EUROPEAN ORGANISATION FOR THE SAFETY OF
AIR NAVIGATION

EUROCONTROL

# EUROCONTROL STANDARD DOCUMENT

# FOR

# SURVEILLANCE DATA EXCHANGE

## Part 12 : Category 021

## ADS-B Messages

SUR.ET1.ST05.2000-STD-12-01

| | | |
|---|---|---|
| Edition | : | 0.26 |
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EUROPEAN AIR TRAFFIC MANAGEMENT PROGRAMME

# DOCUMENT IDENTIFICATION SHEET

## DOCUMENT DESCRIPTION

**Document Title**

Surveillance Data Exchange - Part 12

ADS-B Messages

EWP DELIVERABLE REFERENCE NUMBER

| | |
|---|---|
| **PROGRAMME REFERENCE INDEX**<br>SUR.ET1.ST05.2000-STD-12-01 | **EDITION :** 0.26<br>**EDITION DATE :** 27 June 2005 |

**Abstract**

This document describes the application of ASTERIX to ADS-B.

**Keywords**

ASTERIX Category 21 ADS-B Messages

| | | |
|---|---|---|
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## 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 :**

| 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<br>Manager | D. Doukas | |
| SUR Domain<br>Manager | J. Berends | |
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## 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 | Dec. 1999 | Creation of Eurocontrol document | ALL |
| 0.11 | Mar. 2000 | Modifications in items<br>Creation of UAP | ALL |
| 0.12 | Feb. 2001 | Modifications in items and UAP | ALL |
| 0.13 | Jun. 2001 | Modifications in items and UAP | ALL |
| 0.14 | Sep. 2001 | Modifications in items and UAP | ALL |
| 0.15 | Nov. 2001 | Modifications in items and UAP | ALL |
| 0.16 | Dec. 2001 | • Addition of paragraph 4.4<br>• Editorial corrections | ALL |
| 0.17 | Jan. 2002 | Modifications in items and UAP | ALL |
| 0.18 | Feb. 2002 | Modifications in items and UAP | ALL |
| 0.19 | Oct. 2002 | Modifications in items<br>• I021/110<br>• I021/148<br>• I021/152<br>• I021/155<br>Modification of the UAP | <br>5.2.9<br>5.2.14<br>5.2.17<br>5.2.18<br>5.3 |
| 0.20 | Dec. 2002 | Addition of “Encoding rules”<br>Modification of I021/040<br>Modification of I021/110<br>Suppression of items I021/035 and I021/037<br>Modification of the UAP | All<br>5.2.5<br>5.2.9<br><br>5.3 |
| 0.21 | March 2003 | Modification of the title<br>Modification of I021/140 | <br>5.2.11 |
| 0.22 | August 2003 | Editorial modification in layout of messages | 5.1 |
| 0.23 | Nov. 2003 | Addition of ICAO Annex 10 Vol IV Amendment 77 as Reference Document<br>Addition of one bit (DTI) in item 021/210<br>Editorial modifications | 2.2<br>5.2.24 |
| 0.24 | Oct. 2004 | Modification of the format of item I021/130 to increase the resolution of the position in WGS84 format | 5.2.10 |

| | | | |
|---|---|---|---|
| 0.25 | Mar. 2005 | Document Identification Sheet updated<br>Signature Page updated<br>Correction of length for item I021/040 in table 2 – ADS-B Messages UAP<br>Definition Item 021/140 updated | Page ii<br>Page iii<br>5.3<br><br>5.2.11 |
| 0.26 | 27 June 2005 | Item I021/070 Mode 3/A added<br>Item I021/131 Signal Amplitude added | 5.2.6<br>5.2.12 |

# TABLE OF CONTENTS

# 1 INTRODUCTION

## 1.1 Scope

**1.1.1** This document describes the structure for the transmission of ADS-B messages.

**1.1.2** This document defines the data out of Category 021.

# 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.
2. Eurocontrol Standard SUR.ET1.ST05.2000-STD-01-01. All Purpose Structured Eurocontrol suRveillance Information Exchange - ASTERIX, edition 1.29 February 2002.
3. Minimum Aviation System Performance Standards for ADS-B, RTCA/DO-242, February 19, 1998.
4. Automatic Dependent Surveillance Requirements SUR/ET3/ST06.3220/001, edition 0.8 November 2000.
5. ICAO Annex 10, Vol.IV Amendment 77 I

# 3 DEFINITIONS, ACRONYMS AND ABBREVIATIONS

## 3.1 Definitions

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

| | | |
|---|---|---|
| **3.1.1** | **Catalogue of Data Items:** | List of all the possible Data Items of each Data Category describing the Data Items by their reference, structure, size and units (where applicable). |
| **3.1.2** | **Data Block:** | Unit of information seen by the application as a discrete entity by its contents. A Data Block contains one or more Record(s) containing data of the same category. |
| **3.1.3** | **Data Category:** | Classification of the data in order to permit inter alia an easy identification. |
| **3.1.4** | **Data Field:** | Physical implementation for the purpose of communication of a Data Item, it is associated with a unique Field Reference Number and is the smallest unit of transmitted information. |
| **3.1.5** | **Data Item:** | The smallest unit of information in each Data Category. |
| **3.1.6** | **Record:** | A collection of transmitted Data Fields of the same category preceded by a Field Specification field, signalling the presence/absence of the various Data Fields |
| **3.1.7** | **User Application Profile:** | The mechanism for assigning Data Items to Data Fields, and containing all necessary information which needs to be standardised for the successful encoding and decoding of the messages. |

## 3.2 Acronyms and Abbreviations

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

| | |
|---|---|
| ° | Degree (angle) |
| **ADS-B** | Automatic Dependent Surveillance - Broadcast |
| **ASTERIX** | **A**ll Purpose **ST**ructured **Eurocontrol** su**R**veillance **I**nformation E**X**change |
| **CAT** | Data Category |
| **EATMP** | European Air Traffic Management Programme |
| **FRN** | Field Reference Number |
| **FSPEC** | Field Specification |
| **FX** | Field Extension Indicator |
| **ICAO** | International Civil Aviation Organization |
| **LEN** | Length Indicator |
| **LSB** | Least Significant Bit |
| **PSR** | Primary Surveillance Radar |
| **RE** | Reserved Expansion Indicator |
| **REP** | Field Repetition Indicator |
| **s** | second, unit of time |
| **SAC** | System Area Code |
| **SDPS** | Surveillance Data Processing System |
| **SIC** | System Identification Code |
| **SP** | Special Purpose Indicator |
| **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

This document describes the application of ASTERIX to ADS-B target reports.

## 4.2 Time Management

The time-stamping shall comply with ICAO Annex 5.

## 4.3 Unused Bits in Data Items

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

## 4.4 User Application Profile and Data Blocks

**4.4.1** A single User Application Profile (UAP) is defined and shall be used for ADS-B messages.

**4.4.2** Data Blocks shall have the following layout.

| | | | | | | |
|---|---|---|---|---|---|---|
| **CAT = 021** | **LEN** | **FSPEC** | Items of the first record | | **FSPEC** | Items of the last record |

where:

- Data Category (CAT) = 021, is a one-octet field indicating that the Data Block contains ADS-B messages;
- 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.

## 4.5 Composition of messages

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

**4.5.2** 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 ADS-B messages are defined in Table 1 and described in the following pages.

**Table 1 - Data Items of Category 021**

| Data Item Reference Number | Description | Resolution |
|---|---|---|
| I021/010 | Data Source Identification | N.A. |
| I021/020 | Emitter Category | N.A. |
| I021/030 | Time of Day | 1/128 s |
| I021/032 | Time of Day Accuracy | 1/256 s |
| I021/040 | Target Report Descriptor | N.A. |
| I021/070 | Mode 3/A Code in Octal Representation | N.A. |
| I021/080 | Target Address | N.A. |
| I021/090 | Figure of Merit | N.A. |
| I021/095 | Velocity Accuracy | N.A. |
| I021/110 | Trajectory Intent | N.A. |
| I021/130 | Position in WGS-84 co-ordinates | $180/2^{25}$ ° |
| I021/131 | Signal Amplitude | N.A. |
| I021/140 | Geometric Altitude | 6.25 ft |
| I021/145 | Flight Level | ¼ FL |
| I021/146 | Intermediate State Selected Altitude | 25 ft |
| I021/148 | Final State Selected Altitude | 25 ft |
| I021/150 | Air Speed | N.A. |
| I021/151 | True Air Speed | N.A. |
| I021/152 | Magnetic Heading | $360/2^{16}$ ° |
| I021/155 | Barometric Vertical Rate | 6.25 ft / min |
| I021/157 | Geometric Vertical Rate | 6.25 ft / min |
| I021/160 | Ground Vector | N.A. |
| I021/165 | Rate of Turn | ¼ °/s |
| I021/170 | Target Identification | N.A. |
| I021/200 | Target Status | N.A. |
| I021/210 | Link Technology Indicator | N.A. |
| I021/220 | Met Report | N.A. |
| I021/230 | Roll Angle | 0.01 deg |

## 5.2 Description of Standard Data Items

### 5.2.1 Data Item I021/010, Data Source Identification

**Definition :** Identification of the ADS-B station providing information
**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 | | | | | | | | SIC | | | | | | | |

| | | |
|---|---|---|
| bits-16/9 | (SAC) | System Area Code |
| bits 8/1 | (SIC) | System Identification Code |

**Encoding Rule :**

This Item shall be present in every ASTERIX record

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

### 5.2.2 Data Item I021/020, Emitter Category

**Definition :** Characteristics of the originating ADS-B unit
**Format :** One-Octet fixed length data item.
**Structure:**

Octet no. 1

<table>
<tr><td>8</td><td>7</td><td>6</td><td>5</td><td>4</td><td>3</td><td>2</td><td>1</td></tr>
<tr><td colspan="8">ECAT</td></tr>
</table>

bits-8/1 (ECAT) Emitter Category
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

**Encoding Rule :**
This Item is optional

### 5.2.3 Data Item I021/030, Time of Day

**Definition :** Time of applicability (measurement) of the reported position, in the form of elapsed time since last midnight, expressed as UTC.

**Format :** Three-Octet fixed length data item.

**Structure:**

Octet no. 1

| 24 | 23 | 22 | 21 | 20 | 19 | 18 | 17 |
|---|---|---|---|---|---|---|---|
| Time | | | | | | | |

Octet no. 2 Octet no. 3

| 16 | 15 | 14 | 13 | 12 | 11 | 10 | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Of Day | | | | | | | | | | | | | | | LSB |

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

**Encoding Rule :**

This Item shall be present in every ASTERIX record

**NOTE -** The time of the day value is reset to zero at every midnight.

### 5.2.4 Data Item I021/032, Time of Day Accuracy

**Definition :** The maximum difference between the actual time of applicability of the reported position and the time reported in the Time of Day item (I021/030).

**Format :** One-Octet fixed length data item.

**Structure:**

Octet no. 1

| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |
|---|---|---|---|---|---|---|---|
| Time of Day Accuracy | | | | | | | LSB |

bit-1 (LSB) = $2^{-8}$ s = 1/256 s

**Encoding Rule :**

This Item is optional

### 5.2.5 Data Item I021/040, Target Report Descriptor

**Definition**: Type and characteristics of the data as transmitted by a system.

**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 |
| DCR | GBS | SIM | TST | RAB | SAA | SPI | 0 | ATP | | | ARC | | 0 | 0 | 0 |

bit-16 (DCR) = 0 No differential correction (ADS-B)
= 1 Differential correction (ADS-B)

bit-15 (GBS) = 0 Ground Bit not set
= 1 Ground Bit set

bit-14 (SIM) = 0 Actual target report
= 1 Simulated target report

bit-13 (TST) = 0 Default
= 1 Test Target

bit-12 (RAB) = 0 Report from target transponder
= 1 Report from field monitor (fixed transponder)

bit-11 (SAA) = 0 Equipement not capable to provide Selected Altitude
= 1 Equipement capable to provide Selected Altitude

bit-10 (SPI) = 0 Absence of SPI
= 1 Special Position Identification

bit-9 Spare bit set to zero

bits-8/6 (ATP) = 0 Non unique address
= 1 24-Bit ICAO address
= 2 Surface vehicle address
= 3 Anonymous address
= 4-7 Reserved for future use

bits-5/4 (ARC) Altitude Reporting Capability
= 0 Unknown
= 1 25 ft
= 2 100 ft

bits-3/1 Spare bits set to zero

**Encoding Rule :**
This Item shall be present in every ASTERIX record

### 5.2.6 Data Item I021/070, Mode 3/A Code in Octal Representation

**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 | 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-16 (V) = 0 Code validated
= 1 Code not validated

bit-15 (G) = 0 Default
= 1 Garbled code

bit-14 (L) = 0 Mode-3/A code derived during last update
= 1 Mode-3/A code not extracted during the last update

bit-13 Spare bit set to 0

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

**Encoding Rule:**

- Once a Mode-3/A code is available, that code shall be sent every update, provided information for that target is received.
- Bit 14 (L) will be set when the Mode 3/A Code was taken from the Track file

**NOTES**

1. Bit 15 (G) is set to one when an error correction has been attempted.
2. Bit 16 (V) is normally set to zero, but can exceptionally be set to one to indicate a non-validated Mode-3/A code (e.g. alert condition detected, but new Mode-3/A code not successfully extracted).

### 5.2.7 Data Item I021/080, Target Address

**Definition:** Target address (emitter identifier) assigned uniquely to each target.

**Format:** Three-octet fixed length Data Item.

**Structure:**

Octet no. 1

| 24 | 23 | 22 | 21 | 20 | 19 | 18 | 17 |
|---|---|---|---|---|---|---|---|
| Target | | | | | | | |

Octet no. 2 Octet no. 3

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

bits-24/1 24-Bits address, A23 to A0

**Encoding Rule :**

This Item shall be present in every ASTERIX record

### 5.2.8 Data Item I021/090, Figure of Merit

**Definition :** ADS figure of merit (FOM) provided by the aircraft avionics
**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 |
| AC | | MN | | DC | | 0 | 0 | 0 | 0 | 0 | 0 | PA | | | |

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

bits-10/5 Spare bits set to zero

bits-4/1 (PA) Position Accuracy

**Encoding Rule :**
This Item is optional

**NOTE -** bits-4/1 (PA) code the “Navigational Uncertainty Categories – Position” as described in the ADS-B MASPS [Ref. 3]

### 5.2.9 Data Item I021/095, Velocity Accuracy

**Definition :** Velocity uncertainty category of the least accurate velocity component
**Format :** One-octet fixed length Data Item
**Structure:**

| Octet no. 1 | | | | | | | |
|---|---|---|---|---|---|---|---|
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |
| Velocity Uncertainty Category | | | | | | | |

**Encoding Rule :**
This Item is optional

**NOTE -** bits-8/1 code the “Navigational Uncertainty Categories – Velocity” as described in the ADS-B MASPS [Ref. 3]

### 5.2.10 Data Item I021/110, Trajectory Intent

**Definition :** Reports indicating the 4D intended trajectory of the aircraft

**Format :** Compound Data Item, comprising a primary subfield of one octet, followed by the indicated subfields

**Structure of Primary Subfields :**

Octet no. 1

| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |
|---|---|---|---|---|---|---|---|
| TIS | TID | 0 | 0 | 0 | 0 | 0 | FX |

bit-8 (TIS) Trajectory Intent Status
= 0 Absence of Subfield #1
= 1 Presence of Subfield #1

bit-7 (TID) Trajectory Intent Data
= 0 Absence of Subfield #2
= 1 Presence of Subfield #2

bit-6/2 Spare bits set to 0

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

**Structure of Subfield #1 :**

**Trajectory Intent Status**

Octet no. 1

| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |
|---|---|---|---|---|---|---|---|
| NAV | NVB | 0 | 0 | 0 | 0 | 0 | FX |

| | | | |
|---|---|---|---|
| bit-8 | (NAV) | = 0 | Trajectory Intent Data is available for this aircraft |
| | | = 1 | Trajectory Intent Data is not available for this aircraft |
| bit-7 | (NVB) | = 0 | Trajectory Intent Data is valid |
| | | = 1 | Trajectory Intent Data is not valid |
| bits-6/2 | Spare bits set to zero | | |
| bit-1 | (FX) | = 0 | End of Data Item |
| | | = 1 | Extension into next extent |

### Structure of Subfield #2:

### 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. 1

| 128 | 127 | 126 | 125 | 124 | 123 | 122 | 121 |
|---|---|---|---|---|---|---|---|
| REP | | | | | | | |

Octet no. 2

| 120 | 119 | 118 | 117 | 116 | 115 | 114 | 113 |
|---|---|---|---|---|---|---|---|
| TCA | NC | TCP number | | | | | |

Octet no. 3 Octet no. 4

| 112 | 111 | 110 | 109 | 108 | 107 | 106 | 105 | 104 | 103 | 102 | 101 | 100 | 99 | 98 | 97 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Altitude | | | | | | | | | | | | | | | LSB |

Octet no. 5 Octet no. 6

| 96 | 95 | 94 | 93 | 92 | 91 | 90 | 89 | 88 | 87 | 86 | 85 | 84 | 83 | 82 | 81 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Latitude in WGS - 84 | | | | | | | | | | | | | | | |

Octet no. 7 Octet no. 8

| 80 | 79 | 78 | 77 | 76 | 75 | 74 | 73 | 72 | 71 | 70 | 69 | 68 | 67 | 66 | 65 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | LSB | | | | | | | | |

Octet no. 9 Octet no. 10

| 64 | 63 | 62 | 61 | 60 | 59 | 58 | 57 | 56 | 55 | 54 | 53 | 52 | 51 | 50 | 49 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Longitude in WGS - 84 | | | | | | | | | | | | | | | LSB |

Octet no. 11 Octet no. 12

| 48 | 47 | 46 | 45 | 44 | 43 | 42 | 41 | 40 | 39 | 38 | 37 | 36 | 35 | 34 | 33 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Point Type | | | | TD | | TRA | TOA | TOV | | | | | | | |

Octet no. 13 Octet no. 14

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

Octet no. 15 Octet no. 16

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

| | | |
|---|---|---|
| bits-128/121 | (REP) | Repetition Factor |
| bit-120 | (TCA) | = 0 TCP number available<br>= 1 TCP number not available |
| bit-119 | (NC) | = 0 TCP compliance<br>= 1 TCP non-compliance |
| bits-118/113 | (TCP Number) | Trajectory Change Point number |
| bits-112/97 | (Altitude) | Altitude in two's complement form<br>LSB= 10ft<br>-1500 ft <= altitude <= 150000 ft |
| bits-96/73 | (Latitude) | In WGS.84 in two's complement.<br>-90 <= latitude <= 90 deg.<br>LSB = $180/2^{23}$ deg.<br>= approx.$2.145767*10^{-05}$ deg. |
| bits-72/49 | (Longitude) | In WGS.84 in two's complement.<br>-180 <= longitude < 180<br>LSB = $180/2^{23}$ deg.<br>= approx.$2.145767*10^{-05}$ deg. |
| bits-48/45 | Point Type | = 0 Unknown<br>= 1 Fly by waypoint (LT)<br>= 2 Fly over waypoint (LT)<br>= 3 Hold pattern (LT)<br>= 4 Procedure hold (LT)<br>= 5 Procedure turn (LT)<br>= 6 RF leg (LT)<br>= 7 Top of climb (VT)<br>= 8 Top of descent (VT)<br>= 9 Start of level (VT)<br>= 10 Cross-over altitude (VT)<br>= 11 Transition altitude (VT) |
| bits-44/43 | (TD) | = 00 N/A<br>= 01 Turn right<br>= 10 Turn left<br>= 11 No turn |
| bit-42 | (TRA) | Turn Radius Availabilty<br>= 0 TTR not available<br>= 1 TTR available |
| bit-41 | (TOA) | = 0 TOV available<br>= 1 TOV not available |
| bits-40/17 | (TOV) | Time Over Point<br>LSB = 1 second |
| bits-16/1 | (TTR) | TCP Turn radius<br>LSB = 0.01 Nm<br>0 <= TTR <= 655.35 Nm |

This Item is optional

**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 1

### 5.2.11 Data Item I021/130, Position in WGS-84 Co-ordinates

**Definition :** Calculated Position in WGS-84 Co-ordinates with a resolution of $180/2^{25}$. degrees

**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.<br>Range -90 ≤ latitude ≤ 90 deg. |
| | (LSB) | = $180/2^{25}$ degrees |
| bits-32/1 | (Longitude) | In WGS.84 in two's complement.<br>Range -180 ≤ longitude < 180 deg. |
| | (LSB) | = $180/2^{25}$ degrees |

**Encoding Rule :**

This Item is optional

**NOTES**

1. Positive longitude indicates East. Positive latitude indicates North.
2. The LSB provides a resolution at least better than 0.6m.

### 5.2.12 Data Item I021/131, Signal Amplitude

**Definition**: Relative strength of received signal.

**Format**: One-Octet fixed length Data Item.

**Structure:**

Octet no. 1

| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |
|---|---|---|---|---|---|---|---|
| SAM | | | | | | | |

bits-8/1 (SAM) Range 0..255

**NOTE:** The value is implementation-dependent, 0 being the minimum detectable level for that system.

### 5.2.13 Data Item I021/140, 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:**

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

bit 16/1 -1500 ft <= Altitude <= 150000 ft
(LSB) = 6.25 ft

**Encoding Rule :**
This Item is optional

**NOTES**

1. LSB is required to be less than 10 ft by ICAO

### 5.2.14 Data Item I021/145, Flight Level

**Definition :** Flight Level from barometric measurements, not QNH corrected, 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 |
| Flight Level | | | | | | | | | | | | | | | LSB |

bit 16/1 -15 FL <= Flight Level <= 1500 FL
(LSB) = 1/4 FL

**Encoding Rule :**
This Item is optional

### 5.2.15 Data Item I021/146, Intermediate State Selected Altitude

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

**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 |
| SAS | Source | | Altitude | | | | | | | | | | | | LSB |

| | | | |
|---|---|---|---|
| bit-16 | (SAS) | = 0 | No source information provided |
| | | = 1 | Source Information provided |
| bit-15/14 | (Source) | = 00 | Unknown |
| | | = 01 | Aircraft Altitude |
| | | = 10 | FCU/MSP Selected Altitude |
| | | = 11 | FMS Selected Altitude |
| bits- 13/1 | (Altitude) | Altitude in two's complement form<br>LSB=25ft<br>-1300ft <= Altitude <= 100000ft | |

**Encoding Rule :**

This Item is optional

### 5.2.16 Data Item I021/148, Final State Selected Altitude

**Definition :** The vertical intent value that corresponds with the ATC cleared altitude, as derived from the Altitude Control Panel.

**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 |
| MV | AH | AM | Altitude | | | | | | | | | | | | LSB |

| | | |
|---|---|---|
| bit-16 | (MV) | Manage Vertical Mode<br>= 0 Not active<br>= 1 Active |
| bit-15 | (AH) | Altitude Hold Mode<br>= 0 Not active<br>= 1 Active |
| bit-14 | (AM) | Approach Mode<br>= 0 Not active<br>= 1 Active |
| bits- 13/1 | (Altitude) | Altitude in in two's complement form<br>LSB=25ft<br>-1300ft <= Altitude <= 100000ft |

**Encoding Rule :**

This Item is optional

### 5.2.17 Data Item I021/150, Air Speed

**Definition :** Calculated Air Speed (Element of Air Vector).

**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 |
| IM | Air Speed | | | | | | | | | | | | | | LSB |

bit-16 (IM) = 0 Air Speed = IAS
= 1 Air Speed = Mach

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

**Encoding Rule :**

This Item is optional

### 5.2.18 Data Item I021/151 True Airspeed

**Definition :** True Air Speed
**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 |
| True Air Speed | | | | | | | | | | | | | | | LSB |

bits-16/1 True Air Speed
(LSB) = 1 knot

**Encoding Rule :**
This Item is optional

### 5.2.19 Data Item I021/152, Magnetic Heading

**Definition :** Magnetic Heading (Element of Air Vector).
**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 |
| Magnetic Heading | | | | | | | | | | | | | | | LSB |

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

**Encoding Rule :**
This Item is optional

### 5.2.20 Data Item I021/155, Barometric Vertical Rate

**Definition :** Barometric Vertical Rate, 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 |
| Barometric Vertical Rate | | | | | | | | | | | | | | | LSB |

bits-16/1 Barometric Vertical Rate
(LSB) = 6.25 feet/minute

**Encoding Rule :**
This Item is optional

### 5.2.21 Data Item I021/157, Geometric Vertical Rate

**Definition :** Geometric Vertical Rate, in two’s complement form, with reference to WGS-84.

**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 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Geometric Vertical Rate | | | | | | | | | | | | | | | LSB |

bits-16/1 Geometric Vertical Rate

(LSB) = 6.25 feet/minute

**Encoding Rule :**

This Item is optional

### 5.2.22 Data Item I021/160, Ground Vector

**Definition :** Ground Speed and Track Angle elements of Ground Vector.

**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 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Ground Speed | | | | | | | | | | | | | | | LSB |

Octet no. 3 Octet no. 4

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

bits-32/17 Ground Speed in two's complement form referenced to WGS84

(LSB) = $2^{-14}$ NM/s $\cong$ 0.22 kt

-2 NM/s $\leq$ Ground Speed < 2 NM/s

bits-16/1 Track Angle

(LSB) = 360° / $2^{16}$ = approx. 0.0055°

**Encoding Rule :**

This Item is optional

### 5.2.23 Data Item I021/165, Rate Of Turn

**Definition :** Rate of Turn, in two's complement form.
**Format :** Variable length data item, comprising a first part of one-octet, followed by a one-octet extent as necessary.

**Structure of First Part:**

Octet no. 1

| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |
|---|---|---|---|---|---|---|---|
| TI |  | 0 | 0 | 0 | 0 | 0 | FX |

bits-8/7 (TI) Turn Indicator
00 = Not available
01 = Left
10 = Right
11 = Straight

bits-6/2 Spare bits set to zero

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

**Structure of First Extent:**

Octet no. 1

| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |
|---|---|---|---|---|---|---|---|
| Rate of Turn |  |  |  |  |  | LSB | FX |

bits-8/2 Rate of Turn
(LSB) = $2^{-2}$ °/s = 1/4 °/s
Maximum value = 15 °/s

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

**Encoding Rule :**
This Item is optional

**NOTES**

1. A positive value represents a right turn, whereas a negative value represents a left turn.
2. Value 15 means 15 °/s or above.

### 5.2.24 Data Item I021/170, Target Identification

**Definition**: Target (aircraft or vehicle) identification in 8 characters, as reported by the target.

**Format**: Six-octet fixed length Data Item.

**Structure:**

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

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

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

bits-48/1 Characters 1-8 (coded on 6 Bits each) defining target identification when flight plan is available or the registration marking when no flight plan is available. Coding rules are provided in [5] Section 3.1.2.9

**Encoding Rule :**
This Item is optional

### 5.2.25 Data Item I021/200, Target Status

**Definition :** Status of the target
**Format :** One-octet fixed length Data Item

**Structure:**

| Octet no. 1 | | | | | | | |
|---|---|---|---|---|---|---|---|
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |
| Target Status | | | | | | | |

bits-8/1 Target Status
= 0 No emergency / not reported
= 1 General emergency
= 2 Lifeguard / medical
= 3 Minimum fuel
= 4 No communications
= 5 Unlawful interference

**Encoding Rule :**
This Item is optional

### 5.2.26 Data Item I021/210, Link Technology Indicator

**Definition :** Indication of which ADS link technology has been used to send the target report.

**Format :** One-octet fixed length Data Item

**Structure:**

Octet no. 1

| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |
|---|---|---|---|---|---|---|---|
| 0 | 0 | 0 | DTI | MDS | UAT | VDL | OTR |

| | | |
|---|---|---|
| bits-8/6 | Spare bits | |
| bit-5 | (DTI) | Cockpit Display of Traffic Information<br>= 0 Unknown<br>= 1 Aircraft equiped with CDTI |
| bit-4 | (MDS) | Mode-S Extended Squitter<br>= 0 Not used<br>= 1 Used |
| bit-3 | (UAT) | UAT<br>= 0 Not used<br>= 1 Used |
| bit-2 | (VDL) | VDL Mode 4<br>= 0 Not used<br>= 1 Used |
| bit-1 | (OTR) | Other Technology<br>= 0 Not used<br>= 1 Used |

**Encoding Rule :**

This Item shall be present in every ASTERIX record

### 5.2.27 Data Item I021/220, Met Information

**Definition :** Meteorological information.

**Format :** Compound data item consisting of a one byte primary sub-field, followed by up to four fixed length data fields.

**Structure of Primary Subfield:**

Octet no. 1

| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |
|---|---|---|---|---|---|---|---|
| WS | WD | TMP | TRB | 0 | 0 | 0 | FX |

| | | | |
|---|---|---|---|
| bit-8 | (WS) | = 0 | Absence of Subfield #1 |
| | | = 1 | Presence of Subfield #1 |
| bit-7 | (WD) | = 0 | Absence of Subfield #2 |
| | | = 1 | Presence of Subfield #2 |
| bit-6 | (TMP) | = 0 | Absence of Subfield #3 |
| | | = 1 | Presence of Subfield #3 |
| bit-5 | (TRB) | = 0 | Absence of Subfield #4 |
| | | = 1 | Presence of Subfield #4 |
| bits-4/2 | | Spare bits set to zero | |
| bit-1 | FX | Extension indicator | |
| | | = 0 | no extension |
| | | = 1 | extension |

**Structure of Subfield #1:**
**Wind Speed**

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

bits-8/1 Wind Speed

(LSB) = 1 knot

0 <= Wind Speed <= 300

**Structure of Subfield #2:**
**Wind Direction**

<table>
<tr><th colspan="8">Octet no. 1</th><th colspan="8">Octet no. 2</th></tr>
<tr><td>16</td><td>15</td><td>14</td><td>13</td><td>12</td><td>11</td><td>10</td><td>9</td><td>8</td><td>7</td><td>6</td><td>5</td><td>4</td><td>3</td><td>2</td><td>1</td></tr>
<tr><td colspan="15">Wind Direction</td><td>LSB</td></tr>
</table>

bits-8/1 Wind Direction

(LSB) = 1 degree

1 <= Wind Direction <= 360

**Structure of Subfield #3:**
**Temperature**

<table>
<tr><th colspan="8">Octet no. 1</th><th colspan="8">Octet no. 2</th></tr>
<tr><td>16</td><td>15</td><td>14</td><td>13</td><td>12</td><td>11</td><td>10</td><td>9</td><td>8</td><td>7</td><td>6</td><td>5</td><td>4</td><td>3</td><td>2</td><td>1</td></tr>
<tr><td colspan="15">Temperature</td><td>LSB</td></tr>
</table>

bits-16/1 Temperature in degrees celsius, in two’s complement form

(LSB) = 0.25 °C

-100 °C <= Temperature <= 100 °C

**Structure of Subfield #4:**
**Turbulence**

<table>
<tr><th colspan="8">Octet no. 1</th></tr>
<tr><td>8</td><td>7</td><td>6</td><td>5</td><td>4</td><td>3</td><td>2</td><td>1</td></tr>
<tr><td colspan="8">Turbulence</td></tr>
</table>

bits-8/1 Turbulence

Integer between 0 and 15 inclusive

**Encoding Rule :**

This Item is optional

### 5.2.28 Data Item I021/230 Roll Angle

**Definition :** The roll angle, in two’s complement form, of an aircraft executing a turn.

**Format :** A two byte 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 |
| Roll Angle | | | | | | | | | | | | | | | LSB |

bits-16/1 Roll Angle
(LSB) = 0.01 degree
-180 <= Roll Angle <= 180

**Encoding Rule :**

This Item is optional

## 5.3 User Application Profile for Category 021

The following User Application Profile shall be used for the transmission of ADS-B messages.

**Table 2 – ADS-B Messages UAP**

| FRN | Data Item | Information | Length |
|---|---|---|---|
| **1** | **I021/010** | Data Source Identification | **2** |
| **2** | **I021/040** | Target Report Descriptor | **2** |
| **3** | **I021/030** | Time of Day | **3** |
| **4** | **I021/130** | Position in WGS-84 co-ordinates | **8** |
| **5** | **I021/080** | Target Address | **3** |
| **6** | **I021/140** | Geometric Altitude | **2** |
| **7** | **I021/090** | Figure of Merit | **2** |
| **FX** | **-** | Field extension indicator | **-** |
| **8** | **I021/210** | Link technology | **1** |
| **9** | **I021/230** | Roll Angle | **2** |
| **10** | **I021/145** | Flight Level | **2** |
| **11** | **I021/150** | Air Speed | **2** |
| **12** | **I021/151** | True Air Speed | **2** |
| **13** | **I021/152** | Magnetic Heading | **2** |
| **14** | **I021/155** | Barometric Vertical Rate | **2** |
| **FX** | **-** | Field extension indicator | **-** |
| **15** | **I021/157** | Geometric Vertical Rate | **2** |
| **16** | **I021/160** | Ground Vector | **4** |
| **17** | **I021/165** | Rate of Turn | **1+** |
| **18** | **I021/170** | Target Identification | **6** |
| **19** | **I021/095** | Velocity Accuracy | **1** |
| **20** | **I021/032** | Time of day accuracy | **1** |
| **21** | **I021/200** | Target Status | **1** |
| **FX** | **-** | Field extension indicator | **-** |
| **22** | **I021/020** | Emitter Category | **1** |
| **23** | **I021/220** | Met report | **1+** |
| **24** | **I021/146** | Intermediate State Selected Altitude | **2** |
| **25** | **I021/148** | Final State Selected Altitude | **2** |
| **26** | **I021/110** | Trajectory Intent | **1+N*15** |
| **27** | **I021/070** | Mode 3/A Code in Octal Representation | **2** |
| **28** | **I021/131** | Signal Amplitude | **1** |
| **FX** | **-** | Field extension indicator | **-** |
| **29** | **-** | Spare bits set to zero | **-** |
| **30** | **-** | Spare bits set to zero | **-** |
| **31** | **-** | Spare bits set to zero | **-** |
| **32** | **-** | Spare bits set to zero | **-** |
| **33** | **-** | Spare bits set to zero | **-** |
| **34** | **RE** | Reserved Expansion Field | **1+** |
| **35** | **SP** | Special Purpose Field | **1+** |
| **FX** | **-** | Field extension indicator | **-** |

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.