EUROPEAN ORGANISATION FOR THE SAFETY OF AIR NAVIGATION



EUROCONTROL STANDARD DOCUMENT

FOR

SURVEILLANCE DATA EXCHANGE

Part 9: Category 062

SDPS Track Messages

SUR.ET1.ST05.2000-STD-09-01

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EUROPEAN AIR TRAFFIC MANAGEMENT

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This document describe	s the appli	cation of ASTERI	X to the trans	smiss	ion of System Track Data.	
		Keyw	ords			
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			Track Infor	matio	n Service	
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		1062/106	
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		Creation of I062/295	5.2.24
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		1062/101	
		Modification of I062/105 - Suppression of	5.2.8
		1062/106	
		Suppression of I062/180	
		Re-organization of UAP	5.3
		•	
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		Modification of I062/110	5.2.11
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		Mode S BDSs and Mode S BDS ages.	5.2.25
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		two separate sub-fields.	
			•

		• Changing the range of I062/380 sub-field 5,	5.2.26
		and 16 to match Mode S BDS definitions.	
		Adding additional subfields to item 380 and	5.2.21 /
		295 to explicitly include contents of Mode S	5.2.26
		BDS 4,0 (Selected Vertical Intention)	
		Removal of the low resolution position items	
		(101 and 106).	
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		match cat 48 encoding of STAT.	
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		Modification of format of I062/350 and	5.2.24 /
		1062/360	5.2.25
		Correction of coding the extension indicator	5.2.9
		of primary subfield of I062/110	
		Editorial modifications	
1.0P	March 2004	Encoding rules defined for all the items	
		 Suppression of I062/350 and I062/360 	
		Note added in I062/245	
		Suppression of subfields included in	
		1062/380 and 1062/295 to include BDS 4.0	
		data (information already present elsewhere)	
		Two new subfields added in I062/390	
		Modification of I062/060	
		Modification of I062/080	
1.1	October 2004	Editorial modification in I062/295 (subfield)	5.2.21
		#30)	
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		Document Approval page updated	Page iii
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		Definition item I062/130 updated	5.2.11

	1		ı
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		Aircraft above "Heavy" added	
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	,		
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		Definition of "Reserved Expansion Field"	sep. doc.
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1.9	Oct. 2008	Update of Item I062/380 Aircraft Derived	5.2.24
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		Definition of LSB of I062/380 #3 corrected	5.2.24
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		Range of TTR in SF#9 in I062/380 corrected	5.2.24
		 Range BPS in SF#28 in I062/380 corrected 	5.2.24
		Layout in SF#2 in I062/390 corrected	5.2.25
1.13	Oct. 2010	Reference document 3 corrected	
1.13	JUL. 2010		Page 3
		Reference on item I062/380 SF#2 corrected	5.2.24

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1. INTRODUCTION

1.1 Scope

- **1.1.1** This document describes the message structure for the transmission of System Track Data to a user.
- **1.1.2** This document defines the data out of Category 062.

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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 the 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 Standard 000-1-92. Directives for the Uniform Drafting and Presentation of Eurocontrol Standard Documents. 1992.
- Eurocontrol Standard SUR.ET1.ST05.2000-STD-01-01. All Purpose Structured Eurocontrol Radar Information Exchange - ASTERIX, edition 1.29 February 2002
- 3. ICAO Annex 10, Vol. IV
- 4. ICAO Document 4444
- 5. ICAO Annex 14

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3. DEFINITIONS, ACRONYMS AND ABBREVIATIONS

3.1 Definitions

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

3.1.1	Amalgamation:	Amalgamation is the process by which tracks from co-
		operating systems are merged to form an 'amalgamated'
		track. It is used to smooth any possible differences
		between the tracks to allow the same amalgamated track
		information to be served to the users of both systems.

- 3.1.2 Calculated Item: A piece of information (e.g. the position of a target) derived from raw information through an intermediate processing such as transformation of co-ordinates, tracking, code
 - conversion, etc.
- 3.1.3 Catalogue of List of all the possible Data Items of each Data Category

 Data Items: describing the Data Items by their reference, structure,
 - size and units (where applicable).
- 3.1.4 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.
- 3.1.5 Data Category: Classification of the data in order to permit inter alia an easy identification.
- 3.1.6 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.

- **3.1.7 Data Item:** The smallest unit of information in each Data Category.
- **3.1.8 Measured Item:** A piece of information (e.g. the position of a target) directly derived from raw information and transmitted without any

smoothing.

3.1.9	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
3.1.10	State vector:	A vector describing the state of an object, e.g. position, speed, acceleration
3.1.11	Track:	Time sequence of state vectors of an object estimated by some real time filtering technique using surveillance data as input.
3.1.12	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.

3.2 Acronyms and Abbreviations

For the purposes of this Eurocontrol Document, the following shall apply:

Degree (angle)

ADS-B Automatic Dependent Surveillance - Broadcast

A-SMGCS Advanced Surface Movement Ground Control System

ASTERIX All Purpose STructured Eurocontrol suRveillance Information

EXchange

CAT Data Category

EATM European Air Traffic Management

FCU Flight Control Unit

FL Flight Level, unit of altitude (expressed in 100's of feet)

FMS Flight Management System
FPPS Flight Plan Processing System

FRN Field Reference Number

FSPEC Field Specification

FX Field Extension Indicator

GNSS Global Navigation Satellite System

ICAO International Civil Aviation Organization

kt knot = NM/hour, unit of speed

LEN Length Indicator

LSB Least Significant Bit

MCP Mode Control Panel

NM Nautical Mile, unit of distance (1852 metres)

PSR Primary Surveillance Radar

RDE-TF suRveillance Data Exchange Task Force

RE Reserved Expansion Indicator

REP Field Repetition Indicator

s second, unit of timeSAC System Area Code

SDPS Surveillance Data Processing System

SIC System Identification Code
SP Special Purpose Indicator
SPI Special Position Identification
SSR Secondary Surveillance Radar
SURT Surveillance Team (EATM)

UAP User Application Profile (see Definitions)

UTC Co-ordinated Universal Time

VDL VHF Data Link

WGS-84 World Geodetic System 84

4. GENERAL PRINCIPLES

4.1 General

The transmission of System Track Data shall require the transmission of one type of message, i.e. target reports and flight plan data

4.2 Time Management

The time-stamping shall comply with ICAO Annex 5.

4.3 Projection Systems and Geographical Co-ordinates

4.3.1 Measured Position

The *measured* position is transmitted bias-corrected.

4.3.2 Calculated Position

When the exported calculated position is expressed in a 2D Cartesian coordinate system, a projection is performed on a plane tangential to the WGS-84 Ellipsoid at the location of the reference point. The Y-axis points to the geographical north at that position. The X-axis is perpendicular to the Y-axis and points to the east. The X, Y co-ordinates are calculated using a suitable projection technique for the final 3D to 2D conversion (e.g. a stereographical projection). It is slant range corrected, the source of altitude being indicated in 1062/080 Track Status, Octet 1, bits-5/3 (SRC).

4.4 Mandatory Items

Data Source Identifier and Service Identification shall be present in every record.

4.5 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.

4.6 User Application Profile and Data Blocks

- 4.6.1 A single User Application Profile (UAP) is defined and shall be used for System Track Data messages.
- **4.6.2** Data Blocks shall have the following layout.

CAT = 062	LEN	FSPEC	Items of the	FSPEC	Items	of	the
			first record		last record		

where:

- Data Category (CAT) = 062, is a one-octet field indicating that the Data Block contains System Track Data;
- Length Indicator (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.

4.7 Composition of messages

- 4.7.1 Messages shall be composed of Data Items assembled in the order defined by the Field Reference Number (FRN) in the associated UAP.
- **4.7.2** When sent, items shall always be transmitted in a Record with the corresponding FSPEC bits set to one.

5. LAYOUT OF MESSAGES

5.1 Standard Data Items

The standardised Data Items which shall be used for the transmission of System Track Data are defined in Table 1 and described in the following pages. The column "Encoding rules" indicates what items are mandatory (M) or optional (O) in a record of ASTERIX Cat 062.

Table 1 - Data Items of Category 062

Data Item	Description	Deceletion	For a diam Bulan
Reference Number	Description	Resolution	Encoding Rules
1062/010	Data Source Identifier	N.A.	М
1062/015	Service Identification	N.A.	0
1062/040	Track Number	N.A.	М
1062/060	Track Mode 3/A Code	N.A.	0
1062/070	Time Of Track Information	1/128 s	М
1062/080	Track Status	N.A.	М
1062/100	Calculated Track Position (Cartesian)	0.5 m	0
1062/105	Calculated Track Position (WGS-84)	180/2 ²⁵ °	О
1062/110	Mode 5 Data reports & Extended Mode 1 Code	N.A.	0
1062/120	Track Mode 2 Code	N.A.	0
1062/130	Calculated Track Geometric Altitude	6.25 ft	0
1062/135	Calculated Track Barometric Altitude	1/4 FL	0
1062/136	Measured Flight Level	1/4 FL	0
1062/185	Calculated Track Velocity (Cartesian)	0.25 m/s	0
1062/200	Mode Of Movement	N.A.	0
1062/210	Calculated Acceleration (Cartesian)	0.25 m/s ²	0
1062/220	Calculated Rate Of Climb/Descent	6.25 ft/min	0
1062/245	Target Identification	N.A.	О

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1062/270	Target Size & Orientation	Length/Width:1 m Orient.: 3609128	O
1062/290	System Track Update Ages	N.A.	0
1062/295	Track Data Ages	N.A.	0
1062/300	Vehicle Fleet Identification	N.A.	0
1062/340	Measured Information	N.A.	0
1062/380	Aircraft Derived Data	N.A.	0
1062/390	Flight Plan Related Data	N.A.	0
1062/500	Estimated Accuracies	N.A.	0
1062/510	Composed Track Number	N.A.	0
NOTE: N.A. = Not Ap	plicable		

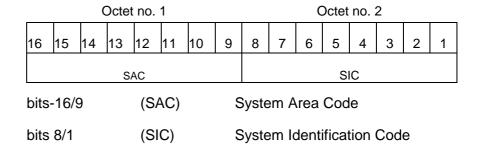
5.2 Description of Standard Data Items

5.2.1 Data Item I062/010, Data Source Identifier

Definition: Identification of the system sending the data

Format: Two-octet fixed length Data Item

Structure:



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

Encoding Rule:

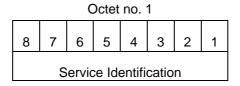
This Item shall be present in every ASTERIX record

5.2.2 Data Item 1062/015, Service Identification

Definition: Identification of the service provided to one or more users.

Format : One-Octet fixed length data item.

Structure:



bits8/1 Service Identification

NOTE - the service identification is allocated by the system

Encoding Rule:

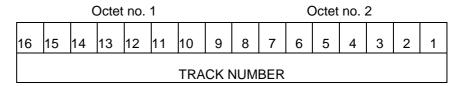
This Item is optional

5.2.3 Data Item 1062/040, Track Number

Definition: Identification of a track

Format: Two-Octet fixed length data item

Structure:



bits 16/1 Track Number

Encoding Rule:

This Item shall be present in every ASTERIX record

5.2.4 Data Item I062/060, Track Mode 3/A Code

Definition: Mode-3/A code converted into octal representation.

Format : Two-octet fixed length Data Item.

Structure:

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

bits-16/15 Spare bits set to 0

bit 14 (CH) Change in Mode 3/A

= 0 No Change

= 1 Mode 3/A has changed

bit-13 Spare bits set to 0

bits-12/1 Mode-3/A reply in octal

representation

Encoding Rule:

This Item is optional

5.2.5 Data Item 1062/070, Time Of Track Information

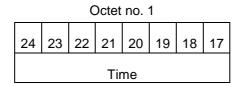
Definition: Absolute time stamping of the information provided in the track

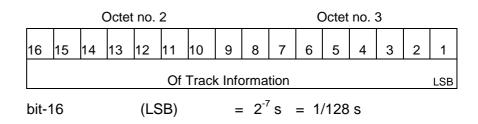
message, in the form of elapsed time since last midnight,

expressed as UTC.

Format: Three-Octet fixed length data item.

Structure:





NOTES

- 1. This is the time of the track state vector.
- 2. The time is reset to zero at every midnight.

Encoding Rule:

This Item shall be present in every ASTERIX record

SDPS Track Messages

5.2.6 Data Item I062/080, Track Status

Definition: Status of a track.

Format: Variable length data item comprising a first part of one Octet,

followed by 1-Octet extents as necessary.

Structure:

		Oct	et no	. 1				_			
8	7	6	5	4	3	2	1				
MON	SPI	MRH		SRC		CNF	FX				
bit 8			(MO	N)		=	0 1		Multisensor track Monosensor track		
bit 7	bit 7					=	0		default value		
					=	= 1 SPI present in the la report received from sensor capable of decoding this data					
bit 6	bit 6			H)			ost 0 1	Re	liable Height Barometric altitude (Mode C) more reliable Geometric altitude more reliable		
bits 5/	bits 5/3			(SRC)				-	of calculated track for I062/130 no source GNSS 3D radar triangulation height from coverage speed look-up table default height multilateration		
bit 2			(CN	F) =		=	0 1		Confirmed track Tentative track		
bit 1		(FX) =			end of data itemextension into first extension						

Encoding Rule:

This Item shall be present in every ASTERIX record

1062/080 Track Status

Structure of First Extent:

Octet	no.	1

								7
8	7	6	5	4	3	2	1	
SIM	TSE	TSB	FPC	AFF	STP	KOS	FX	
bit-8	}		(S	SIM)		=	0	Actual track
						=	1	Simulated track
bit-7	,		(T	SE)		=	0	default value
						=	1	last message transmitted to the
								user for the track
bit-6	6		(T	SB)		=	0	default value
						=	1	first message
							tran	smitted to the user
							for	the track
bit-5	,		(F	PC)		=	0	Not flight-plan correlated
						=	1	Flight plan correlated
bit-4	Ļ		(A	FF)		=	0	default value
						=	1	ADS-B data inconsistent with
								other surveillance information
bit-3	3		(S	TP)		=	0	default value
						=	1	Slave Track Promotion
bit-2	2		(K	(OS)		=	0	Complementary service used
						=	1	Background service used
bit-1			(F	(X) =	:	=	0	End of data item
						=	1	Extension into next extent

1062/080 Track Status

Structure of Second Extent:

			(Octet	no.	1			-	
8	3	7	6	5	4	3	2	1		
AM	IΑ	MI	D4	ME	МІ	MD5		FX		
bit	8		((AMA	A)		0	ama trac	k not resulting from algamation process k resulting from amalgamation cess	
bits	bits 7/6			(MD4)		=	00 01 10 11	Frie Unk	Mode 4 interrogation andly target anown target reply	
bit	bit 5			5 (ME)			0 1	Mili rep	ault value tary Emergency present in the last ort received from a sensor able of decoding this data	
bit	bit 4			oit 4 (MI)				0 1	Mili rep	ault value tary Identification present in the last ort received from a sensor capable ecoding this data
bits	its 3/2 (MD5)			=	00 01 10 11	No Mode 5 interrogation Friendly target Unknown target No reply				
bit	1		((FX)			0 1		l of data item ension into next extent	

1062/080 Track Status

Structure of Third Extent:

_			(Octet	no.	1							
	8	7	6	5	4	3	2	1					
	CST	PSR	SSR	MDS	ADS	SUC	AAC	FX					
k	S-tic	3	(CST	,	= 0 = 1	A h	ge o	ult value of the last received track update is or than system dependent hold (coasting)				
k	oit 7	•	(PSF	,	= 0 = 1	A u	Default value Age of the last received PSR track update is higher than system dependent threshold					
k	oit 6	i	(SSF	•	= 0 = 1	A u	Default value Age of the last received SSR track update is higher than system dependent threshold					
k	bit-5 (MDS)					= 0 = 1	A u	ge o	ult value of the last received Mode S track te is higher than system ndent threshold				
k	oit 4		(ADS	,	= 0 = 1	A u	ge o	ult value of the last received ADS-B track te is higher than system ndent threshold				
k	bit-3 (SUC)					= 0	1 S b	pec e de	ult value ial Used Code (Mode A codes to fined in the system to mark a with special interest)				
k	oit-2	2	(AAC	•	= 0 = 1	A d	ssig iscre	ult value ined Mode A Code Conflict (same ete Mode A Code assigned to her track)				
k	oit 1		((FX)		= 0 = 1			of data item nsion into next extent				

NOTES

- Track type and coasting can also be derived from I062/290 System Track Update Ages
- 2. If the system supports the technology, default value (0) means that the technology was used to produce the report
- 3. If the system does not support the technology, default value is meaningless.

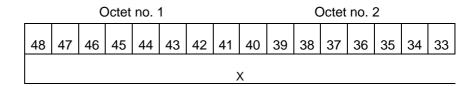
5.2.7 Data Item I062/100, Calculated Track Position. (Cartesian)

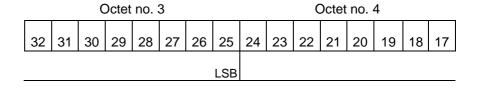
Definition: Calculated position in Cartesian co-ordinates with a resolution of

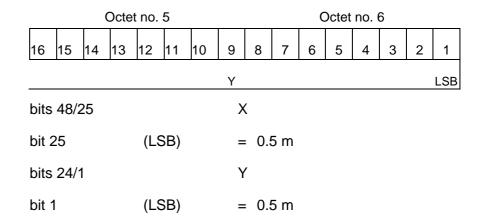
0.5m, in two's complement form.

Format : Six-octet fixed length Data Item.

Structure:







Encoding Rule:

This Item is optional

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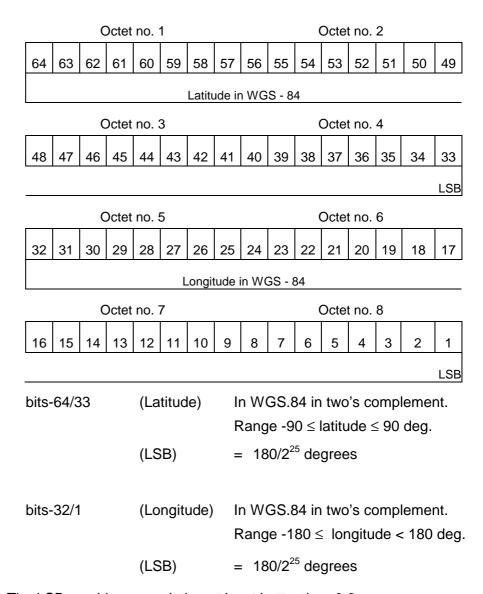
5.2.8 Data Item 1062/105, Calculated Position In WGS-84 Co-ordinates

Definition: Calculated Position in WGS-84 Co-ordinates with a resolution of

180/2²⁵. degrees

Format: Eight-octet fixed length Data Item

Structure:



NOTE - The LSB provides a resolution at least better than 0.6m.

Encoding Rule:

This Item is optional

5.2.9 Data Item I062/110, Mode 5 Data reports & Extended Mode 1 Code

Definition: Mode 5 Data reports & Extended Mode 1 Code

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
SUM	PMN	POS	GA	EM1	TOS	XP	FX

bit-8	(SUM)	Subfie	eld #1: Mode 5 Summary
		= 0	Absence of Subfield #1
		= 1	Presence of Subfield #1
	(D141)	0.15	11 //2 M 1 5 BIN/AL ()
bit-7	(PMN)	Subfie	eld #2: Mode 5 PIN/ National
			Origin/Mission Code
		= 0	Absence of Subfield # 2
		= 1	Presence of Subfield #2
bit-6	(POS)	Subfie	eld #3: Mode 5 Reported Position
	, ,	= 0	Absence of Subfield #3
		= 1	Presence of Subfield #3
bit-5	(GA)	Subfie	eld #4: Mode 5 GNSS-derived Altitude
		= 0	Absence of Subfield #4
		= 1	Presence of Subfield #4

bit-4	(EM1)	Subfield #5: Extended Mode 1 Code in Octal Representation
		= 0 Absence of Subfield #5
		= 1 Presence of Subfield #5
bit-3	(TOS)	Subfield #6: Time Offset for POS and GA.
		= 0 Absence of Subfield #6
		= 1 Presence of Subfield #6
bit-2	(XP)	Subfield #: X Pulse Presence.
	,	= 0 Absence of Subfield #7
		= 1 Presence of Subfield #7
bit-1	(FX)	Extension Indicator
DIL- I	(I X)	= 0 no extension
		= 1 extension
		= 1

Encoding Rule:

This Item is optional

Item I062/110 Mode 5 Data reports & Extended Mode 1 Code

Structure of Subfield #1:

Mode 5 Summary:

		(Octet	no. 1	l							
8	7	6	5	4	3	2	1					
M5	ID	DA	M1	M2	M3	МС	Χ					
bit-8			(M5)		= 0 No Mode 5 interrogation= 1 Mode 5 interrogation						
bit-7			(ID)		= 0 No authenticated Mode 5 ID reply= 1 Authenticated Mode 5 ID reply						
bit-6	(DA)		 = 0 No authenticated Mode 5 Data reply or Report = 1 Authenticated Mode 5 Data reply of Report (i.e any valid Mode 5 reply type other than ID) 								
bit-5			(M1)		Мс	de 5	code not pres reply code from Mo	sent or not from ode 5 reply.			
bit-4			(M2)		Мс	de 5	2 code not pres 5 reply 2 code from Mo	sent or not from ode 5 reply.			
bit-3			(M3)		Мс	de 5	3 code not pres 5 reply 8 code from Mo	sent or not from ode 5 reply.			
bit-2			(MC)	= (C altitude not ode 5 reply	present or not			

= 1 Mode C altitude from Mode 5 reply

bit-1

- (X) X-pulse from Mode 5 Data reply or Report.
 - = 0 X-pulse set to zero or no authenticated Data reply or Report received.
 - = 1 X-pulse set to one.

NOTES

- The flags M2, M3, MC refer to the contents of data items I062/120, I062/060 and I062/135 respectively. The flag M1 refers to the contents of the Subfield #5 (Extended Mode 1 Code in Octal Representation).
- 2. If an authenticated Mode 5 reply is received with the Emergency bit set, then the Military Emergency bit (ME) in Data Item I062/080, Track Status, shall be set.
- 3. If an authenticated Mode 5 reply is received with the Identification of Position bit set, then the Special Position Identification bit (SPI) in Data Item I062/080, Track Status, shall be set.

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Item I062/110 Mode 5 Data reports & Extended Mode 1 Code

Structure of Subfield #2:

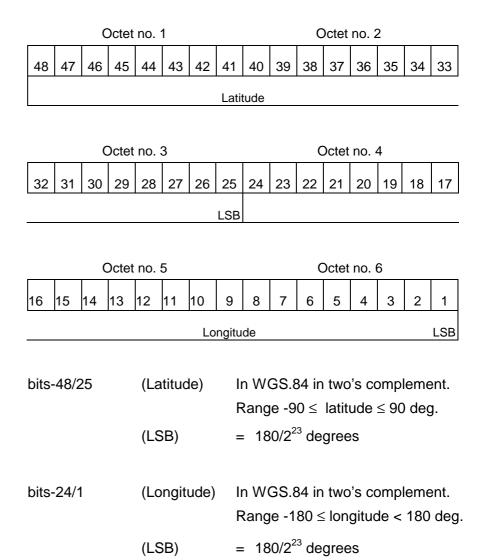
Mode 5 PIN /National Origin/ Mission Code

Octet no. 1									Octet no. 2								
32	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17		
0 0										PIN							
Octet no. 3									Octet no. 4								
16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1		
0 0 0					NAT				0	MIS							
bits-32/31					(spare)				spare bits set to 0								
bits-30/17				(PIN)				PIN Code									
bits-16/14					(spare)				spare bits set to 0								
bits-13/9					(NAT)				National Origin								
bits-8/7 (spare)									spare bits set to 0								
bits-6/1 (MIS)								Λ	Mission Code								

Item I062/110 Mode 5 Data reports & Extended Mode 1 Code

Structure of Subfield #3:

Mode 5 Reported Position



NOTE - The resolution implied by the LSB is better than the resolution with which Mode 5 position reports are transmitted from aircraft transponders using currently defined formats.

Item I062/110 Mode 5 Data reports & Extended Mode 1 Code

Structure of Subfield #4:

Mode 5 GNSS-derived Altitude

		(Octet	no.	1					C	Octet	no. 2	2		
16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1
0	RES							GA							LSB
bit-1	16		(sp	are)		spa	are l	oit se	et to	0					
bit-1	15		(RE	ES)		Alt	itude GA	€	(Coorte	9A) ed ir	n 10	is 00 ft	inc	repo	rived orted. ents,
bits	-14/	1	(GA	A)		exp									irget, S 84

NOTES

- 1. GA is coded as a 14-bit two's complement binary number with an LSB of 25 ft. irrespective of the setting of RES.
- 2. The minimum value of GA that can be reported is -1000 ft.

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Item I062/110 Mode 5 Data reports & Extended Mode 1 Code

Structure of Subfield #5:

Extended Mode 1 Code in Octal Representation

			Oct	et 1							Oct	et 2				
16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	
0	0	0	0		Extended Mode 1 Code											
				A4	A2	A1	B4	B2	B1	C4	C2	C1	D4	D2	D1	

bit 16/13 Spare bits set to 0

bits-12/1 (EM1) Extended Mode 1 Code in octal representation

NOTE - If Subfield #1 is present, the M1 bit in Subfield #1 indicates whether the Extended Mode 1 Code is from a Mode 5 reply or a Mode 1 reply. If Subfield #1 is not present, the Extended Mode 1 Code is from a Mode 1 reply.

Item I062/110 Mode 5 Data reports & Extended Mode 1 Code

Structure of Subfield #6:

Time Offset for POS and GA

		(Octet	no. 1								
8 7 6 5 4 3 2 1												
	(LSB)										

bits-8/1 (TOS)

Time Offset coded as a twos complement number with an LSB of 1/128 s. The time at which the Mode 5 Reported Position (Subfield #3) and Mode 5 GNSS-derived Altitude (Subfield #4) are valid is given by Time of Day (1048/140) plus Time Offset.

Note:

TOS shall be assumed to be zero if Subfield #6 is not present.

Item I062/110 Mode 5 Data reports & Extended Mode 1 Code

Structure of Subfield #7:

X Pulse Presence

		(Octet	no. 1			
8	7	6	5	4	3	2	1
0	0	0	X5	хс	X3	X2	X1

0 0	0 X5 XC X3 X	2 X1
bits-8/6	spare bits set to ze	ero
bit-5	(X5)	X-pulse from Mode 5 Data reply or Report.
		= 0 X-pulse set to zero or no authenticated Data reply or Report received.
		= 1 X-pulse set to one (present).
bit-4	(XC)	X-pulse from Mode C reply
		= 0 X-pulse set to zero or no Mode C reply
		= 1 X-pulse set to one (present)
bit-3	(X3)	X-pulse from Mode 3/A reply
		= 0 X-pulse set to zero or no Mode 3/A reply
		= 1 X-pulse set to one (present)
bit-2	(X2)	X-pulse from Mode 2 reply
		= 0 X-pulse set to zero or no Mode 2 reply
		= 1 X-pulse set to one (present)
bit-1	(X1)	X-pulse from Mode 1 reply
		= 0 X-pulse set to zero or no Mode 1 reply
		= 1 X-pulse set to one (present)

5.2.10 Data Item I062/120, Track Mode 2 Code

Definition: Mode 2 code associated to the track **Format:** Two-Octet fixed length data item.

Structure:

		(Octet	no.	1					(Octet	no. 2	2		
16	6 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

Spare bits set to zero

bits-12/1

Mode-2 code in octal representation

Encoding Rule:

This Item is optional

5.2.11 Data Item I062/130, Calculated Track Geometric Altitude

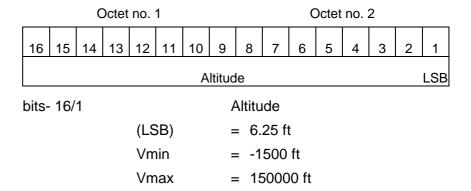
Definition: Vertical distance between the target and the projection of its

position on the earth's ellipsoid, as defined by WGS84, in two's

complement form.

Format : Two-Octet fixed length data item.

Structure:



NOTES

- 1. LSB is required to be less than 10 ft by ICAO
- 2. The source of altitude is identified in bits (SRC) of item I062/080 Track Status

Encoding Rule:

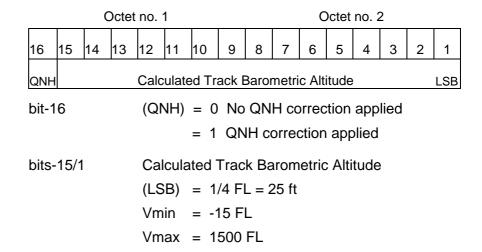
5.2.12 Data Item I062/135, Calculated Track Barometric Altitude

Definition: Calculated Barometric Altitude of the track, in two's complement

form.

Format : Two-Octet fixed length data item.

Structure:



NOTE - ICAO specifies a range between -10 FL and 1267 FL for Mode C

Encoding Rule:

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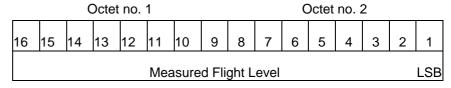
5.2.13 Data Item I062/136, Measured Flight Level

Definition: Last valid and credible flight level used to update the track, in

two's complement form,.

Structure: Two-Octet fixed length data item.

Structure:



bits- 16/1 Measured Flight Level

(LSB) = 1/4 FL Vmin = -15 FL Vmax = 1500 FL

NOTES

- 1. The criteria to determine the credibility of the flight level are Tracker dependent.
- 2. Credible means: within reasonable range of change with respect to the previous detection.
- 3. ICAO specifies a range between -10 FL and 1267 FL for Mode C
- 4. This item includes the barometric altitude received from ADS-B

Encoding Rule:

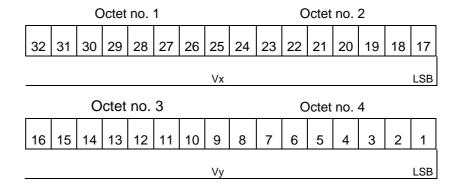
5.2.14 Data Item I062/185, Calculated Track Velocity (Cartesian)

Definition: Calculated track velocity expressed in Cartesian co-ordinates,

in two's complement form.

Format: Four-octet fixed length Data Item .

Structure:



 $-8192 \text{m/s} \le \text{Vy} \le 8191.75 \text{m/s}$

NOTE - The y-axis points to the Geographical North at the location of the target.

Encoding Rule:

5.2.15 Data Item 1062/200, Mode of Movement

Definition: Calculated Mode of Movement of a target.

Format : One-Octet fixed length data item.

Structure:

		C	Octet	no.	1					
8	7	6	5	4	3	2	1			
TRA	ANS	LO	NG	VE	RT	ADF	0			
bits	8/7			(TF	RAN	S)	Т	ran	S'	versal Acceleration:
							=	00)	Constant Course
							=	0	1	Right Turn
							=	1()	Left Turn
							=	1	1	Undetermined
bits	6/5			(LC	NG)	L	ong	jit	udinal Acceleration:
							=	00)	Constant Groundspeed
							=	0	1	Increasing Groundspeed
							=	10)	Decreasing Groundspeed
							=	1	1	Undetermined
bits	4/3			(VE	RT))	٧	erti	C	al Rate :
							=	00)	Level
							=	0	1	Climb
							=	10)	Descent
							=	1	1	Undetermined
bit 2				(AE	PF)		Д	ltitu	ıd	le Discrepancy Flag
							=	0		No altitude discrepancy
							=	1		Altitude discrepancy
bit 1							S	par	е	bit set to zero

NOTE: The ADF, if set, indicates that a difference has been detected in the altitude information derived from radar as compared to other technologies (such as ADS-B).

Encoding Rule:

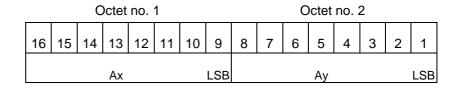
5.2.16 Data Item I062/210, Calculated Acceleration (Cartesian)

Definition: Calculated Acceleration of the target expressed in Cartesian

co-ordinates, in two's complement form.

Format: Two-octet fixed length Data Item .

Structure:



$$(LSB) = 0.25 \text{ m/s}^2$$

$$(LSB) = 0.25 \text{ m/s}^2$$

NOTES

- 1. The y-axis points to the Geographical North at the location of the target.
- 2. Maximum value means maximum value or above.

Encoding Rule:

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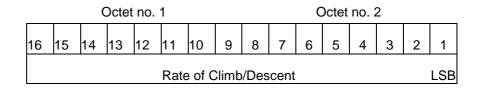
5.2.17 Data Item I062/220, Calculated Rate Of Climb/Descent

Definition: Calculated rate of Climb/Descent of an aircraft in two's

complement form.

Format : Two-Octet fixed length data item.

Structure:



bit 16/1 Rate of Climb/Descent

(LSB) = 6.25 feet/minute

NOTE - A positive value indicates a climb, whereas a negative value indicates a descent.

Encoding Rule:

SDPS Track Messages

5.2.18 Data Item I062/245, Target Identification

Definition: Target (aircraft or vehicle) identification in 8 characters.

Format: Seven-octet fixed length Data Item.

Structure:

		(Octet	no. 1	1		
56	55	54	53	52	51	50	49
S	TI	0	0	0	0	0	0

		(Octe	t no.	2						Octe	t no.	3		
48	48 47 46 45 44 43 42 41 40 39 38 3									37	36	35	34	33	
	Character 1							Char	acter	2			С	hara	cter 3

			Octe	et no.	4						Octe	t no.	5		
32	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17
	Character 4									Char	acter	5			

			Octe	t no.	6						Oct	et no	. 7		
16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1
Cha	Character 6 Character 7											Cha	racte	r 8	

bits-56/55 (STI) = 00 Callsign or registration downlinked from target

= 01 Callsign not downlinked from target

= 10 Registration not downlinked from target

= 11 Invalid

bits-54/49 Spare bits set to zero

bits-48/1 Characters 1-8 (coded on 6 bits each) defining target identification

NOTES

- 1. For coding, see section 3.8.2.9 of [Ref.3]
- 2. As the Callsign of the target can already be transmitted (thanks to I062/380 Subfield #25 if downlinked from the aircraft or thanks to I062/390 Subfield #2 if the target is correlated to a flight plan), and in order to avoid confusion at end user's side, this item SHALL not be used.

Encoding Rule:

5.2.19 Data Item I062/270, Target Size & Orientation

Definition: Target size defined as length and width of the detected target,

and orientation.

Format: Variable length Data Item comprising a first part of one octet,

followed by one-octet extents as necessary.

Structure

of First Part:



bit-2 (LSB) = 1 m

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
	С	RIEN	TATIC	N		LSB	FX

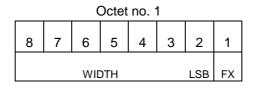
bit-2 (LSB) = $360^{\circ}/128 = approx. 2.81^{\circ}$

bit-1 (FX) = 0 End of Data Item

= 1 Extension into next extent

1062/270, Target Size & Orientation

Structure of Second Extent:



= 1 Extension into next extent

NOTES

- 1. The orientation gives the direction which the target nose is pointing to, relative to the Geographical North.
- 2. When the length only is sent, the largest dimension is provided.

Encoding Rule:

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5.2.20 Data Item I062/290, System Track Update Ages

16 | 15

Definition: Ages of the last plot/local track/target report update for each

sensor type.

Format: Compound Data Item, comprising a primary subfield of up to two

octets, followed by the indicated subfields.

Octet no. 1

Octet no. 2

TRK PSR SSR MDS ADS ES

12 11 10

Structure of

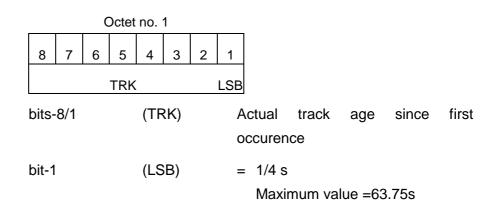
Primary Subfield:

	UAT LOP	MLT 0 0 0 FX
bit-16	(TRK)	Subfield #1: Track age
		= 0 Absence of Subfield #1
		= 1 Presence of Subfield #1
bit-15	(PSR)	Subfield #2: PSR age
		= 0 Absence of Subfield #2
		= 1 Presence of Subfield #2
bit-14	(SSR)	Subfield #3: SSR age
		= 0 Absence of Subfield #3
		= 1 Presence of Subfield #3
bit-13	(MDS)	Subfield #4: Mode S age
		= 0 Absence of Subfield #4
		= 1 Presence of Subfield #4
bit-12	(ADS)	Subfield #5: ADS-C age
		= 0 Absence of Subfield #5
		= 1 Presence of Subfield #5
bit-11	(ES)	Subfield #6: ADS-B Extended Squitter age
		= 0 Absence of Subfield #6
		= 1 Presence of Subfield #6

bit-10	(VDL)	Subfield #7: ADS-B VDL Mode 4 age = 0 Absence of Subfield #7 = 1 Presence of Subfield #7
bit-9	FX	Extension indicator = 0 no extension = 1 extension
bit-8	(UAT)	Subfield #8: ADS-B UAT age = 0 Absence of Subfield #8 = 1 Presence of Subfield #8
bit-7	(LOP)	Subfield #9: Loop age = 0 Absence of Subfield #9 = 1 Presence of Subfield #9
bit-6	(MLT)	Subfield #10: Multilateration age = 0 Absence of Subfield #10 = 1 Presence of Subfield #10
bits-5/2	spare bits	s set to zero
bit-1	FX	Extension indicator = 0 no extension = 1 extension

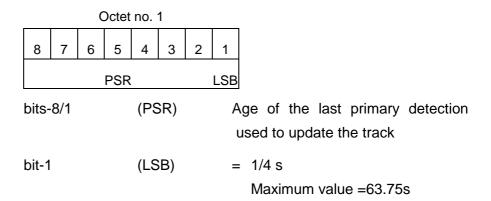
Structure of Subfield # 1:

Track Age



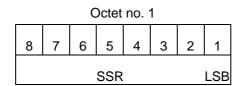
Structure of Subfield # 2:

PSR Age



Structure of Subfield # 3:

SSR Age



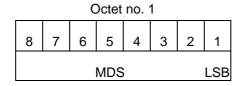
bits-8/1 (SSR) Age of the last secondary detection used to update the track

bit-1 (LSB) = 1/4 s

Maximum value = 63.75s

Structure of Subfield # 4:

Mode S Age



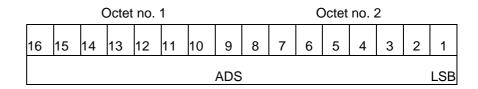
bits-8/1 (MDS) Age of the last Mode S detection used to update the track

bit-1 (LSB) = 1/4 s

Maximum value = 63.75s

Structure of Subfield # 5:

ADS-C Age



bits-8/1 (ADS) Age of the last ADS-C report used to update the track

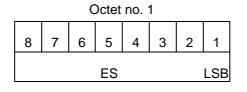
bit-1 (LSB) = 1/4

Max. value = 16383.75s (> 4 hours)

s

Structure of Subfield # 6:

ES Age



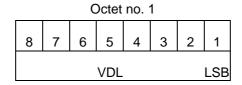
bits-8/1 (ES) Age of the last 1090 Extended Squitter ADS-B report used to update the track

bit-1 (LSB) =
$$1/4$$
 s

Maximum value = 63.75 s

Structure of Subfield #7:

VDL Age



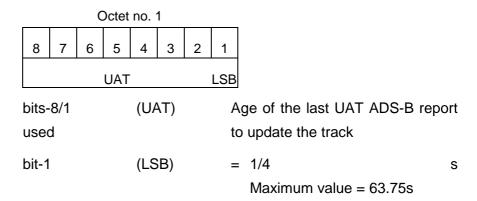
bits-8/1 (VDL) Age of the last VDL Mode 4 ADS-B report used to update the track

bit-1 (LSB) = 1/4 s

Maximum value = 63.75s

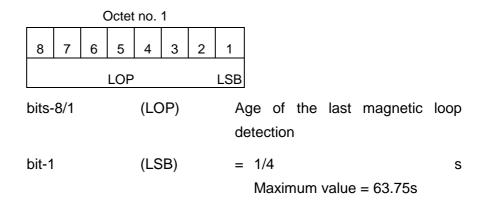
Structure of Subfield #8:

UAT Age



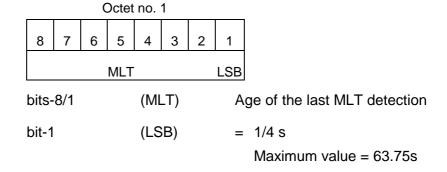
Structure of Subfield #9:

Loop Age



Structure of Subfield # 10:

Multilateration Age



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1. Except for Track Age, the ages are counted from Data Item I062/070, Time Of Track Information, using the following formula:

Age = Time of track information - Time of last detection used to update the track

- 2. The time of last detection is derived from monosensor category time of day
- 3. If the data has never been received, then the corresponding subfield is not sent.
- 4. Maximum value means maximum value or above.

Encoding Rule:

5.2.21 Data Item I062/295, Track Data Ages

Definition: Ages of the data provided.

Format: Compound Data Item, comprising a primary subfield of up to five

octets, followed by the indicated subfields.

Structure of

Primary Subfield:

Octet no. 1							
40	39	38	37	36	35	34	33
MFL	MD1	MD2	MDA	MD4	MD5	MHG	FX
		C	Octet	no.	2		
32	31	30	29	28	27	26	25
IAS	TAS	SAL	FSS	TID	СОМ	SAB	FX
		C	Octet	no.	3		
24	23	22	21	20	19	18	17
ACS	BVR	GVR	RAN	TAR	TAN	GSP	FX
Octet no. 4							
16	15	14	13	12	11	10	9
VUN	MET	EMC	POS	GAL	PUN	MB	FX
Octet no. 5							
8	7	6	5	4	3	2	1
IAR	MAC	BPS	0	0	0	0	FX

bit-40	(MFL)	Subfield #1: Measured Flight Level age = 0 Absence of Subfield #1 = 1 Presence of Subfield #1
bit-39	(MD1)	Subfield #2: Mode 1 age = 0 Absence of Subfield #2 = 1 Presence of Subfield #2
bit-38	(MD2)	Subfield #3: Mode 2 age = 0 Absence of Subfield #3 = 1 Presence of Subfield #3

bit-37	(MDA)	Subfield #4: Mode 3/A age = 0 Absence of Subfield #4 = 1 Presence of Subfield #4
bit-36	(MD4)	Subfield #5: Mode 4 age = 0 Absence of Subfield #5 = 1 Presence of Subfield #5
bit-35	(MD5)	Subfield #6: Mode 5 age = 0 Absence of Subfield #6 = 1 Presence of Subfield #6
bit-34	(MHG)	Subfield #7: Magnetic Heading age = 0 Absence of Subfield #7 = 1 Presence of Subfield #7
bit-33	FX	Extension indicator = 0 no extension = 1 extension
bit-32	(IAS)	Subfield #8: Indicated Airspeed/Mach Nb age = 0 Absence of Subfield #8 = 1 Presence of Subfield #8
bit-31	(TAS)	Subfield #9: True Airspeed age = 0 Absence of Subfield #9 = 1 Presence of Subfield #9
bit-30	(SAL)	Subfield #10: Selected Altitude age = 0 Absence of Subfield #10 = 1 Presence of Subfield #10
bit-29	(FSS)	Subfield #11: Final State Selected Altitude age = 0 Absence of Subfield #11 = 1 Presence of Subfield #11
bit-28	(TID)	Subfield #12: Trajectory Intent Data age = 0 Absence of Subfield #12 = 1 Presence of Subfield #12
bit-27	(COM)	Subfield #13: Communications / ACAS Capability and Flight Status age = 0 Absence of Subfield #13 = 1 Presence of Subfield #13
bit-26	(SAB)	Subfield #14: Status Reported by ADS-B age = 0 Absence of Subfield #14 = 1 Presence of Subfield #14
bit-25	FX	Extension indicator = 0 no extension = 1 extension
bit-24	(ACS)	Subfield #15: ACAS Resolution Advisory Report age = 0 Absence of Subfield #15 = 1 Presence of Subfield #15

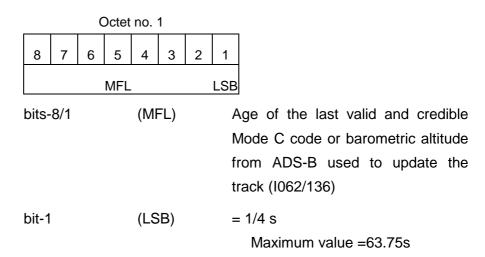
bit-23	(BVR)	Subfield #16: Barometric Vertical Rate age = 0 Absence of Subfield #16 = 1 Presence of Subfield #16
bit-22	(GVR)	Subfield #17: Geometric Vertical Rate age = 0 Absence of Subfield #17 = 1 Presence of Subfield #17
bit-21	(RAN)	Subfield #18: Roll Angle age = 0 Absence of Subfield #18 = 1 Presence of Subfield #18
bit-20	(TAR)	Subfield #19: Track Angle Rate age = 0 Absence of Subfield #19 = 1 Presence of Subfield #19
bit-19	(TAN)	Subfield #20: Track Angle age = 0 Absence of Subfield #20 = 1 Presence of Subfield #20
bit-18	(GSP)	Subfield #21: Ground Speed age = 0 Absence of Subfield #21 = 1 Presence of Subfield #21
bit-17	FX	Extension indicator = 0 no extension = 1 extension
bit-16	(VUN)	Subfield #22: Velocity Uncertainty age = 0 Absence of Subfield #22 = 1 Presence of Subfield #22
bit-15	(MET)	Subfield #23: Meteorological Data age = 0 Absence of Subfield #23 = 1 Presence of Subfield #23
bit-14	(EMC)	Subfield #24: Emitter Category age = 0 Absence of Subfield #24 = 1 Presence of Subfield #24
bit-13	(POS)	Subfield #25: Position Data age = 0 Absence of Subfield #25 = 1 Presence of Subfield #25
bit-12	(GAL)	Subfield #26: Geometric Altitude Data age = 0 Absence of Subfield #26 = 1 Presence of Subfield #26
bit-11	(PUN)	Subfield #27: Position Uncertainty Data age = 0 Absence of Subfield #27 = 1 Presence of Subfield #27
bit-10	(MB)	Subfield #28: Mode S MB Data age = 0 Absence of Subfield #28 = 1 Presence of Subfield #28

bit-9	FX	Extension indicator = 0 no extension = 1 extension
bit-8	(IAR)	Subfield #29: Indicated Airspeed Data age = 0 Absence of Subfield #29 = 1 Presence of Subfield #29
bit-7	(MAC)	Subfield #30: Mach Number Data age = 0 Absence of Subfield #30 = 1 Presence of Subfield #30
bit-6	(BPS)	Subfield #31: Barometric Pressure Setting Data age = 0 Absence of Subfield #31 = 1 Presence of Subfield #31
bit-5/2	spare bits set to zero	
bit-1	FX	Extension indicator = 0 no extension = 1 extension

NOTE - Despite there are now two subfields (#29 and #30) reporting the ages of, respectively, the Indicated Airspeed track data and the Mach Number track data, the subfield #8 (and so its presence bit, bit-32) is kept free in order to prevent a full incompatibility with previous releases of ASTERIX Cat. 062 already implemented.

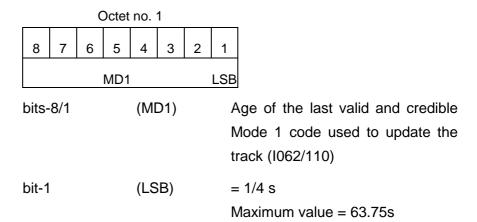
Structure of Subfield # 1:

Measured Flight Level Age



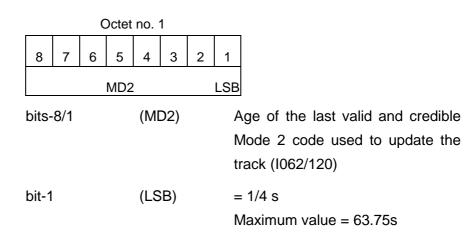
Structure of Subfield # 2:

Mode 1 Age



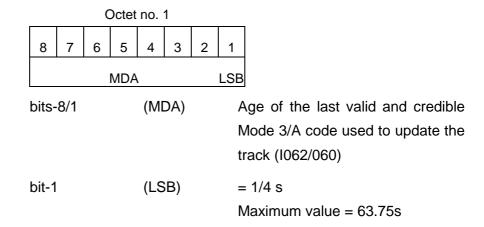
Structure of Subfield #3:

Mode 2 Age



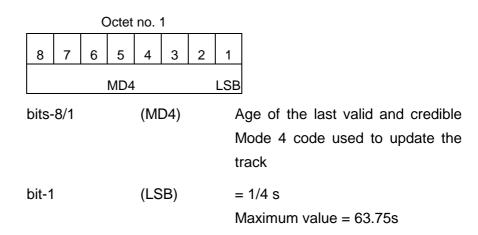
Structure of Subfield # 4:

Mode 3/A Age



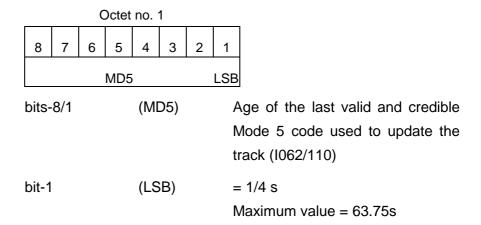
Structure of Subfield # 5:

Mode 4 Age



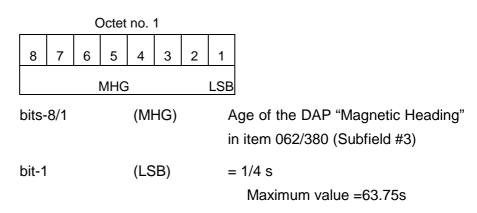
Structure of Subfield # 6:

Mode 5 Age



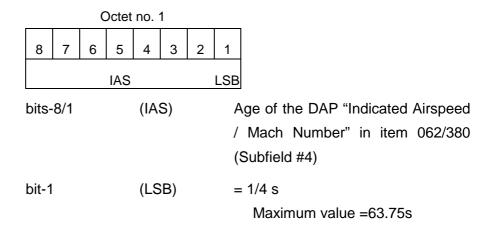
Structure of Subfield #7

Magnetic Heading Age



Structure of Subfield #8

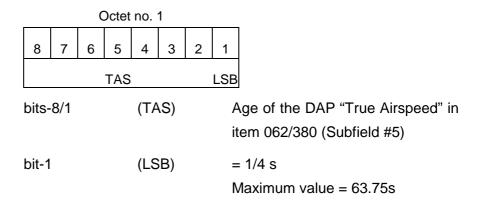
Indicated Airspeed / Mach Nb age



NOTE - Despite there are now two subfields (#29 and #30) reporting the ages of, respectively, the Indicated Airspeed track data and the Mach Number track data, this former subfield is kept free in order to prevent a full incompatibility with previous releases of ASTERIX Cat. 062 already implemented.

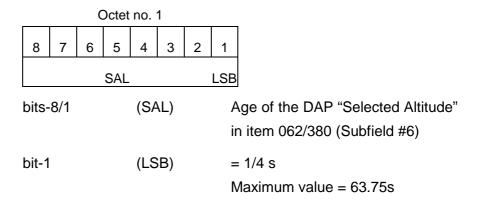
Structure of Subfield #9:

True Airspeed Age



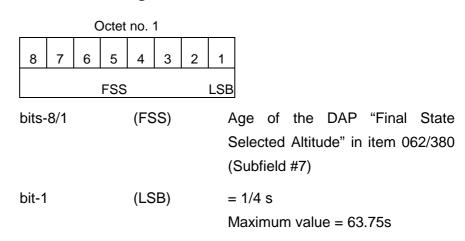
Structure of Subfield # 10

Selected Altitude Age



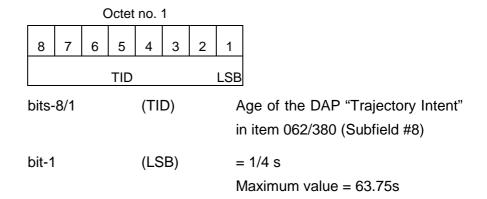
Structure of Subfield # 11:

Final State Selected Altitude Age



Structure of Subfield # 12:

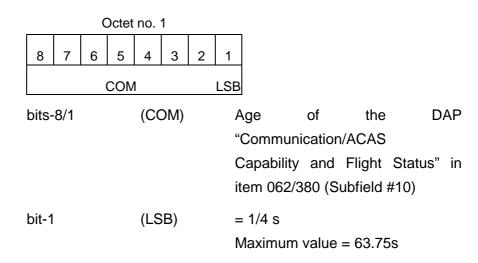
Trajectory Intent Age



Structure of Subfield # 13:

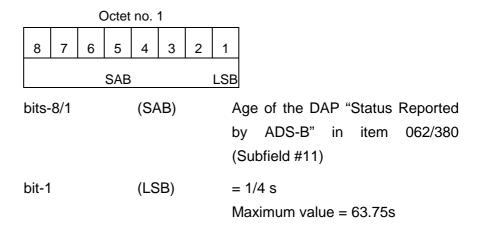
Communication/ACAS

Capability and Flight Status Age



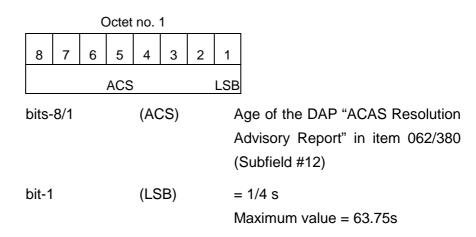
Structure of Subfield # 14:

Status Reported by ADS-B Age



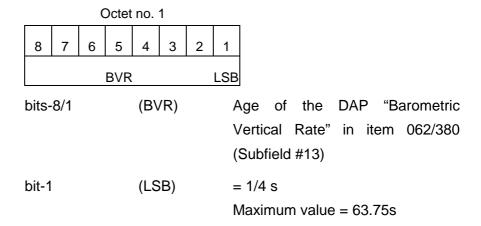
Structure of Subfield # 15:

ACAS Resolution Advisory Report Age



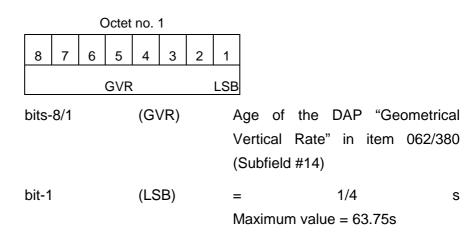
Structure of Subfield # 16:

Barometric Vertical Rate Age



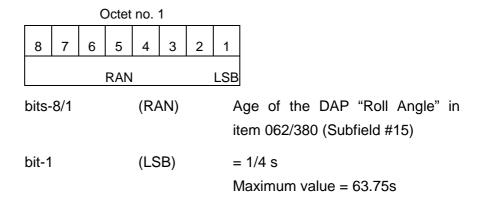
Structure of Subfield # 17:

Geometrical Vertical Rate Age



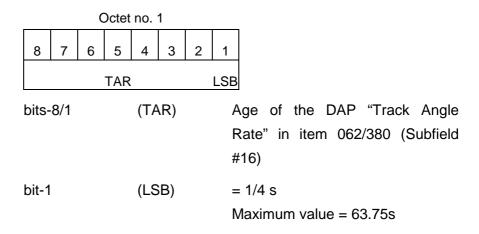
Structure of Subfield # 18:

Roll Angle Age



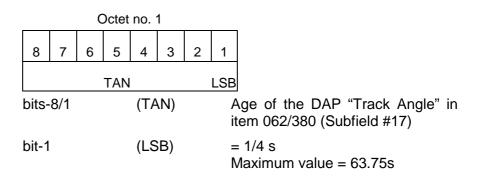
Structure of Subfield # 19:

Track Angle Rate Age



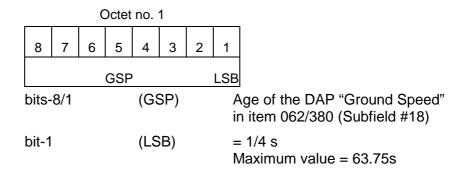
Structure of Subfield # 20:

Track Angle Age



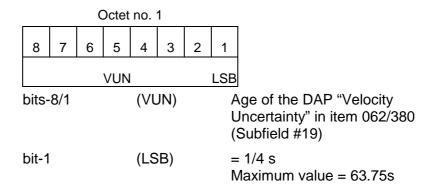
Structure of Subfield # 21:

Ground Speed Age



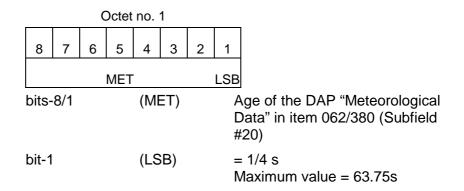
Structure of Subfield # 22:

Velocity Uncertainty Age



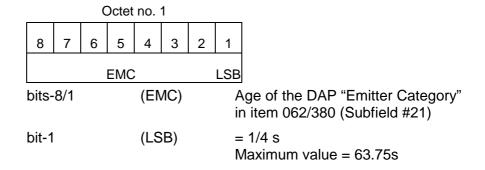
Structure Subfield # 23:

Meteorological Data Age



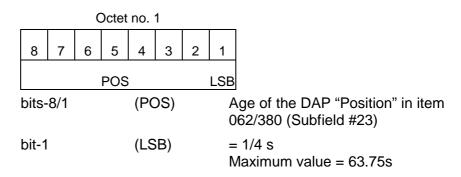
Structure of Subfield # 24:

Emitter Category Age



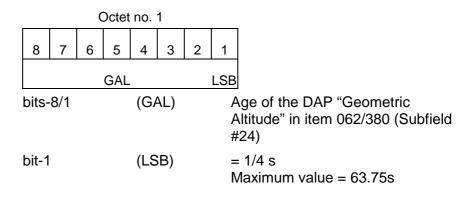
Structure of Subfield # 25:

Position Age



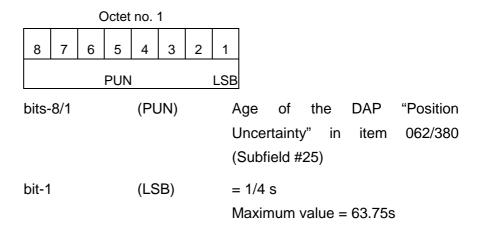
Structure of Subfield # 26:

Geometric Altitude Age



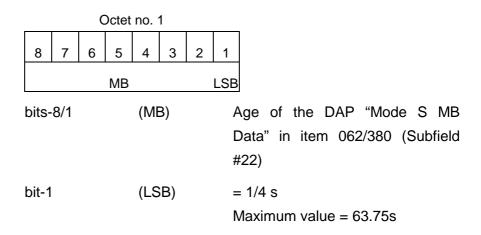
Structure of Subfield # 27:

Position Uncertainty Age



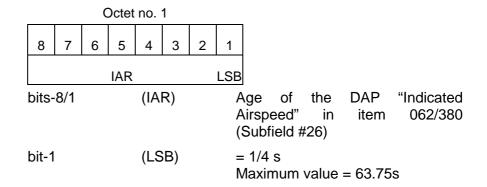
Structure of Subfield # 28:

Mode S MB Data Age



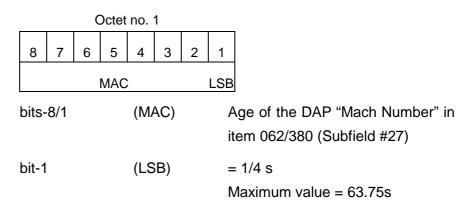
Structure of Subfield # 29:

Indicated Airspeed Data Age



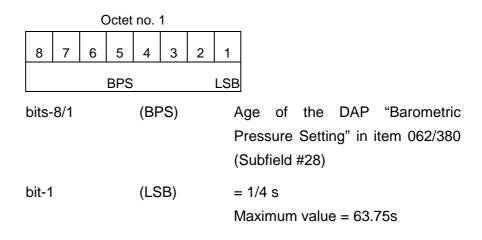
Structure of Subfield # 30:

Mach Number Data Age



Structure of Subfield # 31:

Barometric Pressure Setting Data Age



NOTE - In all the subfields, the age is the time delay since the value was measured

Encoding Rule:

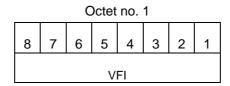
This Item is optional

5.2.22 Data Item I062/300, Vehicle Fleet Identification

Definition: Vehicle fleet identification number.

Format: One octet fixed length Data Item.

Structure:



bits 8-1 (VFI) = 0 Unknown

= 1 ATC equipment maintenance

= 2 Airport maintenance

= 3 Fire

= 4 Bird scarer

= 5 Snow plough

= 6 Runway sweeper

= 7 Emergency

= 8 Police

= 9 Bus

= 10 Tug (push/tow)

= 11 Grass cutter

= 12 Fuel

= 13 Baggage

= 14 Catering

= 15 Aircraft maintenance

= 16 Flyco (follow me)

Encoding Rule:

This Item is optional

SDPS Track Messages

5.2.23 Data Item 1062/340, Measured Information

Definition: All measured data related to the last report used to update the

track. These data are not used for ADS-B.

Format: Compound Data Item, comprising a primary subfield of one octet,

followed by the indicated subfields.

Octet no. 1

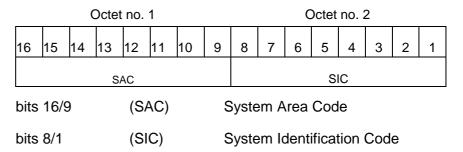
Structure of

Primary Subfield:

	8	8	7	6	5	4	3	2	1	
	s	SID	POS	HEI	MDC	MDA	TYP	0	FX	
bit-8	(SID)		=	Subfi 0 1	Al	osen	ice c	of S	ubfie	ification eld #1 eld #1
bit-7	(POS)		_	Subfi 0 1	Al	osen	ice c	of Su	bfie	osition Id #2 eld #2
bit-6	(HEI)		=	Subfi 0 1	Αŀ	osen	ice c	of Su	ıbfie	D Height ld #3 eld #3
bit-5	(MDC)		S = =	Subfi 0 1	Αŀ	osen	ice c	of S	ubfie	ed Mode C code eld #4 eld #4
bit-4	(MDA)		=	0	Αŀ	osen	ice c	of S	ubfie	ed Mode 3/A code eld #5 eld #5
bit-3	(TYP)		=	0	Αŀ	osen		of S	ubfie	eld #6 eld #6
bit-2	(spare)		S	pare	e bit	set	to ze	ero		
bit-1	FX		= =	xter 0 1	nc	_	icato ensi sion			

Structure of Subfield # 1:

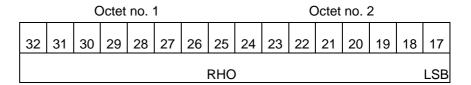
Sensor Identification

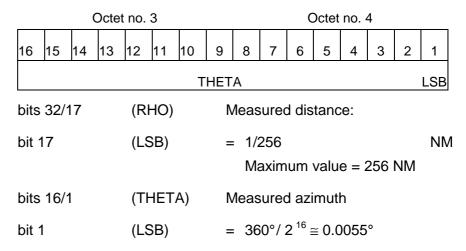


NOTE - The up-to-date list of SACs is published on the Eurocontrol Web Site (http://www.eurocontrol.int).

Structure of Subfield # 2:

Measured Position



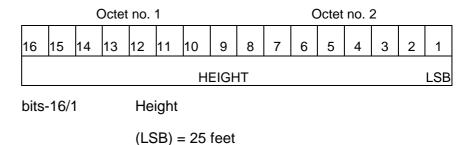


NOTE - The measured position is :

- 1. In case of a plot, the measured bias-corrected polar coordinates:
- 2. In case of a sensor local track, the measured bias-corrected polar co-ordinates of the plot associated to the track;
- 3. In case of a local track without detection, the extrapolated biascorrected polar co-ordinates.

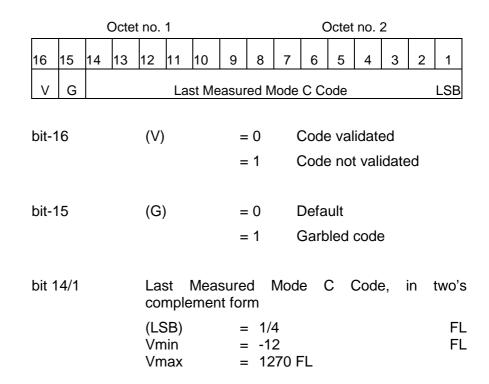
Structure of Subfield #3:

Measured 3-D Height



Structure of Subfield # 4:

Last Measured Mode C Code



Structure of Subfield # 5:

Last Measured Mode 3/A Code

	Octet no. 1 Octet no. 2														
16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1
V	G	L	0	A4	A2	A1	B4	B2	B1	C4	C2	C1	D4	D2	D1
bit 1	16			(V)			=	: 0	(Code	e Va	lidat	ed		
							=	: 1	(Code	e no	t Val	idate	ed	
bit 1	15			(G)	Ī	Defa	ult								
	= 1 Garbled code														
bit 1	bit 14 (L) = 0 MODE $3/A$ code													as	
									(deriv	ed	fror	n tl	he	reply
									(of	the)	tran	spo	nder,
							=	= 1 Smoothed MODE						3/A	
									(code	as	pr	ovide	ed I	by a
									5	sens	or lo	cal	track	cer.	
bit 1	bit 13 Spare bit set to zero														
bits	bits 12/1 Mode 3/A reply under the form														
							O	f 4 c	digits	s in c	octal	rep	rese	ntat	ion

NOTE - Smoothed MODE 3/A data (L = 1) will be used in case of absence of MODE 3/A code information in the plot or in case of difference between plot and sensor local track MODE 3/A code information.

Structure of Subfield # 6:

Report Type

		(Octet	no.	1		•	-						
8	7	6	5	4	3	2	1							
	TYP		SIM	RAB	TST	0	0							
bits-	8/6			(TY	′ P)		=	= 000	No detection					
							=	= 001	Single PSR detection					
							=	= 010	Single SSR detection					
							=	= 011	SSR + PSR detection					
							=	= 100	Single ModeS All-Call					
							=	= 101	Single ModeS Roll-Call					
								= 110						
							=	= 111	ModeS Roll-Call +PSR					
bit-5	5			(SII	M)		=	= 0	Actual target report					
							=	= 1	Simulated target report					
h:4 /	ı			(D.	\ D\			0	Depart from toward					
bit-4	ŀ			(RA	4B)		=	= 0	Report from target					
							_	= 1	transponder Report from field monitor					
							-	- 1	·					
									(fixed transponder)					
bit-3	3			(TS	ST)		=	= 0	Real target report					
				•	-		=	= 1	Test target report					
bits-	2/1						5	Spare	e bits set to zero					

Encoding Rule:

This Item is optional

SDPS Track Messages

5.2.24 Data Item I062/380, Aircraft Derived Data

Definition: Data derived directly by the aircraft.

Format: Compound Data Item, comprising a primary subfield of up to four

octets, followed by the indicated subfields.

Structure of

Primary Subfield:

		C	Octet	no.	1		
32	31	30	29	28	27	26	25
ADR	ID	MHG	IAS	TAS	SAL	FSS	FX
		C	Octet	no.	2		
24	23	22	21	20	19	18	17
TIS	TID	СОМ	SAB	ACS	BVR	GVR	FX
		C	Octet	no.	3		
16	15	14	13	12	11	10	9
RAN	TAR	TAN	GSP	VUN	MET	EMC	FX
		C	Octet	no.	4		
8	7	6	5	4	3	2	1
POS	GAL	PUN	MB	IAR	MAC	BPS	FX

bit-32	(ADR)	Subfield #1:Target Address = 0 Absence of Subfield #1 = 1 Presence of Subfield #1
bit-31	(ID)	Subfield #2:Target Identification = 0 Absence of Subfield #2 = 1 Presence of Subfield #2
bit-30	(MHG)	Subfield #3:Magnetic Heading = 0 Absence of Subfield #3 = 1 Presence of Subfield #3

SDPS Track Messages

bit-29	(IAS)	Subfield #4:Indicated Airspeed/ Mach Number = 0 Absence of Subfield #4 = 1 Presence of Subfield #4
bit-28	(TAS)	Subfield #5:True Airspeed = 0 Absence of Subfield #5 = 1 Presence of Subfield #5
bit-27	(SAL)	Subfield #6:Selected Altitude = 0 Absence of Subfield #6 = 1 Presence of Subfield #6
bit-26	(FSS)	Subfield #7:Final State SelectedAltitude = 0 Absence of Subfield #7 = 1 Presence of Subfield #7
bit-25	FX	Extension indicator = 0 no extension = 1 extension
bit-24	(TIS)	Subfield #8: Trajectory Intent Status = 0 Absence of Subfield #8 = 1 Presence of Subfield #8
bit-23	(TID)	Subfield #9: Trajectory Intent Data = 0 Absence of Subfield #9 = 1 Presence of Subfield #9
bit-22	(COM)	Subfield #10: Communications / ACAS Capability and Flight Status = 0 Absence of Subfield #10 = 1 Presence of Subfield #10
bit-21	(SAB)	Subfield #11: Status reported by ADS-B = 0 Absence of Subfield #11 = 1 Presence of Subfield #11
bit-20	(ACS)	Subfield #12: ACAS Resolution Advisory Report = 0 Absence of Subfield #12 = 1 Presence of Subfield #12
bit-19	(BVR)	Subfield #13: Barometric Vertical Rate = 0 Absence of Subfield #13 = 1 Presence of Subfield #13
bit-18	(GVR)	Subfield #14: Geometric Vertical Rate = 0 Absence of Subfield #14 = 1 Presence of Subfield #14
bit-17	FX	Extension indicator = 0 no extension = 1 extension
bit-16	(RAN)	Subfield #15: Roll Angle = 0 Absence of Subfield #15 = 1 Presence of Subfield #15
bit-15	(TAR)	Subfield #16: Track Angle Rate

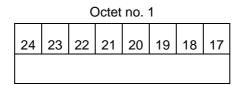
		= 0 Absence of Subfield #16= 1 Presence of Subfield #16
bit-14	(TAN)	Subfield #17: Track Angle = 0 Absence of Subfield #17 = 1 Presence of Subfield #17
bit-13	(GSP)	Subfield #18: Ground Speed = 0 Absence of Subfield #18 = 1 Presence of Subfield #18
bit-12	(VUN)	Subfield #19: Velocity Uncertainty = 0 Absence of Subfield #19 = 1 Presence of Subfield #19
bit-11	(MET)	Subfield #20: Meteorological Data = 0 Absence of Subfield #20 = 1 Presence of Subfield #20
bit-10	(EMC)	Subfield #21: Emitter Category = 0 Absence of Subfield #21 = 1 Presence of Subfield #21
bit-9	FX	Extension indicator = 0 no extension = 1 extension
bit-8	(POS)	Subfield #22: Position Data = 0 Absence of Subfield #22 = 1 Presence of Subfield #22
bit-7	(GAL)	Subfield #23: Geometric Altitude Data = 0 Absence of Subfield #23 = 1 Presence of Subfield #23
bit-6	(PUN)	Subfield #24: Position Uncertainty Data = 0 Absence of Subfield #24 = 1 Presence of Subfield #24
bit-5	(MB)	Subfield #25: Mode S MB Data = 0 Absence of Subfield #25 = 1 Presence of Subfield #25
bit-4	(IAR)	Subfield #26: Indicated Airspeed = 0 Absence of Subfield #26 = 1 Presence of Subfield #26
bit-3	(MAC)	Subfield #27: Mach Number = 0 Absence of Subfield #27 = 1 Presence of Subfield #27
bit-2	(BPS)	Subfield #28: Barometric Pressure Setting. = 0 Absence of Subfield #28 = 1 Presence of Subfield #28
bit-1	FX	Extension indicator = 0 no extension = 1 extension

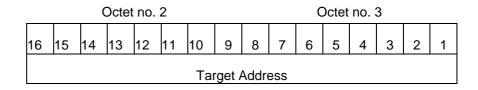
NOTE - Despite there are now two subfields (#26 and #27) reporting, respectively, the Indicated Airspeed track data and the Mach Number track data, the former subfield #4 (and its presence bit, bit-37) is kept in order to prevent a full incompatibility with previous releases of ASTERIX Cat. 062 already implemented.

Data Item 1062/380, Aircraft Derived Data

Structure of Subfield # 1:

Target Address





bits 24/1 24 bits Target Address, A23 to A0

Structure of Subfield # 2:

Target Identification

			Octet	no.	1					C	Octet	no. 2	2		
48	47	46	45	44	43	42	41	40	39	38	37	36	35	34	33
	Chara	cter	1			С	hara	cter		Cł	narac	eter 3	3/1		

		(Octet	no. S	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								С	hara	cter	5		Cha	r 6/1	

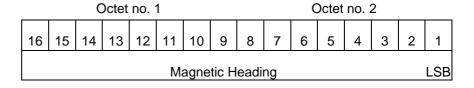
		(Octet	no.	5					C	Octet	no. (6		
16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1
С	hara	cter (6/2		(Chara	cter	7			С	hara	cter	8	

bits 48/1

Characters 1-8 (coded on 6 bits each) defining a target identification when flight plan is available or the registration marking when no flight plan is available. Coding rules are provided in [3] Section 3.1.2.9.1.2 and Table 3-9

Structure of Subfield # 3:

Magnetic Heading

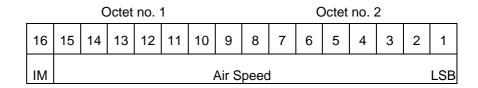


bits-16/1 Magnetic Heading
$$(LSB) = 360^{\circ}/2^{16} \cong 0.0055^{\circ}$$

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Structure of Subfield # 4:

Indicated Airspeed / Mach No

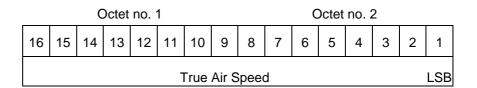


bit-16 (IM) = 0 Air Speed = IAS, LSB (Bit-1) =
$$2^{-14}$$
 NM/s
= 1 Air Speed = Mach, LSB (Bit-1) = 0.001
bits-15/1 Air Speed (IAS or Mach)

NOTE - Despite there are now two subfields (#26 and #27) reporting, respectively, the Indicated Airspeed track data and the Mach Number track data, this former subfield is kept free in order to prevent a full incompatibility with previous releases of ASTERIX Cat. 062 already implemented.

Structure of Subfield # 5:

True Airspeed



bits-16/1 True Air Speed
$$(LSB) = 1 \text{ knot}$$
 $0 \le \text{True Air Speed} \le 2046 \text{ knots}$

Structure of Subfield # 6:

Selected Altitude

Definition: The short-term vertical intent as described by either the FMS selected altitude, the Altitude Control Panel Selected Altitude (FCU/MCP), or the current aircraft altitude according to the aircraft's mode of flight.

		(Octe	t no.	1					C	Octet	no.	2		
16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1
SAS	So	urce						Altit	ude						LSB
bit-′	16			(SA	AS)			: 0 N p : 1 S	rovi	ded	ourc				ation led
bit-	15/1	4		(Sc	ource	=)	= 00 Unknown								
							=	: 01		Airo	craft	Altit	ude		
							=	: 10		FCU/MCP Selected Altitude					
							=	: 11		FMS Selected Altitude					
bits- 13/1 (Altitude)								iltitud SB= 1300	25ft						form

Structure of Subfield #7:

Final State Selected Altitude

Definition: The vertical intent value that corresponds with the ATC cleared altitude, as derived from the Altitude Control Panel (FCU/MCP).

		(Octet	no.	1		Octet no. 2								
16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1
MV	АН	AM						Altit	ude						LSB
bit-1	16			(M	V)			/lana = 0 = 1	1	√erti Not a Activ	activ		Э		
bit-1	15			(Al	⊣)		<i>P</i>	Altitu	de H		activ	е			
bit-1	14			(Al	M)		A	Appro	oach I		de activ	е			
bits	- 13/	′1		(Al	titud	e)	L	Altitu SB= 1300	:25ft						form

Structure of Subfield #8:

Trajectory Intent Status

		(Octet	no. 1	1		
8	7	6	5	4	3	2	1
NAV	NVB	0	0	0	0	0	FX

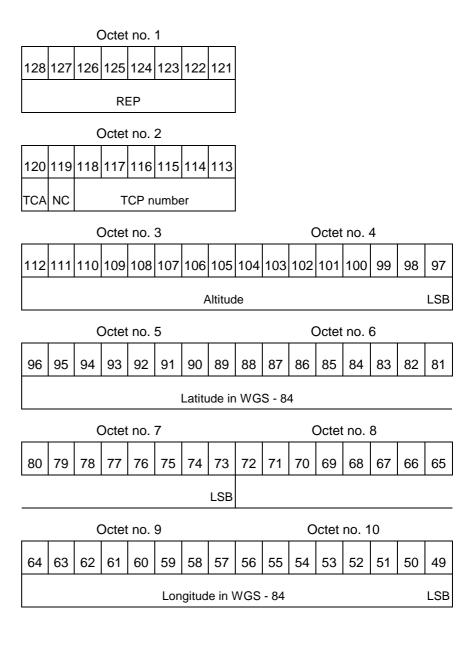
bit-8	(NAV)	= 0	Trajectory available for			is
		= 1	Trajectory not available			is
bit-7	(NVB)	= 0	Trajectory valid	Intent	Data	is
		= 1	Trajectory not valid	Intent	Data	is
bits-6/2	Spare Bits	set to ze	ro			
bit-1	(FX)	= 0	End of Data	Item		
		= 1	Extension in	nto next e	extent	

Structure of Subfield #9:

Trajectory Intent Data

Format:

Repetitive Data Item starting with a one-octet Field Repetition Indicator (REP) followed by at least one Trajectory Intent Point comprising fifteen octets



Octet no. 11 Octet no. 12															
48	47	46	45	44	43	42	41	40	39	38	37	36	35	34	33
	Point	Турє)	Т	D	TRA	TOA				T	ΟV			
Octet no. 13 Octet no. 14															
32 31 30 29 28 27 26 25 24 23 22 21 20 19 18												17			
							TOV	,							LSB
		С	ctet	no. 1	5					С	ctet	no. 1	6		
16 15 14 13 12 11 10 9 8 7 6 5 4 3 2											1				
TTR L												LSB			

Data Item 1062/380, Aircraft Derived Data, Subfield #9: Trajectory Intent Data

bits-128/121	(REP)	Repetition Factor
bit-120	(TCA)	= 0 TCP number available= 1 TCP number not available
bit-119	(NC)	= 0 TCP compliance = 1 TCP non-compliance
bits-118/113	(TCP Number)	Trajectory Change Point number
bits-112/97	(Altitude)	Altitude in two's complement. LSB= 10ft -1500 ft \leq altitude \leq 150000 ft
bits-96/73	(Latitude)	In WGS.84 in two's complement. -90 \leq latitude \leq 90 deg. LSB = $180/2^{23}$ deg. = approx.2.145767*10 ⁻⁰⁵ deg.
bits-72/49	(Longitude)	In WGS.84 in two's complement. -180 \leq longitude $<$ 180 LSB = $180/2^{23}$ deg. = approx.2.145767*10 ⁻⁰⁵ deg.
bits-48/45	Point Type	= 0 Unknown = 1 Fly by waypoint (LT) = 2 Fly over waypoint (LT)

		= 3 Hold pattern (LT)
		= 4 Procedure hold (LT)
		= 5 Procedure turn (LT)
		= 6 RF leg (LT)
		= 7 Top of climb (VT)
		= 8 Top of descent (VT)
		= 9 Start of level (VT)
		= 10 Cross-over altitude (VT)
		= 11 Transition altitude (VT)
bits-44/43	(TD)	= 00 N/A
	,	= 01 Turn right
		= 10 Turn left
		= 11 No turn
bit-42	(TRA)	Turn Radius Availabilty
Dit 42	(110.0)	= 0 TTR not available
		= 1 TTR available
bit-41	(TOA)	= 0 TOV available
		= 1 TOV not available
bits-40/17	(TOV)	Time Over Point
		LSB = 1 second
bits-16/1	(TTR)	TCP Turn radius
	,	LSB = 0.01 Nm
		0 ≤ TTR ≤ 655.35 Nm

NOTES

- 1. NC is set to one when the aircraft will not fly the path described by the TCP data.
- 2. TCP numbers start from zero.
- 3. LT = Lateral Type
- 4. VT = Vertical Type
- 5. TOV gives the estimated time before reaching the point. It is defined as the absolute time from midnight.
- 6. TOV is meaningful only if TOA is set to 0

Structure of Subfield # 10:

Communicat

ti	ons	/AC/	AS C	Capa	abili	ty a	nd F	ligh	t St	atus	rep	orte	d by	/ Mo	de-	S	
			C	Octe	t no.	1					(Octet	no. 2	2			
	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	
		СОМ			STAT	-	0	0	SSC	ARC	AIC	B1A		B1	ΙB		
	b	its-1	6/14	1	(CO	M)	Co	mm	nunic	ation	าร င	apab	ility	of th	ie		
							tra	nsp	onde	er							
							=	0 I	No c	omn	nunio	catio	ns c	apal	oility		
								((surv	eilla	nce	only)				
							=	1 (Com	m. A	and	d Co	mm.	В			
								(capa	bility	′						
							=	2 (Com	m. A	, Co	mm	. B a	and			
								ı	Jplin	ık EL	_M						
							=	3 (Com	m. A	, Co	mm	. B,	Uplir	ηk		
								I	ELM	and	Dov	vnlin	k El	_M			
							=	4 I	_eve	l 5 T	rans	spon	der	capa	ability	y	
							5 t	o 71	Not a	assig	ned						
	b	its-1	3/11	۱ (STA	T)	Fli	ght	Stati	us							
							=	0 1	No a	lert,	no S	SPI, a	aircr	aft			
								á	airbo	rne							
								4 1	\la	ا مسد		ים.	-:	- 41			

- = 1 No alert, no SPI, aircraft on ground
- = 2 Alert, no SPI, aircraft airborne
- = 3 Alert, no SPI, aircraft on ground
- = 4 Alert, SPI, aircraft airborne or on ground
- = 5 No alert, SPI, aircraft airborne or on ground

bit-10/9 Spare bit set to zero

bit-8	(SSC)	Specific service capability
		= 0 No
		= 1 Yes
bit-7	(ARC)	Altitude reporting capability
		= 0 100 ft resolution
		= 1 25 ft resolution
bit-6	(AIC)	Aircraft identification capability
		= 0 No
		= 1 Yes
bit 5	(B1A)	BDS 1,0 bit 16
bits 4/1	(B1B)	BDS 1,0 bits 37/40

Structure of Subfield # 11:

Status reported by ADS-B

		(Octet	no.	1					(Octet	no.	2		
16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1
A	\C	N	ſΝ		C	GBS	0	0	0	0	0	0		STAT	•

bits-16/15 (AC) 00 = unknown

01 = ACAS not operational

10 = ACAS operational

11 = invalid

bits-14/13 (MN) 00 = unknown

01 = Multiple navigational aids not operating

10 = Multiple navigational aids operating

11 = invalid

bits-12/11 (DC) 00 = unknown

01 = Differential correction

10 = No differential correction

11 = invalid

bit-10 (GBS) = 0 Transponder Ground Bit not set or unknown

= 1 Transponder Ground Bit set

bits-9/4 spare bits set to zero

bits-3/1 (STAT) Flight Status

= 0 No emergency

= 1 General emergency

= 2 Lifeguard / medical

= 3 Minimum fuel

= 4 No communications

= 5 Unlawful interference

= 6 "Downed" Aircraft

= 7 Unknown

Structure of Subfield # 12:

ACAS Resolution Advisory Report

Definition: Currently active Resolution Advisory (RA), if any, generated by the

ACAS associated with the transponder transmitting the report and

threat identity data.

Format : Seven-octet fixed length Data Item.

		(Octet	no. ′	1					(Octet	no. 2	2		
56	55	54	53	52	51	50	49	48	47	46	45	44	43	42	41

		(Octet	no. 3	3					(Octet	no. 4	4		
40	39	38	37	36	35	34	33	32	31	30	29	28	27	26	25

		(Octet	no. 5	5					(Octet	no. 6	3		
24	23	22	21	20	19	18	17	16	15	14	13	12	11	10	9

			Oct	et 7			
8	7	6	5	4	3	2	1

bits-56/1 (MB Data) 56-bit message conveying Mode S

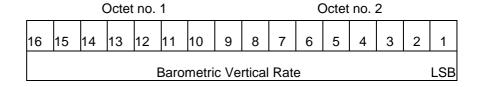
Comm B message data of BDS

Register 3,0

NOTE - Refer to ICAO Draft SARPs for ACAS for detailed explanations.

Structure of Subfield # 13:

Barometric Vertical Rate

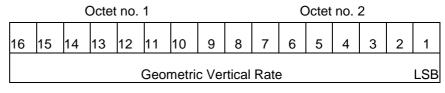


bits-16/1 Barometric Vertical Rate in two's complement form

(LSB) = 6.25 feet/minute

Structure of Subfield # 14:

Geometric Vertical Rate

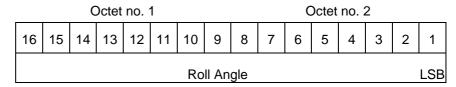


bits-16/1 Geometric Vertical Rate in two's complement form

(LSB) = 6.25 feet/minute

Structure of Subfield # 15:

Roll Angle



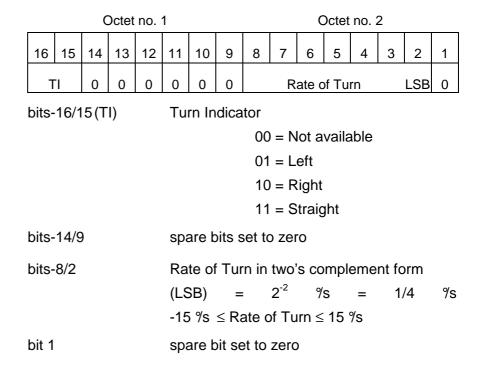
bits-16/1 Roll Angle in two's complement form

(LSB) = 0.01 degree -180 \leq Roll Angle \leq 180 SDPS Track Messages

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Structure of Subfield # 16:

Track Angle Rate



NOTES

- 1. A positive value represents a right turn, whereas a negative value represents a left turn.
- 2. Value 15 means 15% or above.

Structure of Subfield # 17:

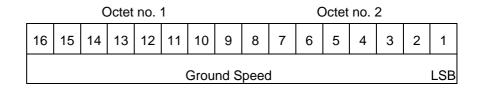
Track Angle

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

bits-16/1 Track Angle
(LSB) =
$$360^{\circ}/2^{16}$$
 = approx. 0.0055°

Structure of Subfield # 18:

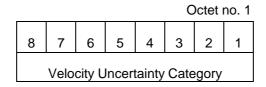
Ground Speed



bits-16/1 Ground Speed in two's complement form referenced to WGS84
$$(LSB) = 2^{-14} \quad NM/s \cong 0.22 \quad kt \\ -2 \; NM/s \leq Ground \; Speed < 2 \; NM/s$$

Structure of Subfield # 19:

Velocity Uncertainty



NOTE - Velocity uncertainty category of the least accurate velocity component

Structure of Subfield # 20:

Met Data

				Octet	no. 1	l											
	64	63	62	61	60	59	58	57									
	ws	WD	TMP	TRB	0	0	0	0									
			(Octet	no. 2	2			-		(Octet	no. 3	3			
	56	55	54	53	52	51	50	49	48	47	46	45	44	43	42	41	
		I		I			Wir	nd Sp	eed					I	I	LSB	
			(Octet	no. 4	1		Octet no. 5									
	40	39	38	37	36	35	34	33	32	31	30	29	28	27	26	25	
	70	00	00	01	00	00	l.				00	23	20		20	LSB	
	Wind Dire Octet no. 6											Octot	no. 7	7		LOD	
			<u> </u>	Octor	110.	,					<u> </u>	J0101	110. 7				
	24	23	22	21	20	19	18	17	16	15	14	13	12	11	10	9	
							Ten	npera	iture							LSB	
			(Octet	no. 8	3			•								
	8	7	6	5	4	3	2	1									
			7	Turbu	llence	Э											
	bit-6	64			(W	S)		= 0	No	ot va	ılid V	Vind	Spe	eed			
					, ,			= 1	Va	Valid Wind Speed							
	bit-63				(WD)			= 0	Not valid Wind Direction								
								= 1	Valid Wind Direction								
bit-62					(TMP)			= 0	Not valid Temperature								
								= 1	Valid Temperature								
	bit-6	51			(TF	RB)		= 0					ulend	ce			
								= 1	Va _	alid i	Γurb	uien	ce				
								_	_								

(spare)

Spare Bits set to zero

bits-60/57

bits-56/41	Wind Speed
	(LSB) = 1 knot
	$0 \le Wind Speed \le 300$
bits-40/25	Wind Direction
	(LSB) = 1 degree
	1 ≤ Wind Direction ≤ 360
bits-24/9	Temperature in degrees celsius
	(LSB) = 0.25 ℃
	-100 $^{\circ}$ ≤ Temperature ≤ 100 $^{\circ}$
bits-8/1	Turbulence
	Integer between 0 and 15 inclusive

Structure of Subfield # 21:

Emitter Category

Octet no. 1 8 7 6 5 4 3 2 1 ECAT

bits-8/1 (ECAT)

1 = light aircraft ≤ 7000 kg

2 = reserved

3 = 7000 kg < medium aircraft < 136000 kg

4 = reserved

 $5 = 136000 \text{ kg} \le \text{heavy aircraft}$

6 = highly manoeuvrable (5g acceleration capability) and high speed (>400 knots cruise)

7 to 9 = reserved

10 = rotocraft

11 = glider / sailplane

12 = lighter-than-air

13 = unmanned aerial vehicle

14 = space / transatmospheric vehicle

15 = ultralight / handglider / paraglider

16 = parachutist / skydiver

17 to 19 = reserved

20 = surface emergency vehicle

21 = surface service vehicle

22 = fixed ground or tethered obstruction

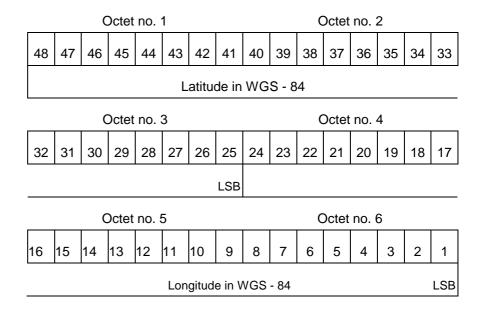
23 to 24 = reserved

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Structure of Subfield # 22:

Position



bits-48/25 (Latitude) In WGS.84 in two's complement form. Range $-90 \le \text{latitude} \le 90 \text{ deg.}$ LSB = $180/2^{23}$ degrees $= 2.145767 * 10^{-05}$ degrees. This corresponds to a resolution of at least 2.4 meters (Longitude) In WGS.84 in two's complement form. bits-24/1 Range -180 ≤ longitude < 180 deg. $LSB = 180/2^{23}$ degrees $= 2.145767 * 10^{-05}$ degrees. This corresponds to a resolution

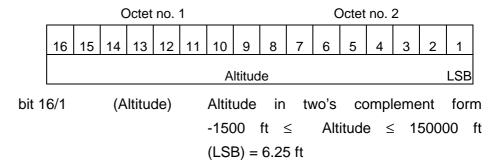
of at least 2.4 meters.

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NOTE -Positive longitude indicates East. Positive latitude indicates North.

Structure of Subfield # 23:

Geometric Altitude



NOTE - LSB is required to be thinner than 10 ft by ICAO

Structure of Subfield # 24:

Position Uncertainty

Octet no. 1													
8	7	6	5	4	3	2	1						
0	0	0	0										

bits-8/5 Spare bits set to zero bits-4/1 (PUN) Position Uncertainty

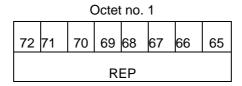
Structure of Subfield # 25:

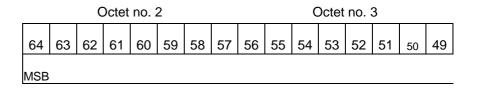
MODE S MB DATA

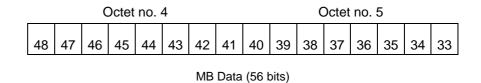
Format:

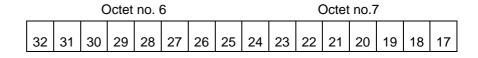
Repetitive starting with an one-octet Field Repetition Indicator (REP) followed by at least one BDS report comprising one seven octet BDS register and one octet BDS code.

Structure:









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

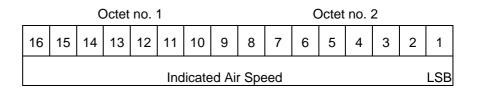
bits 72/65	(REP)	Repetition factor
bits 64/9	(MB data)	56 bit message conveying Mode S B message data
bits 8/5	(BDS1)	Comm B data Buffer Store 1 Address
bits 4/1	(BDS2)	Comm B data Buffer Store 2 Address

NOTE - Only DAPs that can not be encoded into other subfields of this item should be sent using subfield #25

Data Item 1062/380, Aircraft Derived Data

Structure of Subfield # 26:

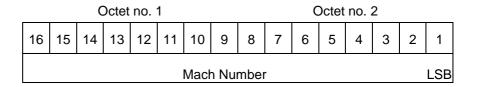
Indicated Airspeed



bit 16/1 0 Kt
$$\leq$$
 Indicated Airspeed \leq 1100 Kt (LSB) = 1 Kt

Structure of Subfield # 27

Mach Number

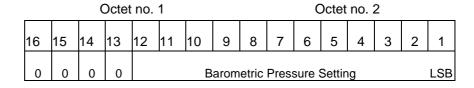


bit 16/1
$$0 \le Mach Number \le 4.096$$
 (LSB) = Mach 0.008

Data Item 1062/380, Aircraft Derived Data

Structure of Subfield # 28:

Barometric Pressure Setting (derived from Mode S BDS 4,0)



bit-16/13 Spare bits set to 0. bits- 12/1 (BPS) LSB=0.1mb

 $-0mb \leq BPS \leq 409.5 mb$

NOTE - BPS is the barometric pressure setting of the aircraft minus 800 mb.

Encoding Rule:

This Item is optional

5.2.25 Data Item I062/390, Flight Plan Related Data

Definition: All flight plan related information, provided by ground-based

systems.

Format: Compound Data Item, comprising a primary subfield of up to three

octets, followed by the indicated subfields.

Structure of

Primary Subfield:

Octet no. 1

24	23	22	21	20	19	18	17
TAG	CSN	IFI	FCT	TAC	WTC	DEP	FX

Octet no. 2

16	15	14	13	12	11	10	9
DST	RDS	CFL	CTL	TOD	AST	STS	FX

Octet no. 3

8	7	6	5	4	3	2	1
STD	STA	PEM	PEC	0	0	0	FX

bit-24 (TAG) Subfield #1: FPPS Identification Tag

= 0 Absence of Subfield #1

= 1 Presence of Subfield #1

bit-23 (CSN) Subfield #2: Callsign

= 0 Absence of Subfield #2

= 1 Presence of Subfield #2

bit-22 (IFI) Subfield #3: IFPS_FLIGHT_ID

= 0 Absence of Subfield #3

= 1 Presence of Subfield #3

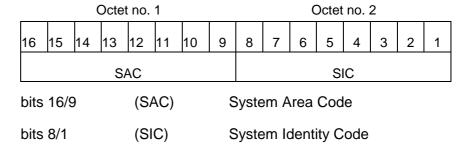
Data Item 1062/390, Flight Plan Related Data bit-21 (FCT) Subfield #4: Flight Category = 0 Absence of Subfield #4 = 1 Presence of Subfield #4 bit-20 (TAC) Subfield #5: Type of Aircraft = 0 Absence of Subfield #5 = 1 Presence of Subfield #5 bit-19 (WTC) Subfield #6: Wake Turbulence Category = 0 Absence of Subfield #6 = 1 Presence of Subfield #6 bit-18 (DEP) Subfield #7: Departure Airport = 0 Absence of Subfield #7 = 1 Presence of Subfield #7 bit-17 FX Extension indicator = 0 no extension = 1 extension bit-16 (DST) Subfield #8: Destination Airport = 0 Absence of Subfield #8 = 1 Presence of Subfield #8 bit-15 (RDS) Subfield #9: Runway Designation = 0 Absence of Subfield #9 = 1 Presence of Subfield #9 bit-14 (CFL) Subfield #10: Current Cleared Flight Level = 0 Absence of Subfield #10 = 1 Presence of Subfield #10 bit-13 (CTL) Subfield #11: Current Control Position = 0 Absence of Subfield #11 = 1 Presence of Subfield #11 bit-12 (TOD) Subfield #12: Time of Departure / Arrival = 0 Absence of Subfield #12

= 1 Presence of Subfield #12

bit-11	(AST)	Subfield #13: Aircraft Stand = 0 Absence of Subfield #13 = 1 Presence of Subfield #13
bit-10	(STS)	Subfield #14: Stand Status = 0 Absence of Subfield #14 = 1 Presence of Subfield #14
bit-9	FX	Extension indicator = 0 no extension = 1 extension
bit-8	(STD)	Subfield #15: Standard Instrument Departure = 0 Absence of Subfield #15 = 1 Presence of Subfield #15
bit-7	(STA)	Subfield #16: STandard Instrument ARrival = 0 Absence of Subfield #16 = 1 Presence of Subfield #16
bit-6	(PEM)	Subfield #17: Pre-emergency Mode 3/A code = 0 Absence of Subfield #17 = 1 Presence of Subfield #17
bit-5	(PEC)	Subfield #18: Pre-emergency Callsign = 0 Absence of Subfield #18 = 1 Presence of Subfield #18
bits-4/2		Spare bits set to zero
bit-1	FX	Extension indicator = 0 no extension = 1 extension

Structure of Subfield # 1:

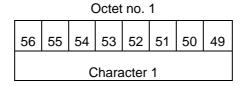
FPPS Identification Tag

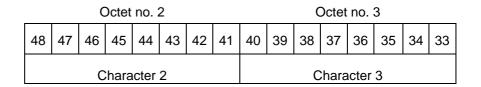


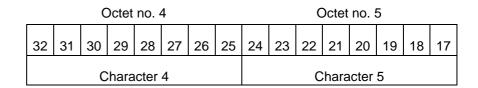
NOTE - The up-to-date list of SACs is published on the Eurocontrol Web Site (http://www.eurocontrol.int).

Structure of Subfield # 2:

Callsign







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

NOTE - Each one of the seven Octets contains an ASCII Character. The Callsign is always left adjusted. It contains up to seven upper-case alphanumeric characters, the remaining character positions (if any) are padded with space characters.

Structure of Subfield # 3: IFPS_FLIGHT_ID

	Octet no. 1							Octet no. 2							
32	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17
T	ΥP	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-32/31 (TYP) = 00 Plan Number = 01 Unit 1 internal

= 01 Unit 1 internal flight number= 10 Unit 2 internal flight number

= 11 Unit 3 internal flight number

bits-30/28 spare bits set to zero

bits-27/1 (NBR) Number from 0 to 99 999 999

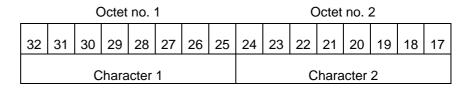
Structure of Subfield # 4: Flight Category

Octet no. 1											
8	7	6	5	4	3	2	1				
GAT	/OAT	FR1	/FR2	RV	SM	HPR	0				

GAT/OAT FR1/FR2	RVSM HPR	0	
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	Spare bit set	to zero	

Structure of Subfield # 5:

Type of Aircraft



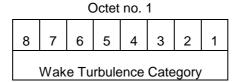
	Octet no. 3								Octet no. 4							
16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	
Character 3										С	hara	cter	4			

NOTES

- 1. Each one of the four Octets composing the type of an aircraft contains an ASCII Character (upper-case alphabetic characters with trailing spaces).
- 2. The types of aircraft are defined in [Ref.4]

Structure of Subfield # 6:

Wake Turbulence Category



bits 8/1 Wake Turbulence Category is an ASCII character code which should be one of the following values :

L = Light

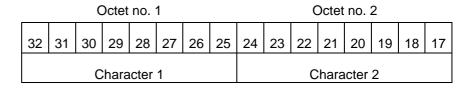
M = Medium

H = Heavy

J = "Super"

Structure of Subfield #7:

Departure Airport

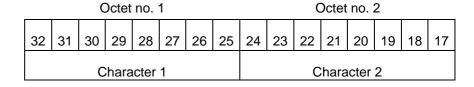


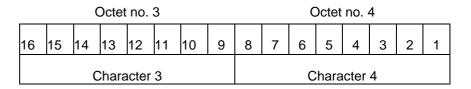
	Octet no. 3								Octet no.4							
16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	
		(Chara	acter	3					С	hara	cter	4			

NOTES

- 1. Each one of the four Octets composing the name of an airport contains an ASCII Character (upper case alphabetic).
- 2. The Airport Names are indicated in the ICAO Location Indicators book.

Structure of Subfield # 8 Destination Airport



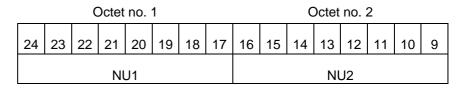


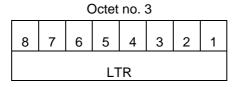
NOTES

- 1. Each one of the four Octets composing the name of an airport contains an ASCII Character (upper case alphabetic).
- 2. The Airport Names are indicated in the ICAO Location Indicators book.

Structure of Subfield #9:

Runway Designation





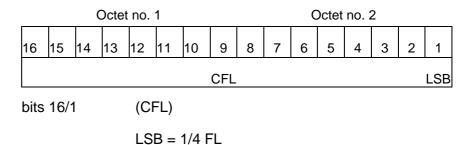
bits 24/17	(NU1)	First number
bits 16/9	(NU2)	Second number
bits 8/1	(LTR)	Letter

NOTES

- 1. NU1, NU2 and LTR each contain an ASCII character
- 2. For details refer to.[5] Section 5

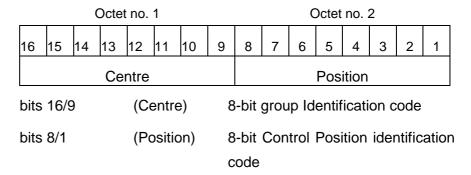
Structure of Subfield # 10:

Current Cleared Flight Level



Structure of Subfield # 11:

Current Control Position



NOTE - The centre and the control position identification codes have to be defined between communication partners.

Structure of Subfield # 12: Time of Departure / Arrival

Octet no. 1 40 39 38 37 36 35 34 33 REP

		(Octet	no. 2	2		
32	31	30	29	28	27	26	25
		TYP		DA	λY	0	

Octet no. 3										C	Octet	no. 4	4		
24	23	22	21	20	19	18	17	16	15	14	13	12	11	10	9
0	0	0		Н	OR		LSB	0	0			MIN			LSB

		(octet	no.	5		
8	7	6	5	4	3	2	1
AVS	0			SEC			LSB

bits-40/33 (REP) Repetition Factor

bits-32/28 (TYP) = 0 Scheduled off-block time

= 1 Estimated off-block time

= 2 Estimated take-off time

= 3 Actual off-block time

= 4 Predicted time at runway hold

= 5 Actual time at runway hold

= 6 Actual line-up time

= 7 Actual take-off time

= 8 Estimated time of arrival

= 9 Predicted landing time

= 10 Actual landing time

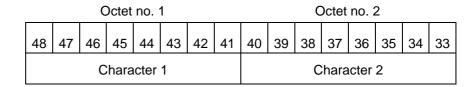
= 11 Actual time off runway

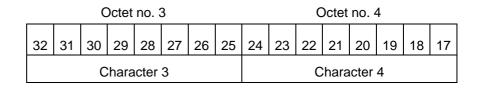
= 12 Predicted time to gate

		= 13 Actual on-block time
bits-27/26	(DAY)	= 00 Today
		= 01 Yesterday
		= 10 Tomorrow
		= 11 Invalid
bits-25/22	spare b	its set to zero
bits-21/17	(HOR)	Hours, from 0 to 23
bits-16/15	spare b	its set to zero
bits-14/9	(MIN)	Minutes, from 0 to 59
bit-8	(AVS)	= 0 Seconds available
		= 1 Seconds not available
bit-7	spare b	its set to zero
bits-6/1	(SEC)	Seconds, from 0 to 59

NOTE - Estimated times are derived from flight plan systems. Predicted times are derived by the fusion system, based on surveillance data. For definitions, see [Ref.4]

Structure of Subfield # 13: Aircraft Stand





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

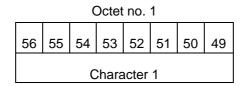
NOTE - Each one of the six Octets contains an ASCII Character. The Aircraft Stand identification is always left adjusted. It contains up to six uppercase alphanumeric characters, the remaining character positions (if any) are padded with space characters.

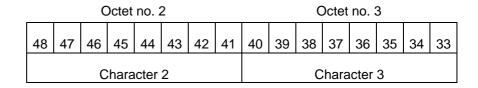
Structure of Subfield # 14: Stand Status

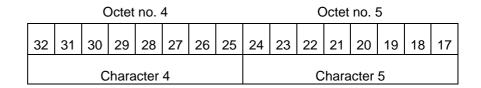
		C	Octet	no.	1			_
8	7	6	5	4	3	2	1	
ΕN	ΙP	A۱	/L	0	0	0	0	
bits-	8/7		(EN	ΛP)	=	00	Emp	oty
					=	01	Occ	upied
					=	10	Unk	nown
					=	11	Inva	alid
bits-	6/5		(AV	/L)	=	00	Ava	ilable
					=	01	Not	available
					=	10	Unk	nown
					=	11	Inva	alid

Structure of Subfield # 15:

Standard Instrument Departure





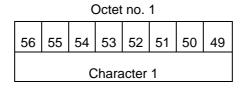


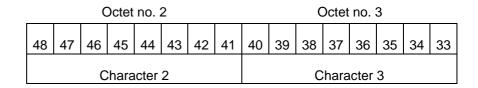
Octet no. 6										C	Octet	no.	7		
16 15 14 13 12 11 10 9							9	8	7	6	5	4	3	2	1
Character 6										С	hara	cter	7		

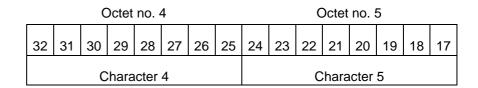
NOTE - Each one of the seven Octets contains an ASCII Character. The SID is always left adjusted. It contains up to seven alphanumeric characters, the remaining character positions (if any) are padded with space characters.

Structure of Subfield # 16:

Standard Instrument Arrival







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

NOTE - Each one of the seven Octets contains an ASCII Character. The STAR is always left adjusted. It contains up to seven alphanumeric characters, the remaining character positions (if any) are padded with space characters.

Encoding Rule:

This Item is optional

Structure of Subfield # 17:

Pre-Emergency Mode 3/A

		(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	VA	A4	A2	A1	B4	B2	B1	C4	C2	C1	D4	D2	D1

bits-16/13 Spare bits set to 0

bit-13 (VA) Validity

= 0 No valid Mode 3/A available

= 1 Valid Mode 3/A available

bits-12/1 Mode-3/A reply in octal

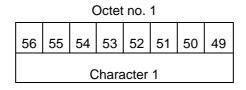
representation

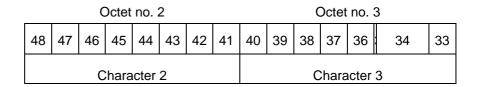
NOTES

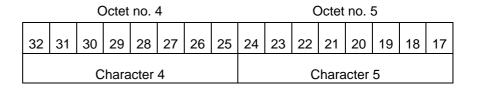
- 1. This subfield is used only when the aircraft is transmitting an emergency Mode 3/A code
- 2. If VA = 0, the content of bits 12/1 is meaningless

Structure of Subfield # 18:

Pre-Emergency Callsign







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

NOTES

- Each one of the seven Octets contains an ASCII Character. The Callsign is always left adjusted. It contains up to seven upper-case alphanumeric characters, the remaining character positions (if any) are padded with space characters
- 2. This subfield is used only when en emergency Mode 3/A is associated with the track (I062/390 Subfield #17)

bit 16

bit 15

bit 14

bit 13

bit 12

5.2.26 Data Item 1062/500, Estimated Accuracies

Definition: Overview of all important accuracies

15

16

14 13

Format: Compound Data Item, comprising a primary subfield of up to two

10

9

octets, followed by the indicated subfields.

Octet no. 1

12

11

Structure of

Primary Subfield:

	APC COV APW AGA ABA ATV AA FX
	Octet no. 2
	8 7 6 5 4 3 2 1
	ARC 0 0 0 0 0 FX
(APC)	Subfield #1: Estimated Accuracy Of Track Position (Cartesian)
	= 0 Absence of subfield #1
	= 1 Presence of subfield #1
(COV)	Subfield #2: XY Covariance
	= 0 Absence of subfield #2
	= 1 Presence of subfield #2
(APW)	Subfield #3: Estimated Accuracy Of Track Position (WGS-84)
	= 0 Absence of subfield #3
	= 1 Presence of subfield #3
(AGA)	Subfield #4: Estimated Accuracy Of Calculated Track Geometric
	Altitude
	= 0 Absence of subfield #4
	= 1 Presence of subfield #4
(ABA)	Subfield #5: Estimated Accuracy Of Calculated Track Barometric
	Altitude
	= 0 Absence of subfield #5

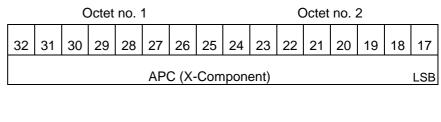
= 1 Presence of subfield #5

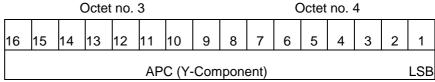
bit 11	(ATV)	Subfield #6: Estimated Accuracy Of Track Velocity (Cartesian) = 0 Absence of subfield #6 = 1 Presence of subfield #6
bit 10	(AA)	Subfield #7: Estimated Accuracy Of Acceleration (Cartesian) = 0 Absence of subfield #7 = 1 Presence of subfield #7
bit 9	(FX)	= 0 no extension= 1 extension
bits 8	(ARC)	Subfield #8: Estimated Accuracy Of Rate Of Climb/Descent = 0 Absence of subfield #8 = 1 Presence of subfield #8
bits 7/2		Spare bits set to 0
bit 1	(FX)	= 0 no extension= 1 extension

Data Item 1062/500, Estimated Accuracies

Structure of Subfield # 1:

Estimated Accuracy Of Track Position (Cartesian)





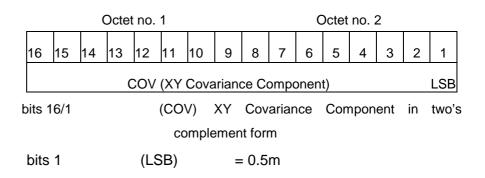
bits 32/1 (APC) Estimated accuracy (i.e. standard deviation) of the calculated position of a target expressed in Cartesian co-ordinates.

bits 17 and 1 (LSB) = 0.5m

NOTE - Maximum value means maximum value or above.

Structure of Subfield # 2:

XY covariance component



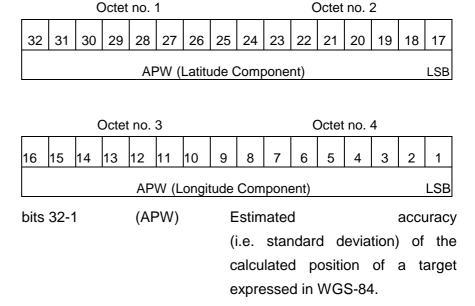
Notes:

- **1.** XY covariance component = sign $\{Cov(X,Y)\}$ * sqrt $\{abs [Cov(X,Y)]\}$
- 2. The maximum value for the (unsigned) XY covariance component is 16.383 km.

Data Item 1062/500, Estimated Accuracies

Structure of Subfield #3:

Estimated Accuracy Of Track Position (WGS-84)

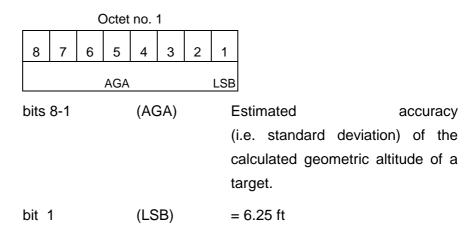


bits 17 and 1 (LSB) 180/2²⁵ degrees

NOTE - Maximum value means maximum value or above.

Structure of Subfield #4:

Estimated Accuracy Of Calculated Track Geometric Altitude

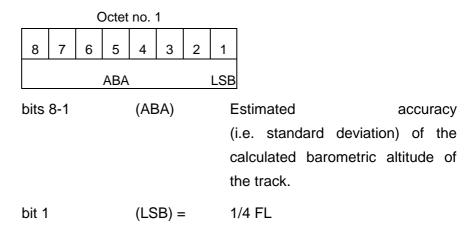


NOTE - Maximum value means maximum value or above.

Data Item 1062/500, Estimated Accuracies

Structure of Subfield #5:

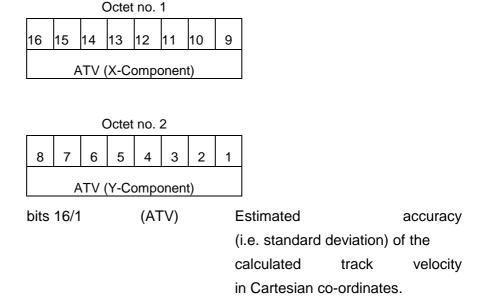
Estimated Accuracy Of Calculated Track Barometric Altitude



NOTE - Maximum value means maximum value or above.

Structure of Subfield #6:

Estimated Accuracy Of Track Velocity (Cartesian)



Edition: 1.13

NOTE - Maximum value means maximum value or above.

bits 9 and 1

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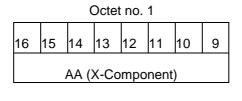
Released Issue

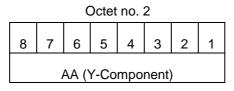
(LSB) = 0.25 m/s

Data Item 1062/500, Estimated Accuracies

Structure of Subfield #7:

Estimated Accuracy Of Acceleration (Cartesian)





bits 16/1 (AA) Estimated accuracy

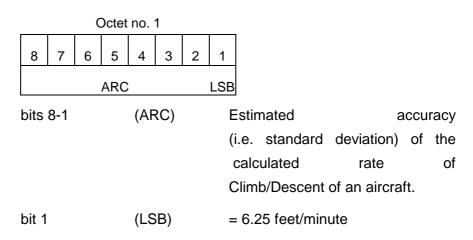
(i.e. standard deviation) of the calculated acceleration in Cartesian co-ordinates.

bits 9 and 1 (LSB) = 0.25m/s^2

NOTE - Maximum value means maximum value or above.

Structure of Subfield #8:

Estimated Accuracy Of Rate Of Climb/Descent



NOTE - Maximum value means maximum value or above.

Encoding Rule : This Item is optional

5.2.27 Data Item 1062/510, Composed Track Number

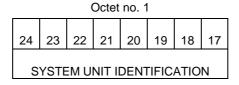
Definition: Identification of a system track

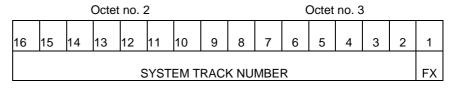
Structure: Extendible data item, comprising a first part of three octets (Master

Track Number), followed by three-octet extents (Slave Tracks

Numbers).

Structure of First Part:





bits 24/17 (SYSTEM UNIT

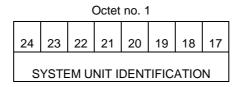
IDENTIFICATION)

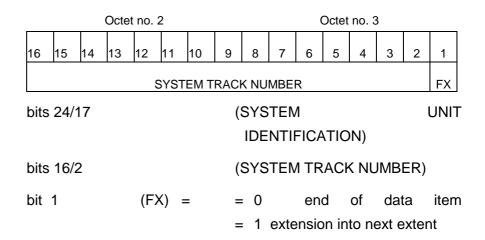
bits 16/2 (SYSTEM TRACK NUMBER)

bit 1 (FX) = 0 end of data item

= 1 extension into next extent

Structure of next Extents:





NOTE - The composed track number is used by co-operating units to uniquely identify a track. It consists of the unit identifier and system track number for each unit involved in the co-operation. The first unit identification identifies the unit that is responsible for the track amalgamation.

Encoding Rule:

This Item is optional

5.3 User Application Profile for Category 062

The following User Application Profile shall be used for the transmission of System Track Data.

Table 3 - Track Information UAP

FRN	Data Item	Information	Length
1	1062/010	Data Source Identifier	2
2	-	Spare	-
3	1062/015	Service Identification	1
4	1062/070	Time Of Track Information	3
5	1062/105	Calculated Track Position (WGS-84)	8
6	1062/100	Calculated Track Position (Cartesian)	6
7	1062/185	Calculated Track Velocity (Cartesian)	4
FX	-	Field extension indicator	-
8	1062/210	Calculated Acceleration (Cartesian)	2
9	1062/060	Track Mode 3/A Code	2
10	1062/245	Target Identification	7
11	1062/380	Aircraft Derived Data	1+
12	1062/040	Track Number	2
13	1062/080	Track Status	1+
14	1062/290	System Track Update Ages	1+
FX	-	Field extension indicator	-
15	1062/200	Mode of Movement	1
16	1062/295	Track Data Ages	1+
17	1062/136	Measured Flight Level	2
18	1062/130	Calculated Track Geometric Altitude	2
19	1062/135	Calculated Track Barometric Altitude	2
20	1062/220	Calculated Rate Of Climb/Descent	2
21	1062/390	Flight Plan Related Data	1+
FX	-	Field extension indicator	-
22	1062/270	Target Size & Orientation	1+
23	1062/300	Vehicle Fleet Identification	1
24	1062/110	Mode 5 Data reports & Extended Mode 1 Code	1+
25	1062/120	Track Mode 2 Code	2
26	1062/510	Composed Track Number	3+
27	1062/500	Estimated Accuracies	1+
28	1062/340	Measured Information	1+
FX	-	Field extension indicator	-
29	-	Spare	
30	-	Spare	-

FRN	Data Item	Information	Length
31	-	Spare	-
32	-	Spare	-
33	-	Spare	-
34	RE	Reserved Expansion Field	1+
35	SP	Reserved For Special Purpose Indicator	1+
FX	-	Field extension indicator	-

NOTE - The Field Reference Number #2 is kept free in order to prevent a full incompatibility with previous releases of ASTERIX Cat. 062 already implemented.

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.