EUROPEAN ORGANISATION FOR THE SAFETY OF AIR NAVIGATION

EUROCONTROL STANDARD DOCUMENT

FOR

SURVEILLANCE DATA EXCHANGE

Part 8 : Category 011

Transmission of A-SMGCS Data

SUR.ET1.ST05.2000-STD-08-01

Edition	:	1.0
Edition Date	:	April 2005
Status	:	Released Issue
Class	:	General Public

EUROPEAN AIR TRAFFIC MANAGEMENT PROGRAMME

DOCUMENT IDENTIFICATION SHEET

DOCUMENT DESCRIPTION

Document Title

Radar Data Exchange - Part 8

Transmission of A-SMGCS Data

EWP DELIVERABLE REFERENCE NUMBER

PROGRAMME REFERENCE INDEX	**EDITION :**	**1.0**
SUR.ET1.ST05.2000-STD-08-01	**EDITION DATE :**	**April 2005**

Abstract

This document describes the application of ASTERIX to the transmission of A-SMGCS data.

Keywords

A-SMGCS	ASTERIX	Target Reports
Data Item	Category 11	UAP

CONTACT PERSON : A. Engel	**TEL :** 93355	**UNIT :** DIS/COM

DOCUMENT STATUS AND TYPE

STATUS		CATEGORY		CLASSIFICATION	
Working Draft	☐	Executive Task	☐	General Public	☑
Draft	☐	Specialist Task	☐	EATMP	☐
Proposed Issue	☐	Lower Layer Task	☑	Restricted	☐
Released Issue	☑				

ELECTRONIC BACKUP

INTERNAL REFERENCE NAME : Asterix - Part 8

HOST SYSTEM	MEDIA	SOFTWARE(S)
Microsoft Windows	Type : Hard disk	
	Media Identification :	

DOCUMENT APPROVAL

The following table identifies all management authorities who have successively approved the present issue of this document.

AUTHORITY	NAME AND SIGNATURE	DATE
ASTERIX Manager	D. Doukas	
SUR Domain Manager	J. Berends	
SURT Chairman	M. Rees	
EATM/DAS Director	B. Redeborn	

DOCUMENT CHANGE RECORD

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

EDITION	DATE	REASON FOR CHANGE	SECTIONS PAGES AFFECTED
0.10	June 1999	Creation of document	ALL
0.11	September 1999	Modifications in General Principles, items, and UAP.	ALL
0.12	February 2000	Modifications in General Principles, items, and UAP.	ALL
0.13	March 2000	Modifications in General Principles, items, and UAP.	ALL
0.14	October 2000	Modifications in General Principles, items, and UAP.	ALL
0.15	February 2001	Modifications in items and UAP.	ALL
0.16	April 2001	Modifications in items and UAP.	ALL
0.17	December 2001	Editorial Corrections.	ALL
1.0	April 2005	Status changed to “Released Issue” Contact Details updated Document Approval Page updated “Cleanup” for Publication	Title,ID-Sheet ID-Sheet Page 3

TABLE OF CONTENTS

This page is intentionally left blank

1. INTRODUCTION

1.1 Scope

1.1.1 This document describes the message structure for the transmission of A-SMGCS:

- surveillance and flight plan data,
- alerts,
- manual attachment / detachment of flight plan to track,
- flight plan data update,
- holdbar status.

NOTE: From edition 0.20 of Part 9, Category 062 has been extended to include A-SMGCS data.

1.1.2 A-SMGCS data are out of Category 011.

2. REFERENCES

2.1 General

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

At the time of publication of this Eurocontrol 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 Document.

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

In the case of a conflict between the requirements of this Eurocontrol Document and the contents of the other referenced documents, this Eurocontrol 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.
2. Eurocontrol Standard SUR.ET1.ST05.2000-STD-01-01. All Purpose Structured Eurocontrol Surveillance Information Exchange - ASTERIX. Edition 1.28, Draft, December 2001.

3. DEFINITIONS, ACRONYMS AND ABBREVIATIONS

3.1 Definitions

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

3.1.1 Calculated Item: A piece of information (e.g. the position of a target) derived from the raw sensor information through an intermediate processing such as transformation of co-ordinates, tracking, code conversion, etc.

3.1.2 Catalogue of Data Items: List of all the possible Data Items of each Data Category describing the Data Items by their reference, structure, size and units (where applicable).

3.1.3 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.

3.1.4 Data Category: Classification of the data in order to permit inter alia an easy identification.

3.1.5 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.

3.1.6 Data Item: The smallest unit of information in each Data Category.

3.1.7 Measured Item: A piece of information (e.g. the position of a target) derived from the sensor information and transmitted without any smoothing.

3.1.8 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

3.1.9 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)
A-SMGCS	Advanced Surface Movement Ground Control System
ASTERIX	**A**ll Purpose **ST**ructured **Eurocontrol** su**R**veillance **I**nformation E**X**change
CAT	Data Category
EATMP	European Air Traffic Management Programme
FL	Flight Level, unit of altitude (expressed in 100's of feet)
FRN	Field Reference Number
FSPEC	Field Specification
FX	Field Extension Indicator
ICAO	International Civil Aviation Organization
kt	knot = NM/hour, unit of speed
LEN	Length Indicator
LSB	Least Significant Bit
NM	Nautical Mile, unit of distance (1852 metres)
PSR	Primary Surveillance Radar
RE	Reserved Expansion Indicator
REP	Field Repetition Indicator
s	second, unit of time
SAC	System Area Code
SIC	System Identification Code
SMR	Surface Movement Radar
SMS	Surface Movement System
SP	Special Purpose Indicator
SPI	Special Position Identification
SSR	Secondary Surveillance Radar
STFRDE	Surveillance Task Force on Radar Data Exchange
SURT	Surveillance Team (EATMP)
UAP	User Application Profile (see Definitions)
UTC	Co-ordinated Universal Time
WGS 84	World Geodetic System 84

4. GENERAL PRINCIPLES

4.1 General

The transmission of A-SMGCS data shall require the transmission of seven types of messages:

- target reports, flight plan data and basic alerts,
- manual attachment of flight plan to track,
- manual detachment of flight plan to track,
- insertion of flight plan data,
- suppression of flight plan data,
- modification of flight plan data,
- holdbar status.

4.2 Time Management

4.2.1 Definition

The time stamp shall be consistent with the reported target position.

4.2.2 Requirements for Time Stamping

The timestamping shall comply with ICAO Annex 5.

4.3 Projection Systems and Geographical Co-ordinates

When the exported calculated position is expressed in a 2D Cartesian co-ordinate 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).

All tracker derived information elements, shall be a consistent set of values, expressed in the same co-ordinate reference system (state vector components and the corresponding elements of the track quality vector).

4.4 Addressing

Data Source Identifier and Message Type shall be sent 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 both target reports and service messages.

4.6.2 Data Blocks shall have the following layout.

CAT = 011	**LEN**		**FSPEC**	Items of the first record	**FSPEC**	Items of the last record

where:

- Data Category (CAT) = 011, is a one-octet field indicating that the Data Block contains A-SMGCS 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 A-SMGCS data are defined in Table 1 and described in the following pages.

Table 1 - Standard Data Items of Category 011

Data Item Ref. No.	Description	Resolution
I011/000	Message Type	N.A.
I011/010	Data Source Identifier	N.A.
I011/015	Service Identification	N.A.
I011/041	Position in WGS-84 Co-ordinates	$180°/2^{31}$
I011/042	Calculated Position in Cartesian Co-ordinates	1 m
I011/060	Mode-3/A Code in Octal Representation	N.A.
I011/090	Measured Flight Level	¼ FL
I011/092	Calculated Track Geometric Altitude	6.25 ft
I011/093	Calculated Track Barometric Altitude	¼ FL
I011/140	Time of Track Information	1/128 s
I011/161	Track Number	N.A.
I011/170	Track Status	N.A.
I011/202	Calculated Track Velocity in Cartesian Coord.	0.25 m/s
I011/210	Calculated Acceleration	$0.25\ m/s^2$
I011/215	Calculated Rate of Climb/Descent	6.25 ft/min
I011/245	Target Identification	N.A.
I011/270	Target Size & Orientation	Length/Width: 1 m Orient.: 360°/128
I011/290	System Track Update Ages	N.A.
I011/300	Vehicle Fleet Identification	N.A.
I011/310	Pre-programmed Message	N.A.
I011/380	Mode S / ADS-B Related Data	N.A.
I011/390	Flight Plan Related Data	N.A.
I011/430	Phase of Flight	N.A.
I011/500	Estimated Accuracies	N.A.
I011/600	Alert Messages	N.A.
I011/605	Tracks in Alert	N.A.
I011/610	Holdbar Status	N.A.

5.2 Description of Standard Data Items

5.2.1 Data Item I011/000, Message Type

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

Format: One-octet fixed length Data Item.

Structure:

Octet no. 1

8	7	6	5	4	3	2	1
MESSAGE TYPE							

bits-8/1 Message Type

NOTES

1. In application where transactions of various types are exchanged, the Message Type Data Item facilitates the proper message handling at the receiver side.
2. All Message Type values are reserved for common standard use.
3. The following set of Message Types are standardised for category 011 records:
    1. Target reports, flight plan data and basic alerts
    2. Manual attachment of flight plan to track
    3. Manual detachment of flight plan to track
    4. Insertion of flight plan data
    5. Suppression of flight plan data
    6. Modification of flight plan data
    7. Holdbar status

5.2.2 Data Item I011/010, Data Source Identifier

Definition: Identification of the system from which the data are received.

Format: Two-octet fixed length Data Item.

Structure:

Octet no. 1								Octet no. 2							
16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1
SAC = 00								SIC							

bits-16/9 (SAC) System Area Code fixed to zero

bits-8/1 (SIC) System Identification Code

NOTE: The SAC is fixed to zero to indicate a data flow local to the airport.

5.2.3 Data Item I011/015, Service Identification

Definition : Identification of the service provided to one or more users.
Format : One-Octet fixed length data item.
Structure:

Octet no. 1

8	7	6	5	4	3	2	1
Service Identification							

Bits-8/1 Service Identification

NOTE - the service identification is allocated by the A-SMGCS

5.2.4 Data Item I011/041, Position in WGS-84 Co-ordinates

Definition : Position of a target in WGS-84 Co-ordinates.
Format : Eight-octet fixed length Data Item
Structure:

Octet no. 1								Octet no. 2							
64	63	62	61	60	59	58	57	56	55	54	53	52	51	50	49
Latitude in WGS - 84															
Octet no. 3								Octet no. 4							
48	47	46	45	44	43	42	41	40	39	38	37	36	35	34	33
															LSB
Octet no. 5								Octet no. 6							
32	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17
Longitude in WGS - 84															
Octet no. 7								Octet no. 8							
16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1
															LSB

bits-64/33	(Latitude)	In WGS.84 in two's complement. Range -90 <= latitude <= 90 deg.
	(LSB)	= $180/2^{31}$ degrees
bits-32/1	(Longitude)	In WGS.84 in two's complement. Range -180 <= longitude < 180 deg.
	(LSB)	= $180/2^{31}$ degrees

5.2.5 Data Item I011/042, Calculated Position in Cartesian Co-ordinates

Definition: Calculated position of a target in Cartesian co-ordinates (two's complement form).

Format: Four-octet fixed length Data Item.

Structure:

Octet no. 1 Octet no. 2

32	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17
X-Component															LSB

Octet no. 3 Octet no. 4

16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1
Y-Component															LSB

bit-17 (LSB) = 1m, max.range = ±32768m, approx.±17.7NM

bit-1 (LSB) = 1m, max.range = ±32768m, approx.±17.7NM

5.2.6 Data Item I011/060, Mode-3/A Code in Octal Representation

Definition: Track 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	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 0

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

5.2.7 Data Item I011/090, Measured Flight Level

Definition : Last valid and credible flight level used to update the track, in two's complement representation.

Format: Two-octet fixed length Data Item.

Structure:

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

Bits- 16/1 Measured Flight Level
(LSB) = 1/4 FL
Vmin = -12 FL
Vmax = 1500 FL

NOTES

1. The criteria to determine the credibility of the flight level are Tracker dependent.
1. Credible means: within reasonable range of change with respect to the previous detection.

5.2.8 Data Item I011/092, Calculated Track Geometric Altitude

Definition : Calculated geometric vertical distance above mean sea level, not related to barometric pressure.

Format : Two-Octet fixed length data item.

Structure:

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

Bits-16/1 Calculated Track Geometric Altitude.
(LSB) = 6.25 ft
Vmin = -1500 ft
Vmax = 150000 ft

NOTE: The source of altitude is identified in bits (SRC) of item I011/170 Track Status.

5.2.9 Data Item I011/093, Calculated Track Barometric Altitude

Definition : Calculated Barometric Altitude of the track.

Format : Two-Octet fixed length data item.

Structure:

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

Bit-16 (QNH) = 0 No QNH correction applied
= 1 QNH correction applied

Bits-15/1 Calculated Track Barometric Altitude
(LSB) = 1/4 FL = 25 ft
Vmin = -15 FL
Vmax = 1500 FL

5.2.10 Data Item I011/140, Time of Track Information

Definition: Absolute time stamping expressed as UTC.

Format: Three-octet fixed length Data Item.

Structure:

Octet no. 1

24	23	22	21	20	19	18	17
Time of							

Octet no. 2 Octet no. 3

16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1
Track Information															LSB

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

NOTE - The time of day value is reset to zero each day at midnight.

5.2.11 Data Item I011/161, Track Number

Definition: Identification of a fusion track (single track number)

Format: Two-octet fixed length Data Item.

Structure:

Octet no. 1 Octet no. 2

16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1
0	FUSION TRACK NUMBER(0…4095)														

bit-16 Spare bit set to zero.
bits-12/1 Fusion Track Number.

5.2.12 Data Item I011/170, 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:

Octet no. 1

8	7	6	5	4	3	2	1
MON	GBS	MRH	SRC			CNF	FX

bit 8	(MON)	= 0	Multisensor track
		= 1	Monosensor track
bit 7	(GBS)	= 0	Transponder Ground bit not set or unknown
		= 1	Transponder Ground bit set
bit 6	(MRH)		Most Reliable Height
		= 0	Barometric altitude (Mode C) more reliable
		= 1	Geometric altitude more reliable
bits 5/3	(SRC)		Source of height for I011/092
		= 000	no source
		= 001	GPS
		= 010	3D radar
		= 011	triangulation
		= 100	height from coverage
		= 101	speed look-up table
		= 110	default height
		= 111	multilateration
bit 2	(CNF) =	= 0	Confirmed track
		= 1	Tentative track
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
SIM	TSE	TSB	FRI/FOE		ME	MI	FX

bit-8	(SIM)	= 0	Actual track
		= 1	Simulated track
bit 7	(TSE)	= 0	default value
		= 1	track service end (i.e. last message transmitted to the user for the track).
bit 6	(TSB)	= 0	default value
		= 1	track service begin (i.e. first message transmitted to the user for the track)
bit 5/4	(FRI/FOE)	= 00	No Mode 4 interrogation
		= 01	Friendly target
		= 10	Unknown target
		= 11	No reply
bit 3	(ME)	= 0	default value
		= 1	Military Emergency present in the last report received from a sensor capable of decoding this data
bit 2	(MI)	= 0	default value
		= 1	Military Identification present in the last report received from a sensor capable of decoding this data
bit 1	(FX) =	= 0	End of data item
		= 1	Extension into second extent

Structure of
Second Extent :

Octet no. 1

8	7	6	5	4	3	2	1
AMA	SPI	CST	FPC	AFF	0	0	FX

bit 8	(AMA)	= 0	track not resulting from amalgamation process
		= 1	track resulting from amalgamation process
bit 7	(SPI)	= 0	default value
		= 1	SPI present in the last report received from a sensor capable of decoding this data
bit 6	(CST)	= 0	default value
		= 1	Age of the last received track update is higher than system dependent threshold (coasting)
bit-5	(FPC)	= 0	Not flight-plan correlated
		= 1	Flight plan correlated
bit-4	(AFF)	= 0	default value
		= 1	ADS-B data inconsistent with other surveillance information
bits 3/2		spare bits set to zero	
bit 1	(FX)	= 0	End of data item
		= 1	Extension into next extent

Structure of Third Extent :

Octet no. 1

8	7	6	5	4	3	2	1
0	PSR	SSR	MDS	ADS	SUC	AAC	FX

bit-8 spare bit set to zero

bit 7	(PSR)	= 0	Default value
		= 1	Age of the last received PSR track update is higher than system dependent threshold
bit 6	(SSR)	= 0	Default value
		= 1	Age of the last received SSR track update is higher than system dependent threshold
bit-5	(MDS)	= 0	Default value
		= 1	Age of the last received Mode S track update is higher than system dependent threshold
bit 4	(ADS)	= 0	Default value
		= 1	Age of the last received ADS track update is higher than system dependent threshold
bit-3	(SUC)	= 0	Default value
		= 1	Special Used Code (Mode A codes to be defined in the system to mark a track with special interest)
bit-2	(AAC)	= 0	Default value
		= 1	Assigned Mode A Code Conflict (same individual Mode A Code assigned to another track)
bit 1	(FX) =	= 0	End of data item
		= 1	Extension into next extent

NOTE: Track type and coasting can also be derived from I011/290 System Track Update Ages

5.2.13 Data Item I011/202, Calculated Track Velocity in Cartesian Co-ordinates

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

Format: Four-octet fixed length Data Item.

Structure:

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

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

bit-17 & 1 (LSB) = 0.25 m/s,
Max.range = ±8192m/s

5.2.14 Data Item I011/210, Calculated Acceleration

Definition : Calculated Acceleration of the target, in two's complement form.

Format : Two-Octet fixed length data item.

Structure:

Octet no. 1							
16	15	14	13	12	11	10	9
Ax							LSB

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

bits 9 & 1 (LSB) = 0.25 m/s^2
Max. range ± 31 m/s^2

5.2.15 Data Item I011/215, 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:

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

bit 1 (LSB) = 6.25 feet/minute
Max. range ± 204800 feet/minute

5.2.16 Data Item I011/245, Target Identification

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

Format: Seven-octet fixed length Data Item.

Structure:

Octet no. 1

56	55	54	53	52	51	50	49
STI		0	0	0	0	0	0

Octet no. 2 Octet no. 3

48	47	46	45	44	43	42	41	40	39	38	37	36	35	34	33
MSB Character 1						Character 2						Character 3			

Octet no. 4 Octet no. 5

32	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17
		Character 4						Character 5							

Octet no. 6 Octet no. 7

16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1
Character 6				Character 7						Character 8					LSB

bits-56/55	(STI) = 00	Callsign or registration downlinked from transponder
	= 01	Callsign not downlinked from transponder
	= 10	Registration not downlinked from transponder
bits-54/49		Spare bits set to zero
bits-48/1		Characters 1-8 (coded on 6 bits each) defining target identification.

5.2.17 Data Item I011/270, 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:

Octet no. 1

8	7	6	5	4	3	2	1
LENGTH						LSB	FX

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
ORIENTATION						LSB	FX

bit-2 (LSB) = 360° / 128 = approx. 2.81°

bit-1 (FX) = 0 End of Data Item
= 1 Extension into next extent

Structure of Second Extent:

Octet no. 1

8	7	6	5	4	3	2	1
WIDTH						LSB	FX

bit-2 (LSB) = 1 m

bit-1 (FX) = 0 End of Data Item
= 1 Extension into next extent

NOTE: The orientation gives the direction which the aircraft nose is pointing, relative to the Geographical North.

5.2.18 Data Item I011/290, System Track Update Ages

Definition : Ages of the last plot/local track, or the last *valid* mode-A/mode-C, used to update the system track.

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

Structure of Primary Subfield:

Octet no. 1								Octet no. 2							
16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1
PSR	SSR	MDA	MFL	MDS	ADS	ADB	FX	MD1	MD2	LOP	TRK	MUL	0	0	FX

bit-16 (PSR) PSR age
= 0 Absence of Subfield #1
= 1 Presence of Subfield #1

bit-15 (SSR) SSR age
= 0 Absence of Subfield #2
= 1 Presence of Subfield #2

bit-14 (MDA) Mode A age
= 0 Absence of Subfield #3
= 1 Presence of Subfield #3

bit-13 (MFL) Measured Flight Level age
= 0 Absence of Subfield #4
= 1 Presence of Subfield #4

bit-12 (MDS) Mode S age
= 0 Absence of Subfield #5
= 1 Presence of Subfield #5

bit-11 (ADS) ADS age
= 0 Absence of Subfield #6
= 1 Presence of Subfield #6

bit-10 (ADB) ADS-B age
= 0 Absence of Subfield #7
= 1 Presence of Subfield #7

bit-9 FX Extension indicator
= 0 no extension
= 1 extension

bit-8 (MD1) Mode 1 age
= 0 Absence of Subfield #8
= 1 Presence of Subfield #8

bit-7 (MD2) Mode 2 age
= 0 Absence of Subfield #9
= 1 Presence of Subfield #9

bit-6 (LOP) Loop age
= 0 Absence of Subfield #10
= 1 Presence of Subfield #10

bit-5 (TRK) Track age
= 0 Absence of Subfield #11
= 1 Presence of Subfield #11

bit-4	(MUL)	Multilateration age = 0 Absence of Subfield #12 = 1 Presence of Subfield #12
bits-3/2	(spare)	Spare bits set to zero
bit-1	FX	Extension indicator = 0 no extension = 1 extension

Structure of Subfield # 1:

PSR Age

Octet no. 1

8	7	6	5	4	3	2	1
PSR							LSB

bits-8/1	(PSR)	Age of the last primary report used to update the track
bit-1	(LSB)	= 1/4 s Maximum value =63.75s

Structure of Subfield # 2:

SSR Age

Octet no. 1

8	7	6	5	4	3	2	1
SSR							LSB

bits-8/1	(SSR)	Age of the last secondary report used to update the track
bit-1	(LSB)	= 1/4 s Maximum value = 63.75s

Structure of Subfield # 3:

Mode A Age

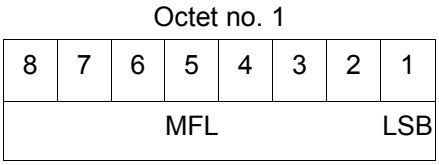
Octet no. 1

8	7	6	5	4	3	2	1
MDA							LSB

bits-8/1	(MDA)	Age of the last valid Mode A report used to update the track
bit-1	(LSB)	= 1/4 s Maximum value = 63.75s

Structure of Subfield # 4:

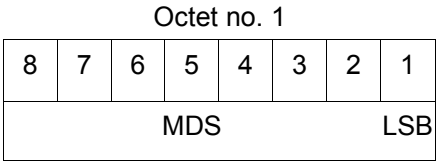
Measured Flight Level Age



bits-8/1	(MFL)	Age of the last valid and credible Mode C used to update the track
bit-1	(LSB)	= 1/4 s Maximum value = 63.75s

Structure of Subfield # 5:

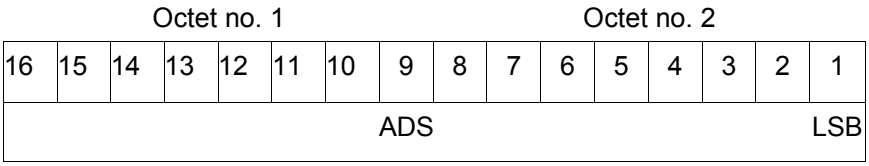
Mode S Age



bits-8/1	(MDS)	Age of the last Mode S report used to update the track
bit-1	(LSB)	= 1/4 s Maximum value = 63.75s

Structure of Subfield # 6:

ADS Age



bits-8/1	(ADS)	Age of the last ADS report used to update the track
bit-1	(LSB)	= 1/4 s Max. value = 16383.75s (> 4 hours)

Structure of Subfield # 7:

ADS-B Age

Octet no. 1

8	7	6	5	4	3	2	1
ADB							LSB

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

bit-1 (LSB) = 1/4 s
Maximum value = 63.75s

Structure of Subfield # 8:

Mode 1 Age

Octet no. 1

8	7	6	5	4	3	2	1
MD1							LSB

bits-8/1 (MD1) Age of the last valid Mode 1 used to update the track

bit-1 (LSB) = 1/4 s
Maximum value = 63.75s

Structure of Subfield # 9:

Mode 2 Age

Octet no. 1

8	7	6	5	4	3	2	1
MD2							LSB

bits-8/1 (MD2) Age of the last valid Mode 2 used to update the track

bit-1 (LSB) = 1/4 s
Maximum value = 63.75s

Structure of Subfield # 10:

Loop Age

Octet no. 1

8	7	6	5	4	3	2	1
LOP							LSB

bits-8/1 (LOP) Age of the last magnetic loop detection

bit-1 (LSB) = 1/4 s
Maximum value = 63.75s

Structure of Subfield # 11:

Track Age

Octet no. 1

8	7	6	5	4	3	2	1
TRK							LSB

bits-8/1	(TRK)	Actual track age since first occurrence
bit-1	(LSB)	= 1/4 s Maximum value = 63.75s

Structure of Subfield # 12:

Multilateration Age

Octet no. 1

8	7	6	5	4	3	2	1
MUL							LSB

bits-8/1	(MUL)	Age of the last multilateration detection
bit-1	(LSB)	= 1/4 s Maximum value = 63.75s

NOTE - The ages are counted from Data Item I011/140, Time Of Track Information, using the following formula:

Age = Time of track information - Time of last (valid) update

If the computed age is greater than the maximum value or if the data has never been received, then the corresponding subfield is not sent.

5.2.19 Data Item I011/300, Vehicle Fleet Identification

Definition: Vehicle fleet identification number.

Format: One octet fixed length Data Item.

Structure:

Octet no. 1

8	7	6	5	4	3	2	1
VFI							

Bits 8-1 (VFI)
- = 0 Flyco (follow me)
- = 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 Unknown

5.2.20 Data Item I011/310, Pre-programmed Message

Definition: Number related to a pre-programmed message that can be transmitted by a vehicle.

Format: One octet fixed length Data Item.

Structure:

Octet no. 1

8	7	6	5	4	3	2	1
TRB	MSG						

Bit-8 (TRB)
- = 0 Default
- = 1 In Trouble

Bits 7-1 (MSG)
- = 1 Towing aircraft
- = 2 “Follow me” operation
- = 3 Runway check
- = 4 Emergency operation (fire, medical…)
- = 5 Work in progress (maintenance, birds scarer, sweepers…)

5.2.21 Data Item I011/380, Mode-S / ADS-B Related Data

Definition : Data specific to Mode-S / ADS-B.
Format : Compound Data Item, comprising a primary subfield of two octets, followed by up to 11 subfields.

Structure of Primary Subfield:

Octet no. 1

16	15	14	13	12	11	10	9
MB	ADR	0	COM	0	0	0	FX

Octet no. 2

8	7	6	5	4	3	2	1
ACT	EMC	0	ATC	0	0	0	FX

bit-16 (MB) Mode S MB data
= 0 Absence of Subfield #1
= 1 Presence of Subfield #1

bit-15 (ADR) Aircraft Address
= 0 Absence of Subfield #2
= 1 Presence of Subfield #2

bit-14 bit set to zero (subfield #3 never sent)

bit-13 (COM) Communications / ACAS Capability and Flight Status
= 0 Absence of Subfield #4
= 1 Presence of Subfield #4

bits-12/10 bits set to zero (subfields #5 to #7 never sent)

bit-9 FX Extension indicator-
= 0 no extension
= 1 extension

bit-8 (ACT) Aircraft Derived Aircraft Type
= 0 Absence of Subfield #8
= 1 Presence of Subfield #8

bit-7 (EMC) Emitter Category
= 0 Absence of Subfield #9
= 1 Presence of Subfield #9

bit-6 bit set to zero (subfield #10 never sent)

bit-5 (ATC) Available Technologies
= 0 Absence of Subfield#11
= 1 Presence of Subfield#11

bit-4/2 (spare) Spare bits set to zero

bit-1 FX Extension indicator
= 0 no extension
= 1 extension

Structure of Subfield # 1:

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:

Octet no. 1

72	71	70	69	68	67	66	65
REP							

Octet no. 2 Octet no. 3

64	63	62	61	60	59	58	57	56	55	54	53	52	51	50	49
MSB															

Octet no. 4 Octet no. 5

48	47	46	45	44	43	42	41	40	39	38	37	36	35	34	33
MB Data (56 bits)															

Octet no. 6 Octet no.7

32	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17

Octet no. 8 Octet no. 9

16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1
							LSB	BDS 1				BDS 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

Structure of Subfield # 2:

Aircraft Address

Octet no. 1

24	23	22	21	20	19	18	17

Octet no. 2 Octet no. 3

16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1
Aircraft Address															

bits 24/1 24 bits Aircraft address, A23 to A0

Subfield # 3: Never Sent

Structure of Subfield # 4:

Communications/ACAS Capability and Flight Status

Octet no. 1 Octet no. 2

24	23	22	21	20	19	18	17	16	15	14	13	12	11	10	9
COM			STAT				0	SSC	ARC	AIC	B1A	B1B			

Octet no. 3

8	7	6	5	4	3	2	1
AC	MN	DC	0	0	0	0	0

bits-24/22 (COM) Communications capability of the transponder

= 0 No communications capability (surveillance only)
= 1 Comm. A and Comm. B capability
= 2 Comm. A, Comm. B and Uplink ELM
= 3 Comm. A, Comm. B, Uplink ELM and Downlink ELM
= 4 Level 5 Transponder capability
5 to 7 Not assigned

bits-21/18	(STAT)	Flight Status = 0 No alert, no SPI, aircraft airborne = 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 = *6 General Emergency* = *7 Lifeguard / medical* = *8 Minimum fuel* = *9 No communications* = *10 Unlawful interference*
bit-17		Spare bit set to zero
bit-16	(SSC)	Specific service capability = 0 No = 1 Yes
bit-15	(ARC)	Altitude reporting capability = 0 100 ft resolution = 1 25 ft resolution
bit-14	(AIC)	Aircraft identification capability = 0 No = 1 Yes
bit 13	(B1A)	BDS 1,0 bit 16
bits 12/9	(B1B)	BDS 1,0 bits 37/40
bit-8	(AC)	ACAS operational = 0 No = 1 Yes
bit-7	(MN)	Multiple navigational aids operating = 0 No = 1 Yes
bit-6	(DC)	Differential correction = 0 Yes = 1 No
bits-5/1		Spare bits set to zero

Subfield # 5: Never Sent

Subfield # 6: Never Sent

Subfield # 7: Never Sent

Structure of Subfield # 8:

Aircraft Derived Aircraft Type

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

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

NOTE: Each of the four bytes composing the type of an aircraft contains an ASCII Character (upper-case alphanumeric characters with trailing spaces).

Structure of Subfield # 9:

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 kg <= 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

Subfield # 10: Never Sent

Structure of Subfield # 11:

Available Technologies

Octet no. 1

8	7	6	5	4	3	2	1
VDL	MDS	UAT	0	0	0	0	0

bit-8 (VDL) = 0 VDL Mode 4 available
= 1 VDL Mode 4 not available

bit-7 (MDS) = 0 Mode S available
= 1 Mode S not available

bit-6 (UAT) = 0 UAT available
= 1 UAT not available

bits-5/1 spare bits set to zero

5.2.22 Data Item I011/390, Flight Plan Related Data

Definition : All flight plan related information.
Format : Compound Data Item, comprising a primary subfield of two octets, followed by up to fourteen subfields.

Structure of Primary Subfield:

Octet no. 1

16	15	14	13	12	11	10	9
TAG	CSN	IFI	FCT	TAC	WTC	DEP	FX

Octet no. 2

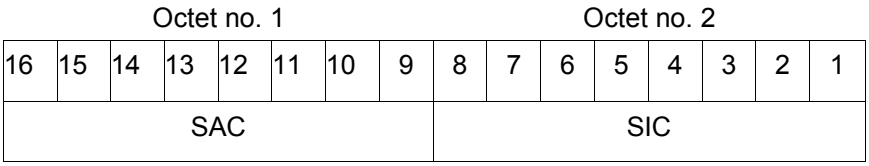
8	7	6	5	4	3	2	1
DST	RDS	CFL	CTL	TOD	AST	STS	FX

bit-16	(TAG)	FPPS Identification Tag = 0 Absence of Subfield #1 = 1 Presence of Subfield #1
bit-15	(CSN)	Callsign = 0 Absence of Subfield #2 = 1 Presence of Subfield #2
bit-14	(IFI)	IFPS_FLIGHT_ID = 0 Absence of Subfield #3 = 1 Presence of Subfield #3
bit-13	(FCT)	Flight Category = 0 Absence of Subfield #4 = 1 Presence of Subfield #4
bit-12	(TAC)	Type of Aircraft = 0 Absence of Subfield #5 = 1 Presence of Subfield #5
bit-11	(WTC)	Wake Turbulence Category = 0 Absence of Subfield #6 = 1 Presence of Subfield #6
bit-10	(DEP)	Departure Airport = 0 Absence of Subfield #7 = 1 Presence of Subfield #7
bit-9	FX	Extension indicator = 0 no extension = 1 extension

bit-8	(DST)	Destination Airport = 0 Absence of Subfield #8 = 1 Presence of Subfield #8
bit-7	(RDS)	Runway Designation = 0 Absence of Subfield #9 = 1 Presence of Subfield #9
bit-6	(CFL)	Current Cleared Flight Level = 0 Absence of Subfield #10 = 1 Presence of Subfield #10
bit-5	(CTL)	Current Control Position = 0 Absence of Subfield #11 = 1 Presence of Subfield #11
bit-4	(TOD)	Time of Departure = 0 Absence of Subfield #12 = 1 Presence of Subfield #12
bit-3	(AST)	Aircraft Stand = 0 Absence of Subfield #13 = 1 Presence of Subfield #13
bit-2	(STS)	Stand Status = 0 Absence of Subfield #14 = 1 Presence of Subfield #14
bit-1	FX	Extension indicator = 0 no extension = 1 extension

Structure of Subfield # 1:

FPPS Identification Tag



bits 16/9	(SAC)	System Area Code
bits 8/1	(SIC)	System Identity Code

Structure of Subfield # 2:

Callsign

Octet no. 1

56	55	54	53	52	51	59	49
Character 1							

Octet no. 2 Octet no. 3

48	47	46	45	44	43	42	41	40	39	38	37	36	35	34	33
Character 2								Character 3							

Octet no. 4 Octet no. 5

32	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17
Character 4								Character 5							

Octet no. 6 Octet no. 7

16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1
Character 6								Character 7							

NOTE - Each 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
TYP		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 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		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. 1								Octet no. 2							
32	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17
Character 1								Character 2							

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

NOTES

1. Each of the four Octets composing the type of an aircraft contains an ASCII Character (upper-case alphabetic characters with trailing spaces).
1. The types of aircraft are defined in the ICAO Document 4444.

Structure of Subfield # 6:
Wake Turbulence Category

Octet no. 1							
8	7	6	5	4	3	2	1
Wake Turbulence Category							

bits 8/1

Wake Turbulence Category is an ASCII character code which may have the following values :
L = Light
M = Medium
H = Heavy

Structure of Subfield # 7:
Departure Airport

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

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

NOTES

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

Structure of Subfield # 8
Destination Airport

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

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

NOTES

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

Structure of Subfield # 9: Runway Designation

Octet no. 1								Octet no. 2							
24	23	22	21	20	19	18	17	16	15	14	13	12	11	10	9
NU1								NU2							

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

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 (upper-case alphabetic).
2. For details refer to ICAO Annex 14, chapter 5.

Structure of Subfield # 10: Current Cleared Flight Level

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

bits 16/1	(CFL)	
	LSB = 1/4 FL	

Structure of Subfield # 11: Current Control Position

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

bits 16/9	(Centre)	8-bit group Identification code
bits 8/1	(Position)	8-bit Control Position identification code

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

Structure of Subfield # 12:
Time of Departure

Octet no. 1

40	39	38	37	36	35	34	33
REP							

Octet no. 2

32	31	30	29	28	27	26	25
TYP					DAY		0

Octet no. 3 Octet no. 4

24	23	22	21	20	19	18	17	16	15	14	13	12	11	10	9
0	0	0	HOR				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

bits-25/22 spare bits set to zero

bits-21/17 (HOR) Hours, from 0 to 23

bits-16/15 spare bits 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 bits 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.

Structure of Subfield # 13:
Aircraft Stand

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

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

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

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

Structure of Subfield # 14:
Stand Status

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

bits-8/7 (EMP) = 00 Empty
= 01 Occupied
= 10 Unknown

bits-6/5 (AVL) = 00 Available
= 01 Not available
= 10 Unknown

5.2.23 Data Item I011/430, Phase of Flight

Definition: Current phase of the flight.

Format: One-octet fixed length Data Item.

Structure:

Octet no. 1

8	7	6	5	4	3	2	1
FLS							

Bits 8-1 (FLS)

= 0 unknown
= 1 on stand
= 2 taxiing for departure
= 3 taxiing for arrival
= 4 runway for departure
= 5 runway for arrival
= 6 hold for departure
= 7 hold for arrival
= 8 push back
= 9 on finals

5.2.24 Data Item I011/500, Estimated Accuracies

Definition : Overview of all important accuracies (standard deviations)

Format : Compound Data Item, comprising a primary subfield of one octets, followed by subfields of predefined length.

Structure of Primary Subfield:

Octet no. 1

8	7	6	5	4	3	2	1
APC	APW	ATH	AVC	ARC	AAC	0	FX

bit 8 (APC) Estimated Accuracy Of Track Position (Cartesian)
= 0 Absence of subfield #1
= 1 Presence of subfield #1

bit 7 (APW) Estimated Accuracy Of Track Position (WGS-84)
= 0 Absence of subfield #2
= 1 Presence of subfield #2

bit 6 (ATH) Estimated Accuracy Of Track Height
= 0 Absence of subfield #3
= 1 Presence of subfield #3

bit 5 (AVC) Estimated Accuracy Of Track Velocity (Cartesian)
= 0 Absence of subfield #4
= 1 Presence of subfield #4

bit 4 (ARC) Estimated Accuracy Of Rate Of Climb / Descent
= 0 Absence of subfield #5
= 1 Presence of subfield #5

bit 3 (AAC) Estimated Accuracy Of Acceleration (Cartesian)
= 0 Absence of subfield #6
= 1 Presence of subfield #6

bit 2 Spare bit set to 0

bit 1 (FX)
= 0 End of Primary Subfield
= 1 Extension into next Octet

Structure of Subfield # 1:
Estimated Accuracy Of Track Position (Cartesian)

Octet no. 1

16	15	14	13	12	11	10	9
APC (X-Component)							LSB

Octet no. 2

8	7	6	5	4	3	2	1
APC (Y-Component)							LSB

bits 16-1	(APC)	Estimated accuracy of the calculated position (Cartesian).
bits 9 and 1	(LSB)	= 0.25 m

Structure of Subfield #2:
Estimated Accuracy Of Track Position (WGS-84)

Octet no. 1 Octet no. 2

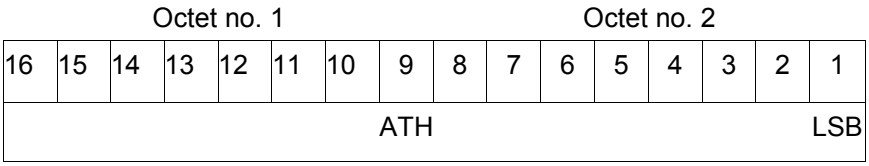
32	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17
APW (Latitude Component)															LSB

Octet no. 3 Octet no. 4

16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1
APW (Longitude Component)															LSB

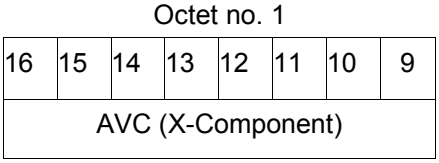
bits 32-1	(APW)	Estimated accuracy (i.e. standard deviation) of the calculated position of an aircraft expressed in WGS-84.
bits 17 and 1	(LSB)	$180/2^{31}$ degrees = approx. $8.3819 * 10^{-08}$ degrees.

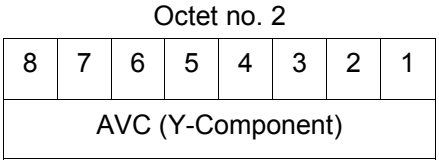
Structure of Subfield #3:
Estimated Accuracy Of Height



bits 16-1	(ATA)	Estimated accuracy (i.e. standard deviation) of the calculated altitude of an aircraft.
bit 1	(LSB)	= 0.5 m

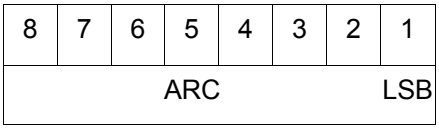
Structure of Subfield #4:
Estimated Accuracy Of Track Velocity (Cartesian)





bits 16-1	(AVC)	Estimated accuracy of the calculated velocity (Cartesian).
bits 9 and 1	(LSB)	= 0.1 m/s

Structure of Subfield #5:
Estimated Accuracy Of Rate Of Climb/Descent



bits 8-1	(ARC)	Estimated accuracy of the calculated rate of Climb/Descent of an aircraft.
bit 1	(LSB)	= 0.1 m/s

Structure of Subfield #6:
Estimated Accuracy Of Acceleration (Cartesian)

Octet no. 1

16	15	14	13	12	11	10	9
AAC (X-Component)							

Octet no. 2

8	7	6	5	4	3	2	1
AAC (Y-Component)							

bits 16-1 (AAC) Estimated accuracy of the calculated acceleration (Cartesian).

bits 9 and 1 (LSB) = 0.01 m/s^2

5.2.25 Data Item I011/600, Alert Messages

Definition: Alert involving the targets indicated in I011/605.

Format: Three-octet fixed length Data Item.

Structure:

Octet no. 1

24	23	22	21	20	19	18	17
ACK	SVR		0	0	0	0	0

Octet no. 2 Octet no. 3

16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1
Alert Type								Alert Number							

Bit-24 (ACK) 0 = Alert acknowledged
1 = Alert not acknowledged

Bits-23/22 (SVR) 00 = End of alert
01 = Pre-alarm
10 = Severe alert

Bits-16/9 Alert Type

Bits-8/1 Alert Number

5.2.26 Data Item I011/605, Tracks in Alert

Definition: List of track numbers of the targets concerned by the alert described in I011/600.

Format: Repetitive Data Item starting with a one-octet Field Repetition Indicator (REP) followed by two-octet track numbers.

Structure:

Octet no. 1

24	23	22	21	20	19	18	17
REP							

Octet no. 2								Octet no. 3							
16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1
0	0	0	0	FUSION TRACK NUMBER (0..4095)											

Bits-24/17 (REP) Repetition Factor
Bits-12/1 Fusion Track Number

5.2.27 Data Item I011/610, Holdbar Status

Definition: Status of up to sixteen banks of twelve indicators.

Format: Repetitive Data Item starting with a one-octet Field Repetition Indicator (REP) followed by two-octet banks/indicators.

Structure:

Octet no. 1

24	23	22	21	20	19	18	17
REP							

Octet no. 2								Octet no. 3							
16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1
BKN				I1	I2	I3	I4	I5	I6	I7	I8	I9	I10	I11	I12

Bits-24/17 (REP) Repetition Factor

Bits-16/13 Bank Number

Bits-12/1 (Ii) 0 = Indicator i off
1 = Indicator i on

NOTE: This item is included as a temporary solution

5.3 Standard User Application Profile

5.3.1 The following UAP shown in Table 3 shall be used for the transmission of A-SMGCS messages :

FRN	Data Item	Information	Length in Octets
1	I011/010	Data Source Identifier	2
2	I011/000	Message Type	1
3	I011/015	Service Identification	1
4	I011/140	Time of Track Information	3
5	I011/041	Position in WGS-84 Co-ordinates	8
6	I011/042	Calculated Position in Cartesian Co-ordinates	4
7	I011/202	Calculated Track Velocity in Cartesian coord.	4
FX	-	Field Extension Indicator	-
8	I011/210	Calculated Acceleration	2
9	I011/060	Mode-3/A Code in octal representation	2
10	I011/245	Target Identification	7
11	I011/380	Mode-S / ADS-B Related Data	1+1+
12	I011/161	Track Number	2
13	I011/170	Track Status	1+1+
14	I011/290	System Track Update Ages	1+1+
FX	-	Field Extension Indicator	-
15	I011/430	Phase of Flight	1
16	I011/090	Measured Flight Level	2
17	I011/093	Calculated Track Barometric Altitude	2
18	I011/092	Calculated Track Geometric Altitude	2
19	I011/215	Calculated Rate of Climb/Descent	2
20	I011/270	Target Size & Orientation	1+
21	I011/390	Flight Plan Related Data	1+1+
FX	-	Field Extension Indicator	-
22	I011/300	Vehicle Fleet Identification	1
23	I011/310	Pre-programmed Message	1
24	I011/500	Estimated Accuracies	1+1+
25	I011/600	Alert Messages	3
26	I011/605	Tracks in Alert	1+2N
27	I011/610	Holdbar Status	1+2N
28	SP	Special Purpose Field	1+
FX	-	Field Extension Indicator	-
29	RE	Reserved Expansion Field	1+
30	-	Spare	-
31	-	Spare	-
32	-	Spare	-
33	-	Spare	-
34	-	Spare	-
35	-	Spare	-
FX		Field Extension Indicator	-

where:

- the first column indicates the 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 one-octet followed by n-octets extents as necessary.