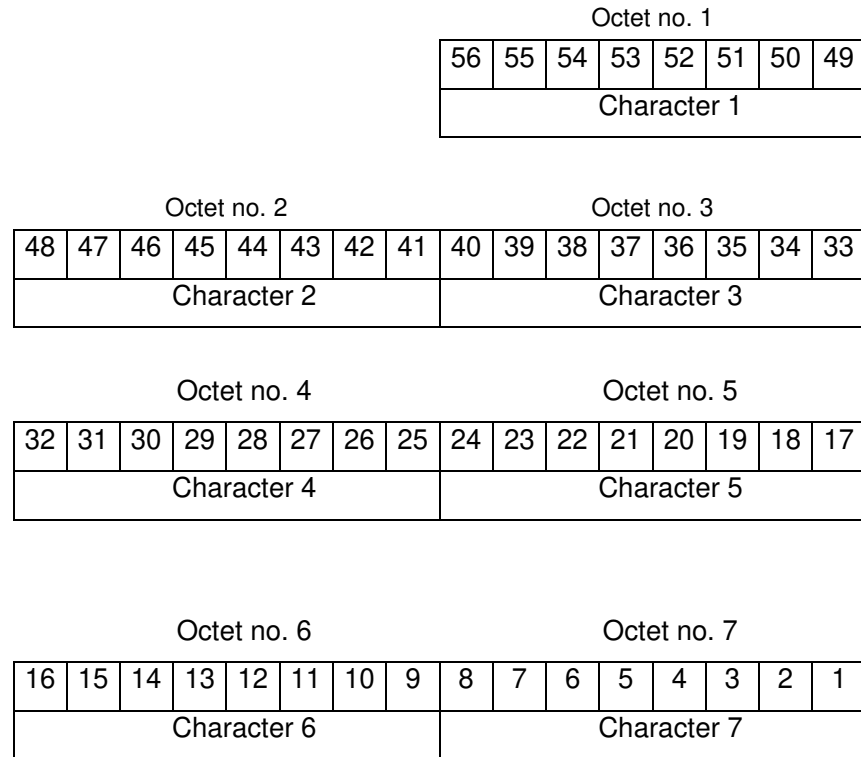
NOTE - The runway designator is always left adjusted. If needed, the remaining characters are filled with space characters.
The runway is encoded as follows: Location indicator, runway direction, left or right.
Example: EGLL09L means London Heathrow (EGLL), Runway 09 (direction 090 degrees) left runway

**Structure of Subfield #5:
Stop Bar Designator**

Definition: Designator of Stop-Bar Involved in a RIMCA

Format: Seven-octet fixed length Data Item.

Structure:



bits-56/1

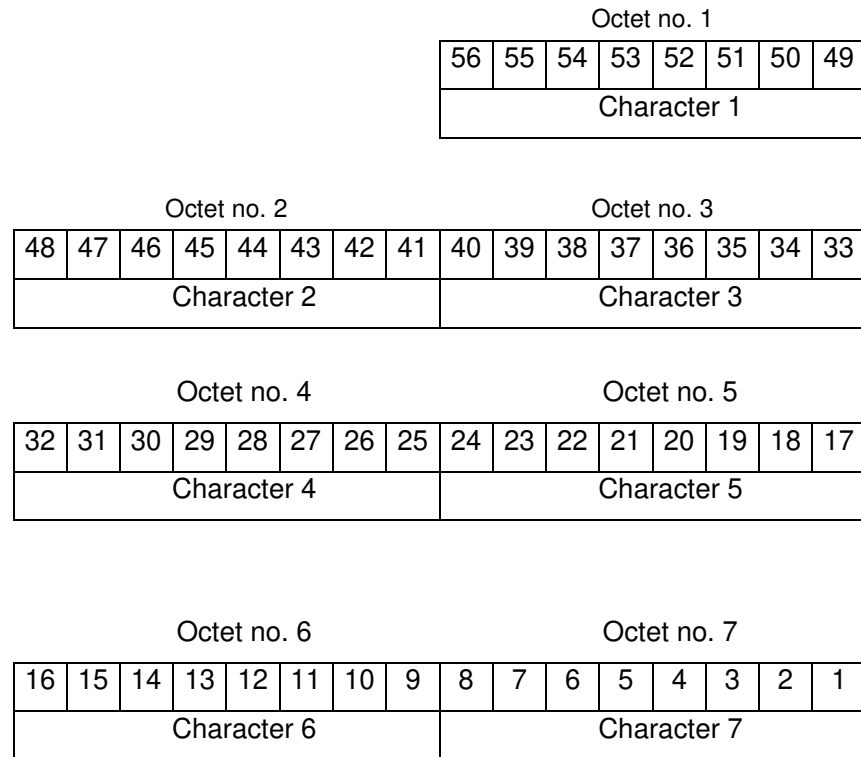
Each octet is an ASCII character defining the stop-bar involved in a stop-bar crossed alert (message type 016)

NOTE - The stop-bar designator is always left adjusted. If needed, the remaining characters are filled with space characters.

Structure of Subfield #6:**Gate Designator**

Definition: Gate Designator (in 7 characters) of the approaching aircraft in a RIMCA

Format: Seven-octet fixed length Data Item.

Structure:

bits-56/1

Each octet is an ASCII character defining the gate for the approaching aircraft

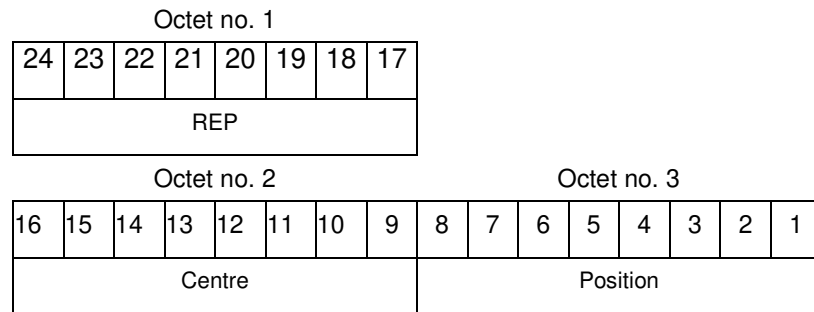
NOTE - The gate designator is always left adjusted. If needed, the remaining characters are filled with space character.

6.2.15 Data Item I004/110, FDPS Sector Control Identification

Definition : Identification of a list of FDPS Sector Control Positions in charge of the involved targets, as provided by the FDPS

Format : Repetitive Data Item starting with one-octet Field Repetition Indicator (REP) followed by at least one FDPS Sector Control Position

Structure:



bits 24/17 (REP) Repetition Factor

bits 16/9 (Centre) Centre identification code

bits 8/1 (Position) Control position identification code

NOTE - The Centre identification code and the Control position identification code must be defined between the communication partners.

6.2.16 Data Item I004/120, Conflict Characteristics**Definition :** Description of the Conflict Properties**Format :** Compound Data Item, comprising a primary subfield of one octet, followed by the indicated subfields.**Structure of Primary Subfield:**

Octet no. 1

8	7	6	5	4	3	2	1
CN	CC	CP	CD	0	0	0	FX

- bit-8 (CN) Subfield #1: Conflict Nature
 = 0 Absence of Subfield #1
 = 1 Presence of Subfield #1
- bit-7 (CC) Subfield #2: Conflict Classification
 = 0 Absence of Subfield #2
 = 1 Presence of Subfield #2
- bit-6 (CP) Subfield #3: Conflict Probability
 = 0 Absence of Subfield #3
 = 1 Presence of Subfield #3
- bit-5 (CD) Subfield #4: Conflict Duration
 = 0 Absence of Subfield #4
 = 1 Presence of Subfield #4
- bit-4/2 Spare Bits, Set to 0
- bit-1 (FX) Extension Indicator
 = 0 no extension
 = 1 extension

Structure of Subfield #1:**Conflict Nature:****Definition :** Nature of the conflict expressed by a set of properties**Format :** Variable length Data Item comprising a first part of one octet, followed by one-octet extents as necessary.**Structure:** The structure of this Data Item is defined as follows:

Octet no. 1							
8	7	6	5	4	3	2	1
MAS	CAS	FLD	FVD	Type	Cross	Div	FX

- bit-8 (MAS) Conflict location in military airspace
 = 0 conflict not predicted to occur in military airspace
 = 1 conflict predicted to occur in military airspace
- bit-7 (CAS) Conflict location in civil airspace
 = 0 conflict not predicted to occur in civil airspace
 = 1 conflict predicted to occur in civil airspace
- bit-6 (FLD) Fast lateral divergence
 = 0 Aircraft are not fast diverging laterally at current time
 = 1 Aircraft are fast diverging laterally at current time
- bit-5 (FVD) Fast vertical divergence
 = 0 Aircraft are not fast diverging vertically at current time
 = 1 Aircraft are fast diverging vertically at current time
- bit-4 (Type) Type of separation infringement
 0 = Minor separation infringement
 1 = Major separation infringement
- bit-3 (Cross) Crossing test
 0 = Aircraft have not crossed at starting time of conflict
 1 = Aircraft have crossed at starting time of conflict
- bit-2 (Div) Divergence test
 0 = Aircraft are not diverging at starting time of conflict
 1 = Aircraft are diverging at starting time of conflict
- bit-1 (FX) Field extension indicator
 0 = No extension
 1 = Extension

Structure of First Extent:

Octet no. 2

8	7	6	5	4	3	2	1
RRC	RTC	MRVA	VRAM CRM	VRAM VRM	VRAM VTM	HAM HD	FX

- bit-8 (RRC) Runway/Runway crossing in RIMCAS
= 0 Default
= 1 Runway/Runway Crossing
- bit-7 (RTC) Runway/Taxiway Crossing in RIMCAS
= 0 Default
= 1 Runway/Taxiway Crossing
- bit-6 (MRVA)
= 0 Default
= 1 Msg Type 4 (MSAW) indicates MRVA
- bit-5 (VRAM CRM)
= 0 Default
= 1 Msg Type 25 (VRAM) indicates CRM
- bit-4 (VRAM VRM)
= 0 Default
= 1 Msg Type 25 (VRAM) indicates VRM
- bit-3 (VRAM VTM)
= 0 Default
= 1 Msg Type 25 (VRAM) indicates VTM
- bit-2 (HAM HD)
= 0 Default
= 1 Msg Type 29 (HAM) indicates HD
- bit-1 (FX)
= 0 No extension
= 1 Extension

Structure of Second Extent:

Octet no. 3

8	7	6	5	4	3	2	1
HAM RD	HAM VD	DBPSM ARR	DBPSM DEP	DBPSM TL	AIW	0	FX

- bit-8 (HAM RD)
= 0 Default
= 1 Msg Type 29 (HAM) indicates RD
- bit-7 (HAM VD)
=0 Default
=1 Msg Type 29 (HAM) indicates VD
- bit-6 (DBPSM ARR)
=0 Default
=1 Msg Type 20 (DBPSM) indicates ARR
- bit-5 (DBPSM DEP)
=0 Default
=1 Msg Type 20 (DBPSM) indicates DEP
- bit-4 (DBPSM TL)
=0 Default
=1 Msg Type 20 (DBPSM) indicates above TL
- bit-3 (AIW)
=0 Default
=1 Msg Type 99 (AIW) indicates pAIW Alert
- bit-2 spare bit, set to "0"
- bit-1 (FX)
= 0 No extension
= 1 Extension

Structure of Subfield #2:**Conflict Classification****Definition :** Severity classification of the conflict**Format :** One-octet fixed length Data Item**Structure:**

Octet no. 1

8	7	6	5	4	3	2	1
Table Id				Conflict Properties			CS

bits-8/5	(Table Id)	Identification of conflict categories definition table
bits-4/2	(Conflict Properties)	Conflict Properties Class
bit-1	(CS)	Conflict Severity = 0 LOW = 1 HIGH

NOTE - If no Table Id is defined for a message type, only the value of the CS bit may be of relevance. In that case, for this message type, Table Id and Conflict Properties are meaningless and **shall** be set to "0000" and "000" respectively.

For APW (Message Type = 005), Table Id = 0001 defines the following APW conflict classes:

bits-4/2 (APW)	APW Classifications: = 000 APW Low Severity = 001 APW Medium Severity = 010 APW High Severity
----------------	--

For STCA (Message Type = 007), Table Id = 0000 defines the following conflict classes:

Class	Condition
001	major separation infringement and not (crossed and diverging)
010	minor separation infringement and not (crossed and diverging)
011	major separation infringement and (crossed and diverging)
100	minor separation infringement and (crossed and diverging)

For STCA (Message Type = 007), Table Id = 0001 defines the following filter settings:

bits-4	(LPF)	Linear Prediction Filter = 0 Filter not set = 1 Filter set
bits-3	(CPF)	Current Proximity Filter = 0 Filter not set = 1 Filter set
bits-2	(MHF)	Manoeuvre Hazard Filter = 0 Filter not set = 1 Filter set

For RIMCAS (Message Type = 009 - 016), Table Id = 0010 defines the following alert stages:

bits-4	(RAS)	RIMCAS Alert Stage = 0 Stage One Alert = 1 Stage Two Alert
--------	-------	--

For VRAM (Message Type = 024), Table Id = 0001 defines the following VRM conflict classes:

bits-4/2	(VRM)	VRM Conflict Classifications: = 000 VRM Slow Climb = 001 VRM Slow Descent
----------	-------	---

For VRAM (Message Type = 024), Table Id = 0002 defines the following VTM conflict classes:

bits-4/2	(VTM)	VTM Conflict Classifications: = 000 VTM Fast Climb = 001 VTM Fast Descent
----------	-------	---

For DSAM (Message Type = 026), Table Id = 0001 defines the following deviation classifications:

bits-4/2	(DDC)	DSAM Deviation Classifications: = 000 Vertical manoeuvre deviation prior to reaching its expected level = 001 Vertical manoeuvre deviation past its expected level
----------	-------	--

For HAM (Message Type = 027), Table Id = 0001 defines the following RD conflict classes:

bits-4/2 (RD)	RD Conflict Classifications:
	= 000 Slow Descent
	= 001 Fast Descent
	= 010 Slow Climb
	= 011 Fast Climb

For HAM (Message Type = 027), Table Id = 0002 defines the following VD conflict classes:

bits-4/2 (VD)	VD Conflict Classifications:
	= 000 Above
	= 001 Below

NOTE - Additional conflict classes may be defined by introducing additional properties of a conflict.

6.2.17 Data Item I004/170, Aircraft Identification & Characteristics 1

Definition : Identification & Characteristics of Aircraft 1 Involved in the Conflict.

Format : Compound Data Item, comprising a primary subfield of up to two octets, followed by the indicated subfields.

**Structure of
Primary Subfield:**

Octet no. 1

16	15	14	13	12	11	10	9
AI1	M31	CPW	CPC	TT1	DT1	AC1	FX

Octet no. 2

8	7	6	5	4	3	2	1
MS1	FP1	CF1	0	0	0	0	FX

bit-16	(AI1)	Subfield #1: Aircraft Identifier 1 = 0 Absence of Subfield #1 = 1 Presence of Subfield #1
bit-15	(M31)	Subfield #2: Mode 3/A Code Aircraft 1 = 0 Absence of Subfield #2 = 1 Presence of Subfield #2
bit-14	(CPW)	Subfield #3: Predicted Conflict Position 1 (WGS84) = 0 Absence of Subfield #3 = 1 Presence of Subfield #3
bit-13	(CPC)	Subfield #4: Predicted Conflict Position 1 (Cartesian Coordinates) = 0 Absence of Subfield #4 = 1 Presence of Subfield #4
bit-12	(TT1)	Subfield #5: Time to Threshold Aircraft 1 = 0 Absence of Subfield #5 = 1 Presence of Subfield #5
bit-11	(DT1)	Subfield #6: Distance to Threshold Aircraft 1 = 0 Absence of Subfield #6 = 1 Presence of Subfield #6
bit-10	(AC1)	Subfield #7: Aircraft Characteristics Aircraft 1 = 0 Absence of Subfield #7 = 1 Presence of Subfield #7
bit-9	FX	Extension indicator = 0 no extension = 1 extension
bit-8	(MS1)	Subfield #8: Mode S Identifier Aircraft 1 = 0 Absence of Subfield #8 = 1 Presence of Subfield #8

bit-7	(FP1)	Subfield #9: Flight Plan Number Aircraft 1 = 0 Absence of Subfield #9 = 1 Presence of Subfield #9
bit-6	(CF1)	Subfield #10: Cleared Flight Level Aircraft 1 = 0 Absence of Subfield #10 = 1 Presence of Subfield #10
bits-5/2		Spare Bits, set to 0
bit-1	FX	Extension indicator = 0 no extension = 1 extension

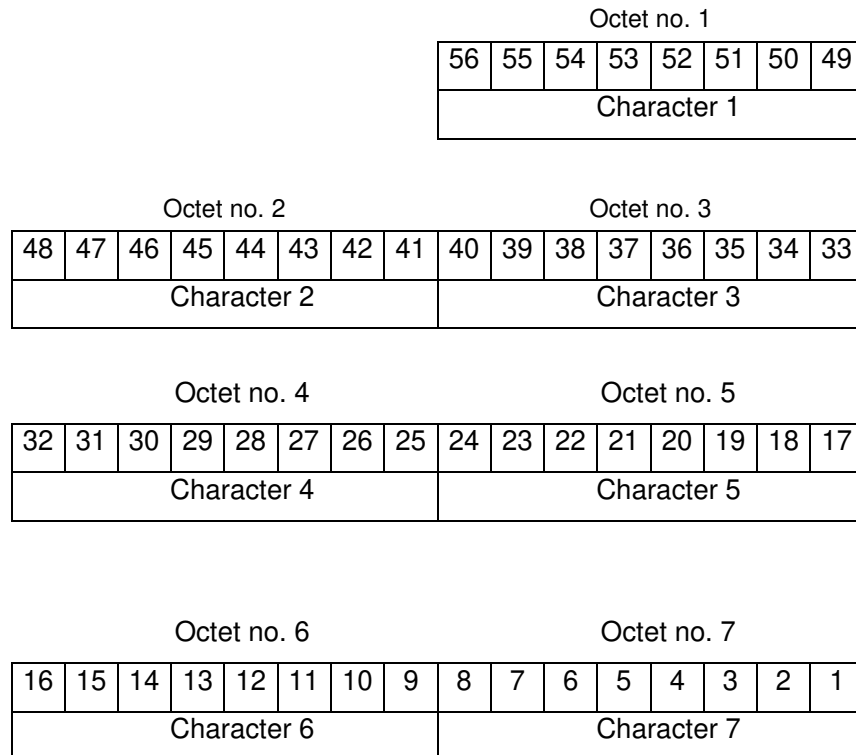
Structure of Subfield # 1:

Aircraft Identifier 1

Definition: Aircraft Identifier (in 7 characters) of Aircraft 1 Involved in the Conflict

Format: Seven-octet fixed length Data Item.

Structure:



bits-56/1 Each octet is an ASCII character defining the first aircraft

NOTE - The aircraft identifier is always left adjusted. If needed, the remaining characters are filled with space character.

Structure of Subfield # 2:**Mode 3/A Code Aircraft 1**

Definition : Mode-3/A code (converted into octal representation) of Aircraft 1 Involved in the Conflict

Format : Two-octet fixed length Data Item.

Structure:

Octet no. 1								Octet no. 2							
16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1
0	0	0	0	A4	A2	A1	B4	B2	B1	C4	C2	C1	D4	D2	D1

bits-16/13

bits-12/1

Spare bits set to 0

Mode-3/A reply in octal representation

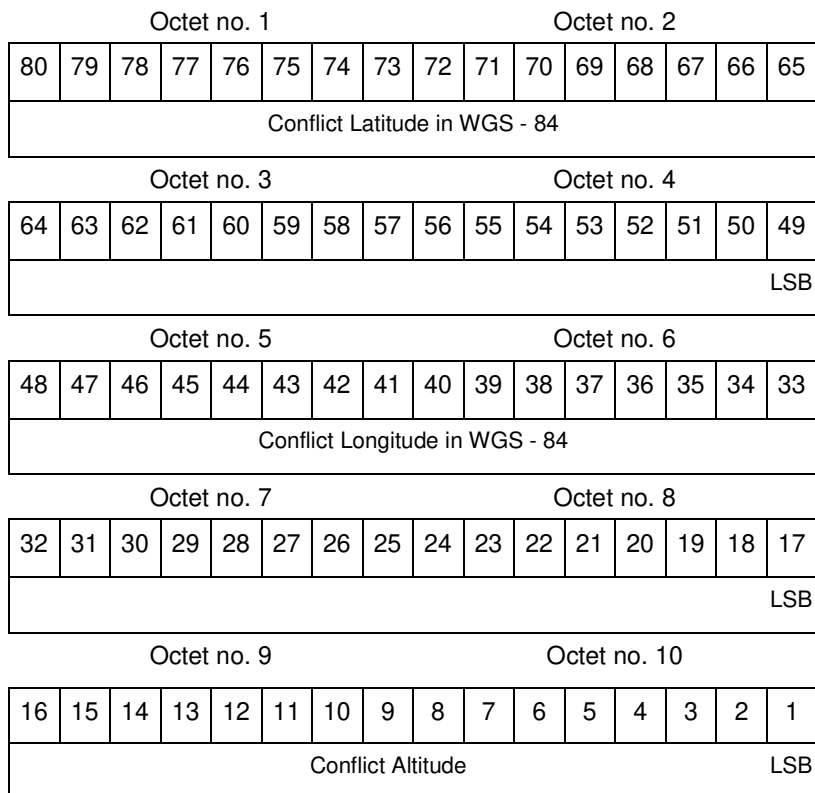
Structure of Subfield # 3:

Predicted Conflict Position Aircraft 1 (WGS-84)

Definition : Predicted conflict position target 1 in WGS-84 Coordinates.

Format : Ten-octet fixed length Data Item

Structure:



bits-80/49 (Latitude) In WGS-84 in two's complement.
 Range -90 <= latitude <= 90 deg.
 (LSB) = $180/2^{25}$ degrees

bits-48/17 (Longitude) In WGS-84 in two's complement.
 Range -180 <= longitude < 180 deg.
 (LSB) = $180/2^{25}$ degrees

The LSB provides a resolution better than 0.6m.

bits-16/1 (Altitude) Altitude of predicted conflict
 (LSB) = 25ft
 Hmin = -1500 ft
 Hmax = 150000 ft

NOTE - Altitude expressed in two's complement form

Structure of Subfield # 4:

Predicted Conflict Position Aircraft 1 in Cartesian Coordinates

Definition : Predicted conflict position for the aircraft 1 involved in the conflict

Format : Eight-octet fixed length Data Item

Structure:

Octet no. 1							
64	63	62	61	60	59	58	57
Starting							

Octet no. 2								Octet no. 3							
56	55	54	53	52	51	50	49	48	47	46	45	44	43	42	41
X-Position of Conflict														LSB	

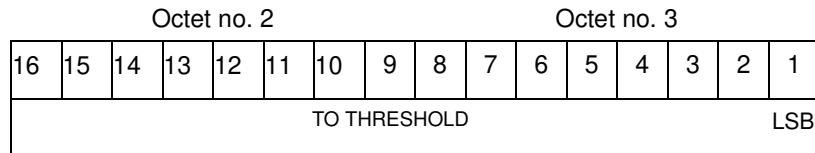
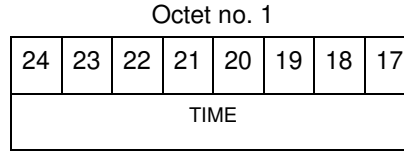
Octet no. 4							
40	39	38	37	36	35	34	33
Starting							

Octet no. 5								Octet no. 6							
32	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17
Y-Position of Conflict														LSB	

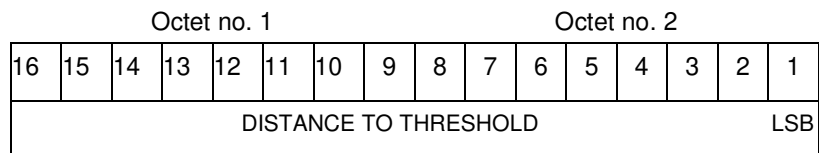
Octet no. 7								Octet no. 8							
16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1
Starting Z-Position of Conflict														LSB	

- bit-48/33 (X-position) Starting X-position of the conflict
LSB = 0.5m
- bit-32/17 (Y-position) Starting Y-position of the conflict
LSB = 0.5m
- bit-16/1 (Z-position) Starting Z-position of the conflict
LSB = 25 ft
Hmin = -1500 ft
Hmax = 150000 ft

NOTE - Two's complement fixed-point format.

Structure of Subfield # 5:**Time to Threshold Aircraft 1****Definition :** Time to runway threshold for first approaching aircraft in a RIMCA**Format :** Three-octet fixed length Data Item.**Structure:**

$$\text{bit-1 (LSB)} = (2^{-7}) \text{ sec} = 1/128 \text{ sec}$$

NOTE - Time to Threshold expressed in Two's Complement**Structure of Subfield # 6:****Distance to Threshold Aircraft 1****Definition :** Distance from threshold for Aircraft 1 involved in a RIMCA.**Format :** Two-octet fixed length Data Item.**Structure:**

$$\text{bits 16/1 (Distance to Threshold)} \\ \text{LSB} = 0.5\text{m}$$

Structure of Subfield #7 :**Aircraft Characteristics Aircraft 1****Definition :** Characteristics of Aircraft 1 involved in the Conflict**Format :** Variable length Data Item comprising a first part of one octet, followed by one-octet extents as necessary.**Structure of First Part:**

Octet no. 1							
8	7	6	5	4	3	2	1
GAT/OAT		FR1/FR2		RVSM		HPR	FX

bits 8/7	(GAT/OAT)	= 00	Unknown
		= 01	General Air Traffic
		= 10	Operational Air Traffic
		= 11	Not applicable
bits 6/5	(FR1/FR2)	= 00	Instrument Flight Rules
		= 01	Visual Flight rules
		= 10	Not applicable
		= 11	Controlled Visual Flight Rules
bits 4/3	(RVSM)	= 00	Unknown
		= 01	Approved
		= 10	Exempt
		= 11	Not Approved
bit 2	(HPR)	= 0	Normal Priority Flight
		= 1	High Priority Flight
bit-1	(FX)	= 0	End of Data Item
		= 1	Extension into first extent

Structure of First Extent:

Octet no. 1							
8	7	6	5	4	3	2	1
CDM		PRI	GV	0	0	0	FX

bit-8/7	(CDM)	Climbing/Descending mode	
		= 00	Maintaining
		= 01	Climbing
		= 10	Descending
		= 11	Invalid
bit 6	(PRI)	= 0	Non primary target
		= 1	Primary target
bit 5	(GV)	= 0	Default
		= 1	Ground Vehicle
bits-4/2	spare bits set to zero		
bit-1	(FX)	= 0	End of Data Item
		= 1	Extension into second extent

Structure of Subfield # 8:**Mode-S Identifier Aircraft 1**

Definition: Aircraft Identification downloaded from Aircraft 1 involved in the Conflict if equipped with a Mode-S transponder.

Format: Six-octet fixed length Data Item.

Structure:

Octet no. 1						Octet no. 2									
48	47	46	45	44	43	42	41	40	39	38	37	36	35	34	33
Character 1						Character 2						Character 3/1			

Octet no. 3						Octet no. 4									
32	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17
Char 3/2		Character 4						Character 5						Char 6/1	

Octet no. 5						Octet no. 6									
16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1
Character 6/2						Character 7						Character 8			

bits 48/1

Characters 1-8 (coded on 6 bits each) defining aircraft identification when a flight plan is available or the registration marking when no flight plan is available. Coding rules are provided in [3] Section 3.1.2.9

Structure of Subfield # 9:

Flight Plan Number Aircraft 1

Definition: Number of the Flight Plan Correlated to Aircraft 1 Involved in the Conflict

Format: Four-octet fixed length Data Item.

Structure:

Octet no. 1								Octet no. 2							
32	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17
0	0	0	0	0	NBR										

Octet no. 3								Octet no. 4							
16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1
														LSB	

bits-32/28 spare bits set to zero
 bits-27/1 (NBR) Number from 0 to 99 999 999

Structure of Subfield # 10:

Cleared Flight Level Aircraft 1

Definition : Cleared Flight Level for Aircraft 1 Involved in the Conflict

Format : Two-octet fixed length Data Item, two's complement format.

Structure:

Octet no. 1								Octet no. 2							
16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1
CFL														LSB	

bits 16/1 (CFL) Cleared Flight Level
 LSB = ¼ FL

NOTE - The value shall be within the range described by ICAO Annex 10

6.2.18 Data Item I004/171, Aircraft Identification & Characteristics 2

Definition : Identification & Characteristics of Aircraft 2 Involved in the Conflict.

Format : Compound Data Item, comprising a primary subfield of up to two octets, followed by the indicated subfields.

**Structure of
Primary Subfield:**

Octet no. 1

16	15	14	13	12	11	10	9
AI2	M32	CPW	CPC	TT2	DT2	AC2	FX

Octet no. 2

8	7	6	5	4	3	2	1
MS2	FP2	CF2	0	0	0	0	FX

bit-16	(AI2)	Subfield #1: Aircraft Identifier 2 = 0 Absence of Subfield #1 = 1 Presence of Subfield #1
bit-15	(M32)	Subfield #2: Mode 3/A Code Aircraft 2 = 0 Absence of Subfield #2 = 1 Presence of Subfield #2
bit-14	(CPW)	Subfield #3: Predicted Conflict Position 2 (WGS84) = 0 Absence of Subfield #3 = 1 Presence of Subfield #3
bit-13	(CPL)	Subfield #4: Predicted Conflict Position 2 (Cartesian Coordinates) = 0 Absence of Subfield #4 = 1 Presence of Subfield #4
bit-12	(TT2)	Subfield #5: Time to Threshold Aircraft 2 = 0 Absence of Subfield #5 = 1 Presence of Subfield #5
bit-11	(DT2)	Subfield #6: Distance to Threshold Aircraft 2 = 0 Absence of Subfield #6 = 1 Presence of Subfield #6
bit-10	(AC2)	Subfield #7: Aircraft Characteristics Aircraft 2 = 0 Absence of Subfield #7 = 1 Presence of Subfield #7
bit-9	FX	Extension indicator = 0 no extension = 1 extension
bit-8	(MS2)	Subfield #8: Mode S Identifier Aircraft 2 = 0 Absence of Subfield #8 = 1 Presence of Subfield #8

bit-7	(FP2)	Subfield #9: Flight Plan Number Aircraft 2 = 0 Absence of Subfield #9 = 1 Presence of Subfield #9
bit-6	(CF2)	Subfield #10: Cleared Flight Level Aircraft 2 = 0 Absence of Subfield #10 = 1 Presence of Subfield #10
bits-5/2		Spare Bits, set to 0
bit-1	FX	Extension indicator = 0 no extension = 1 extension

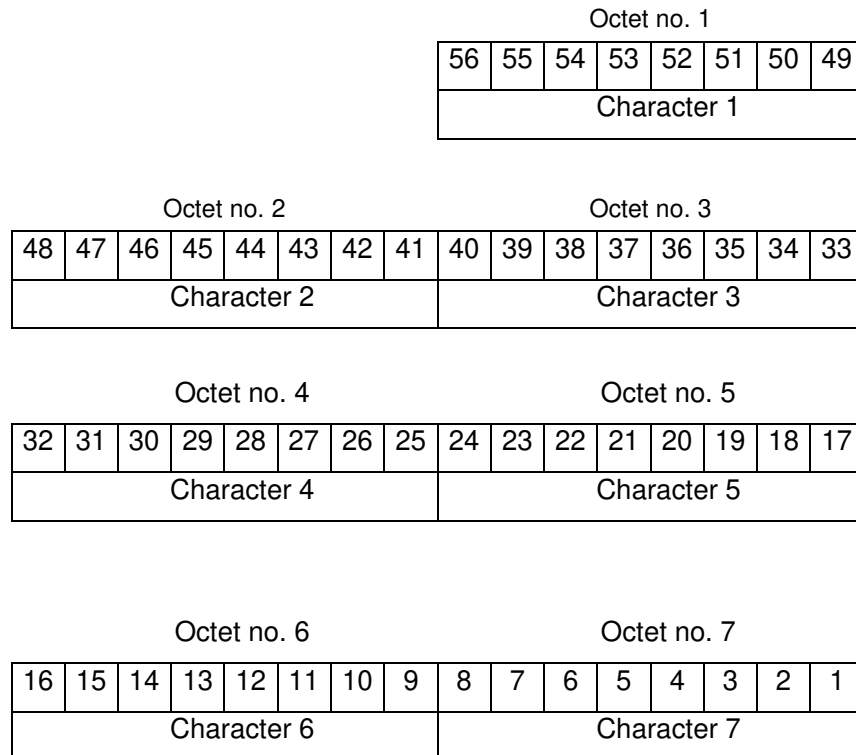
Structure of Subfield # 1:

Aircraft Identifier 2

Definition: Aircraft Identifier (in 7 characters) of Aircraft 2 Involved in the Conflict

Format: Seven-octet fixed length Data Item.

Structure:



bits-56/1 Each octet is an ASCII character defining the second aircraft

NOTE - The aircraft identifier is always left adjusted. If needed, the remaining characters are filled with space character.

Structure of Subfield # 2:**Mode 3/A Code Aircraft 2**

Definition : Mode-3/A code (converted into octal representation) of Aircraft 2
Involved in the Conflict

Format : Two-octet fixed length Data Item.

Structure:

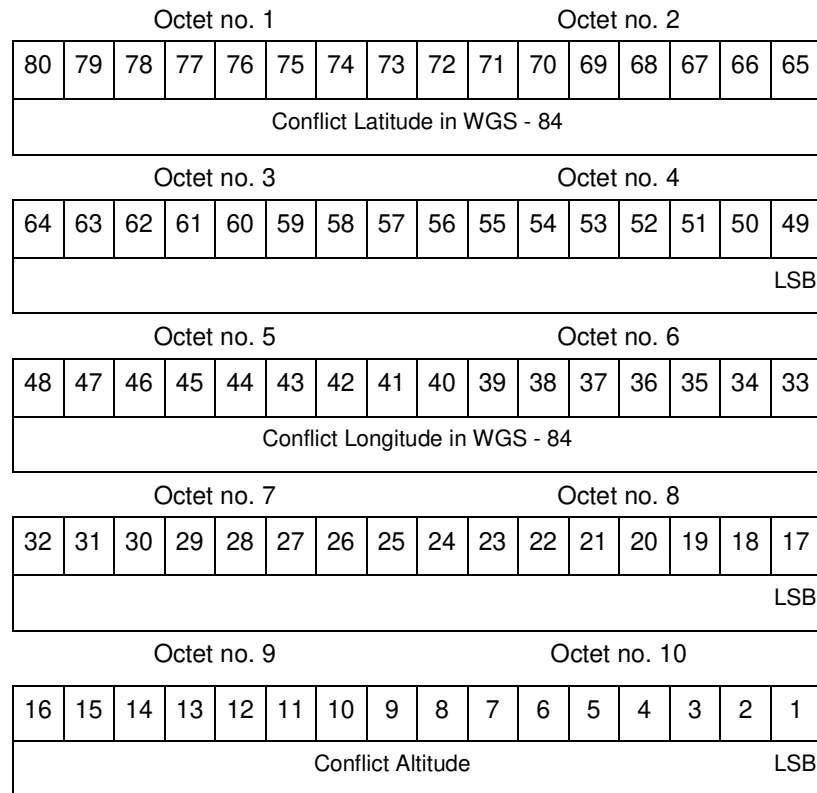
Octet no. 1								Octet no. 2							
16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1
0	0	0	0	A4	A2	A1	B4	B2	B1	C4	C2	C1	D4	D2	D1

bits-16/13

bits-12/1

Spare bits set to 0

Mode-3/A reply in octal
representation

Structure of Subfield # 3:**Predicted Conflict Position Aircraft 2 (WGS-84)****Definition :** Predicted conflict position target 2 in WGS-84 Coordinates.**Format :** Ten-octet fixed length Data Item**Structure:**

bits-80/49 (Latitude) In WGS-84 in two's complement.
Range -90 <= latitude <= 90 deg.
(LSB) = $180/2^{25}$ degrees

bits-48/17 (Longitude) In WGS-84 in two's complement.
Range -180 <= longitude < 180 deg.
(LSB) = $180/2^{25}$ degrees

The LSB provides a resolution better than 0.6m.

bits-16/1 (Altitude) Altitude of predicted conflict
(LSB) = 25ft
Hmin = -1500 ft
Hmax = 150000 ft

NOTE - Altitude expressed in two's complement form

Structure of Subfield # 4:

Predicted Conflict Position Aircraft 2 in Cartesian Coordinates

Definition : Predicted conflict position for the aircraft 2 involved in the conflict

Format : Eight-octet fixed length Data Item

Structure:

Octet no. 1

64	63	62	61	60	59	58	57
Starting							

Octet no. 2								Octet no. 3							
56	55	54	53	52	51	50	49	48	47	46	45	44	43	42	41
X-Position of Conflict														LSB	

Octet no. 4

40	39	38	37	36	35	34	33
Starting							

Octet no. 5								Octet no. 6							
32	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17
Y-Position of Conflict														LSB	

Octet no. 7								Octet no. 8							
16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1
Starting Z-Position of Conflict														LSB	

- bit-48/33 (X-position) Starting X-position of the conflict
LSB = 0.5m
- bit-32/17 (Y-position) Starting Y-position of the conflict
LSB = 0.5m
- bit-16/1 (Z-position) Starting Z-position of the conflict
LSB = 25 ft
Hmin = -1500 ft
Hmax = 150000 ft

NOTE - Two's complement fixed-point format.

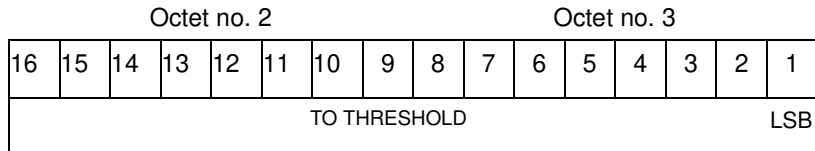
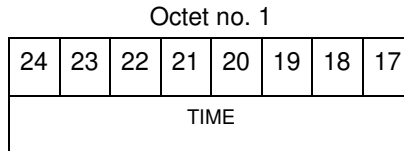
Structure of Subfield # 5:

Time to Threshold Aircraft 2

Definition : Time to runway threshold for second approaching aircraft in a RIMCA

Format : Three-octet fixed length Data Item.

Structure:



bit-1 (LSB) = (2^{-7}) sec = 1/128 sec

NOTE - Time to Threshold expressed in Two's Complement

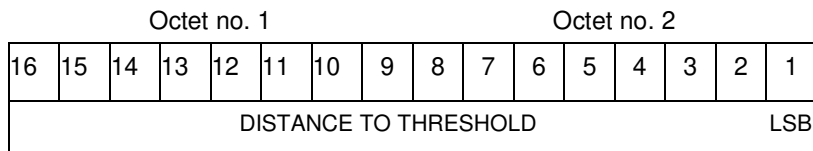
Structure of Subfield # 6:

Distance to Threshold Aircraft 2

Definition : Distance from threshold for Aircraft 2 involved in a RIMCA.

Format : Two-octet fixed length Data Item.

Structure:



bits 16/1 (Distance to Threshold)
LSB = 0.5m

Structure of Subfield #7 :**Aircraft Characteristics Aircraft 2****Definition :** Characteristics of Aircraft 2 involved in the Conflict**Format :** Variable length Data Item comprising a first part of one octet, followed by one-octet extents as necessary.**Structure of First Part:**

Octet no. 1							
8	7	6	5	4	3	2	1
GAT/OAT		FR1/FR2		RVSM		HPR	FX

bits 8/7	(GAT/OAT)	= 00	Unknown
		= 01	General Air Traffic
		= 10	Operational Air Traffic
		= 11	Not applicable
bits 6/5	(FR1/FR2)	= 00	Instrument Flight Rules
		= 01	Visual Flight rules
		= 10	Not applicable
		= 11	Controlled Visual Flight Rules
bits 4/3	(RVSM)	= 00	Unknown
		= 01	Approved
		= 10	Exempt
		= 11	Not Approved
bit 2	(HPR)	= 0	Normal Priority Flight
		= 1	High Priority Flight
bit-1	(FX)	= 0	End of Data Item
		= 1	Extension into first extent

Structure of First Extent:

Octet no. 1							
8	7	6	5	4	3	2	1
CDM		PRI	GV	0	0	0	FX

bit-8/7	(CDM)	Climbing/Descending mode	
		= 00	Maintaining
		= 01	Climbing
		= 10	Descending
		= 11	Invalid
bit 6	(PRI)	= 0	Non primary target
		= 1	Primary target
bit 5	(GV)	= 0	Default
		= 1	Ground Vehicle
bits-4/2	spare bits set to zero		
bit-1	(FX)	= 0	End of Data Item
		= 1	Extension into second extent

Structure of Subfield # 8:

Mode-S Identifier Aircraft 2

Definition: Aircraft Identification downloaded from Aircraft 2 involved in the Conflict if equipped with a Mode-S transponder.

Format: Six-octet fixed length Data Item.

Structure:

Octet no. 1						Octet no. 2									
48	47	46	45	44	43	42	41	40	39	38	37	36	35	34	33
Character 1						Character 2						Character 3/1			

Octet no. 3						Octet no. 4									
32	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17
Char 3/2		Character 4						Character 5						Char 6/1	

Octet no. 5						Octet no. 6									
16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1
Character 6/2						Character 7						Character 8			

bits 48/1

Characters 1-8 (coded on 6 bits each) defining aircraft identification when a flight plan is available or the registration marking when no flight plan is available. Coding rules are provided in [3] Section 3.1.2.9

Structure of Subfield # 9:

Flight Plan Number Aircraft 2

Definition: Number of the Flight Plan Correlated to Aircraft 2 Involved in the Conflict

Format: Four-octet fixed length Data Item.

Structure:

Octet no. 1								Octet no. 2							
32	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17
0	0	0	0	0	NBR										

Octet no. 3								Octet no. 4							
16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1
LSB															

bits-32/28 spare bits set to zero
 bits-27/1 (NBR) Number from 0 to 99 999 999

Structure of Subfield # 10:

Cleared Flight Level Aircraft 2

Definition : Cleared Flight Level for Aircraft 2 Involved in the Conflict

Format : Two-octet fixed length Data Item, two's complement format.

Structure:

Octet no. 1								Octet no. 2							
16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1
CFL														LSB	

bits 16/1 (CFL) Cleared Flight Level
 LSB = ¼ FL

NOTE - The value shall be within the range described by ICAO Annex 10

6.3 User Application Profile for Category 004

The following User Application Profile shall be used for the transmission of Safety Nets messages.

FRN	Data Item	Information	Length
1	I004/010	Data Source Identifier	2
2	I004/000	Message Type	1
3	I004/015	SDPS Identifier	1+
4	I004/020	Time Of Message	3
5	I004/040	Alert Identifier	2
6	I004/045	Alert Status	1
7	I004/060	Safety Net Function & System Status	1+
FX	-	Field Extension Indicator	-
8	I004/030	Track Number 1	2
9	I004/170	Aircraft Identification & Characteristics 1	1+
10	I004/120	Conflict Characteristics	1+
11	I004/070	Conflict Timing and Separation	1+
12	I004/076	Vertical Deviation	2
13	I004/074	Longitudinal Deviation	2
14	I004/075	Transversal Distance Deviation	3
FX	-	Field Extension Indicator	-
15	I004/100	Area Definitions	1+
16	I004/035	Track Number 2	2
17	I004/171	Aircraft Identification & Characteristics 2	1+
18	I004/110	FDPS Sector Control Identifier	1+
19	-	Spare	-
20	RE	Reserved Expansion Field	1+
21	SP	Reserved For Special Purpose Field	1+
FX	-	Field Extension Indicator	-

Table 6 : Safety Net Messages UAP

In the above table

- the first column indicates the Field Reference Number (FRN) associated to each Data Item used in the UAP;
- the fourth column gives the format and the length of each item, a stand-alone figure indicates the octet-count of a fixed-length Data Item, 1+ indicates a variable-length Data Item comprising a first part of 1 octet followed by n-octets extents as necessary.