

EUROCONTROL STANDARD DOCUMENT

FOR

SURVEILLANCE DATA EXCHANGE

Part 5 : Category 017

**Mode S Surveillance Coordination
Function Messages**

SUR.ET2.ST03.3111-SPC-02-00

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Abstract

This document describes the application of ASTERIX to the transmission of Mode S Surveillance Coordination Function messages.

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

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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 |
|----------------|---------------|--|---|
| 0.3a | July 1998 | Creation of the document | ALL |
| 0.4 | January 1999 | I017/045 : "accuracy" replaced by "resolution" I017/210 : clarification of the encoding rule I017/230 : definition modified I017/240 : structure modified I017/350 : definition modified I017/360 : note modified §5.3.2 : Table 3 modified Annex A : §4.1.6 ; 6.1 & 6.2 modified | see I017/045 see I017/210 see I017/230 see I017/240 see I017/350 see I017/360 see §5.3.2 see Annex A |
| 0.5 | February 1999 | Change definition of NM to meters Mode S Address List, textual change in encoding rule Cluster Controller Command State, textual change in definition | see par. 3.1 see I017/210 see I017/360 |
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| 1.1 | July 2005 | Footer on first page corrected Link to SAC-information on ASTERIX website added | Page i 5.2.2 5.2.3 |
| 1.2 | April 2007 | Document ID-Sheet Updated Signature Page Updated Editorial "clean-up" | ID-Page Signature Pg |
| 1.3 | January 2009 | References to POEMS removed SI/II indication added to item I017/230 Reference to EUROCONTROL website added | 5.2.12 5.2.14 |

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EXECUTIVE SUMMARY

1. SCOPE

- 1.1** This document describes the message structure for the transmission of Mode S Surveillance Coordination Function messages between Mode S ground interrogators.
- 1.2** Surveillance Coordination Function messages are ASTERIX data out of Data Category 017.

2. REFERENCES

2.1 General

At the time of publication of this ASTERIX specification, the editions indicated for the referenced documents and standards were valid.

In the case of a conflict between the requirements of this document and the contents of the other referenced documents, this 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 Radar Information Exchange - ASTERIX.

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3. DEFINITIONS, ACRONYMS AND ABBREVIATIONS

3.1 Definitions

For the purposes of this 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 radar information through an intermediate processing such as transformation of coordinates, 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) directly derived from the radar information and transmitted without any intermediate processing.
- 3.1.8 Mode S:** An enhanced mode of secondary surveillance radar (SSR) which permits the interrogation of all SSR equipped aircraft and the addressed interrogation of suitably equipped aircraft and two-way exchange of digital data between such aircraft and the interrogator.
- 3.1.9 Record:** A collection of transmitted Data Fields of the same category preceded by a Field Specification field, signalling the presence/absence of the various Data Fields
- 3.1.10 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 document the following shall apply:

| | |
|----------------|---|
| ° | Degree (angle) |
| ACAS | Airborne Collision Avoidance System |
| ASTERIX | All Purpose ST ructured Eurocontrol Su R veillance In fo rmation EX change |
| ATC | Air Traffic Control |
| CAT | Data Category |
| CC | Cluster Controller |
| dBm | The dBm is the unit of absolute power related to 1 milliwatt. |
| EATCHIP | European Air Traffic Control Harmonisation and Integration Programme |
| ELM | Extended Length Message |
| EWPD | EATCHIP Work Programme Document |
| f | Scaling factor |
| FL | Flight Level, unit of altitude (expressed in 100's of feet) |
| FRN | Field Reference Number |
| FRUIT | False Replies Unsynchronised In Time |
| FSPEC | Field Specification |
| FX | Field Extension Indicator |
| GICB | Ground Initiated Comm B |
| ICAO | International Civil Aviation Organization |
| II | Interrogator Identifier |
| kt | knot = NM/hour, unit of speed |
| LEN | Length Indicator |
| LSB | Least Significant Bit |
| MB | Message, Comm B |
| MSSR | Monopulse Secondary Surveillance Radar |
| MTD | Moving Target Detection |
| MTI | Moving Target Indicator |
| NIM | Network Information Message |
| NM | Nautical Mile, unit of distance (1852 meters) |
| NMP | Network Monitoring Protocol |
| PSR | Primary Surveillance Radar |

| | |
|---------------|--|
| RA | Resolution Advisory |
| RDE-TF | SuRveillance Date Exchange Task Force |
| RDP | Radar Data Processing (system) |
| REP | Field Repetition Indicator |
| RS | Random Sequence Indicator |
| RSSP | Radar Systems Specialist Panel |
| s | second, unit of time |
| SAC | System Area Code |
| SCN | Surveillance Coordination Network |
| SGN | Surveillance Ground Network |
| SI | Selective Interrogation |
| SIC | System Identification Code |
| SP | Special Purpose Indicator |
| SPI | Special Position Identification |
| SSR | Secondary Surveillance Radar |
| STFRDE | Surveillance Task Force on Radar Data Exchange |
| SURT | Surveillance Team (EATCHIP) |
| TASP | Track Acquisition & Support Protocol |
| UAP | User Application Profile (see Definitions) |
| UTC | Coordinated Universal Time |
| WGS-84 | World Geodetic System-84 |

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4. GENERAL PRINCIPLES

4.1 General

The mode-S sensors shall use the following co-ordinate system:

- Between the SCF function of the Mode-S sensors in a cluster, WGS 84 latitude / longitude co-ordinates shall be used. The coordinates shall be a direct translation of the measured or coasted position of the track. The time stamp shall represent the time the aircraft has been (measured) or should have been (coasted) on that position.
- The speed will be expressed as groundspeed and heading, the heading will be with respect to geographical north at the position of the aircraft as valid at the moment of the time stamp.
- Between Cluster Controller (CC) and the Mode-S sensor also WGS-84 co-ordinates shall be used. Two options are supported with respect to the time synchronisation:
 - The CC extrapolates the co-ordinates to the position and time needed for the next selective interrogation.
 - The mode S sensor extrapolates the co-ordinates to the positions and time needed for the next selective interrogation, based on the track velocity and heading sent.

Note: Dependent on the implementation chosen for the CC, the extrapolation by the CC could take into account e.g. Rate of Turns. In case the extrapolation has been done by the CC, extrapolation in the Mode-S sensor based on the time difference will be minimal. Mode-S sensor could decide to skip extrapolations, if the extrapolation time is within predefined limits

4.1 User Application Profile and Data Blocks

4.2.1 A single User Application Profile (UAP) is defined and shall be used for Surveillance Coordination Function messages.

4.2.2 Data Blocks containing Surveillance Coordination Function messages shall have the following layout.

| | | | | | |
|------------------|------------|--------------|---------------------------|--------------|--------------------------|
| CAT = 017 | LEN | FSPEC | Items of the first record | FSPEC | Items of the last record |
|------------------|------------|--------------|---------------------------|--------------|--------------------------|

where:

- Data Category (CAT) = 017, is a one-octet field indicating that the Data Block contains Surveillance Coordination Function 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.

4.2 Composition of Messages

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

4.3.2 Data Items shall be either compulsory or optional.

4.3.2.1 Compulsory items represent commonly used data required by any application, they shall be implemented;

4.3.2.2 Optional items represent more specific data and their implementation shall be negotiated between users.

4.3.2.3 When Data Items are optional, they shall be either always transmitted or conditionally transmitted. When conditionally transmitted, they shall be present in a Record only if certain conditions are met (e.g. availability of the data).

4.3.2.4 When transmitted, they shall always be in a Record with the corresponding FSPEC bits set to one;

5. LAYOUT OF SURVEILLANCE COORDINATION FUNCTION MESSAGES

5.1 Data Items

The Data Items which shall be used for the transmission of Surveillance Coordination Function messages are defined in Table 1 and described in the following pages.

Table 1 - Data Items of Category 017

| DATA ITEM REF. No. | DESCRIPTION | SYSTEM UNIT |
|--------------------|---|---|
| I017/000 | Message Type | N.A. |
| I017/010 | Data Source Identifier | N.A. |
| I017/012 | Data Destination Identifier | N.A. |
| I017/045 | Aircraft Position in WGS 84 Coordinates | $180/2^{23}$ degrees, |
| I017/050 | Flight Level in Binary Representation | 25 ft |
| I017/070 | Mode 3/A Code in Octal Representation | N.A. |
| I017/140 | Time of Day | 1/128 seconds |
| I017/200 | Track Velocity in Polar Coordinates | Speed : (2^{-14}) NM/s Heading : $360^\circ / (2^{16})$ |
| I017/210 | Mode-S Address List | N.A. |
| I017/220 | Aircraft Address | N.A. |
| I017/221 | Duplicate Address Reference Number | N.A. |
| I017/230 | Transponder Capability | N.A. |
| I017/240 | Track Status | N.A. |
| I017/350 | Cluster Station / Node List | N.A. |
| I017/360 | Cluster Controller Command State | N.A. |

5.2 Description of Data Items

5.2.1 Data Item I017/000, Message Type

Definition: Definition of the type of message in the Surveillance Coordination Network (SCN) environment

Format: One-octet fixed length Data Item.

Structure:

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

bits-8/1

Message type, decimal value

Message Types for category 017 records:

- 000 Network information;
- 010 Track data;
- 020 Track data request;
- 021 Track data stop;
- 022 Cancel track data request;
- 023 Track data stop acknowledgement;
- 030 New Node / Change-over Initial or intermediate message segment
- 031 New Node / Change-over Final or only message segment
- 032 New Node / Change-over Initial or intermediate message segment reply
- 033 New Node / Change-over Final or only message segment reply
- 110 Move node to new cluster state;
- 111 Move node to new cluster state acknowledgement;

Encoding Rules:

See table 3 in 5.3.2

NOTE:

Message types 30 to 33 are specific to POEMS stations.

5.2.2 Data Item I017/010, Data Source Identifier

Definition: Identification of the source node for the SCN data

Format: Two-octets 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 Identity Code

Encoding Rules:

See table 3 in 5.3.2

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

5.2.3 Data Item I017/012, Data Destination Identifier

Definition: Identification of the destination node for the SCN data.

Format: Two-octets 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 Identity Code

Encoding Rules:

See table 3 in 5.3.2

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

5.2.4 Data Item I017/045 Calculated Position in WGS-84 Coordinates

Definition: Calculated Position in WGS-84 Coordinates.

Format: Six-octet fixed length Data Item.

Structure:

Octets no. 6-4

| | | | | | | | | | | | | | | | | | | | | | | | | |
|--------------------|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 2 | 2 | 2 | 2 | 2 |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 | 9 | 8 | 7 | 6 | 5 | |
| Latitude in WGS.84 | | | | | | | | | | | | | | | | | | | | | | | | |

Octets no. 3-1

| | | | | | | | | | | | | | | | | | | | | | | | | |
|---------------------|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2 | 2 | 2 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 4 | 3 | 2 | 1 | 0 | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | |
| Longitude in WGS.84 | | | | | | | | | | | | | | | | | | | | | | | | |

| | | |
|-----------|-----------|---|
| bit-48/25 | Latitude | Latitude in WGS.84 expressed in two's complement. Range: -90 <= latitude < 90 degrees |
| bit-25 | lsb | $lsb = 180/2^{23}$ degrees = $2.145767 * 10^{-05}$ degrees. This corresponds to a resolution of at least 2.4 meters. |
| bit-24/01 | Longitude | Longitude in WGS.84 expressed in two's complement. Range: -180 <= longitude < 180 degrees |
| bit-01 | lsb | $lsb = 180/2^{23}$ degrees = $2.145767 * 10^{-05}$ degrees. This corresponds to a resolution of at least 2.4 meters. |

Encoding Rules:

See table 3 in 5.3.2

Note :

See Annex A for calculation details

5.2.5 Data Item I017/050 Flight Level in Binary Representation

Definition: Flight Level of the Aircraft

Format: Two-octets 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 | Altitude | | | | | | | | | | | | | |

bits-16 (V) = 0 Code validated
= 1 Code not validated

bit-15 (G) = 0 Default
= 1 Garbled code / Error correction applied

bits-14/1 Altitude in binary representation, (LSB) = 1/4
FL = 25 ft.

Encoding Rules:

See table 3 in 5.3.2

NOTES

1. The value shall be within the range described by ICAO Annex 10
2. Bit-15 (G) is set to one when an error correction has been attempted
3. In case of a track miss (coasted position) the flight level sent will be either the predicted flight level from the vertical tracking or the last measured flight level, if no vertical tracking is performed. Bit 7 (FLT) of I017/240 (Track Status) indicates whether vertical tracking was performed or not.

5.2.6 Data Item I017/070, Mode 3/A Code in Octal Representation

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

Format: Two-octets 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 |

| | | | |
|-----------|-----|-----|---|
| bits-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 from the reply of the transponder |
| | | = 1 | Smoothed Mode-3/A code not extracted during the last scan |
| bit-13 | | | Spare bit set to 0 |
| bits-12/1 | | | Mode 3/A reply in octal representation |

Encoding Rules:

See table 3 in 5.3.2

NOTES

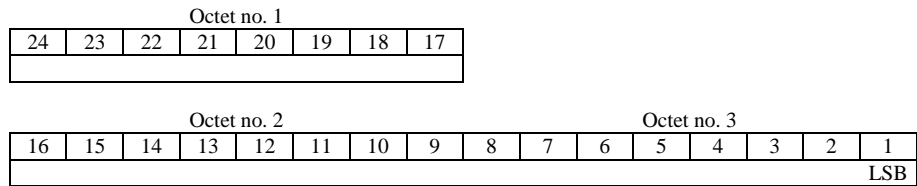
1. Bit 15 is set to one when an error correction has been attempted
2. The data could be used to correlate tracks with non unique Mode S addresses

5.2.7 Data Item I017/140, Time of Day

Definition: Absolute time stamping expressed as Coordinated Universal Time (UTC) time.

Format: Three-octets fixed length Data Item.

Structure:



| | | |
|-----------|---------------|--|
| bits-24/1 | (Time-of-Day) | Acceptable Range of Values : |
| | | $0 \leq \text{Time-of-Day} < 24\text{hrs}$ |
| bit-1 | (LSB) | = $(2^{(-7)}) \text{ s} = 1/128 \text{ s}$ |

Encoding Rules:

See table 3 in 5.3.2

NOTE

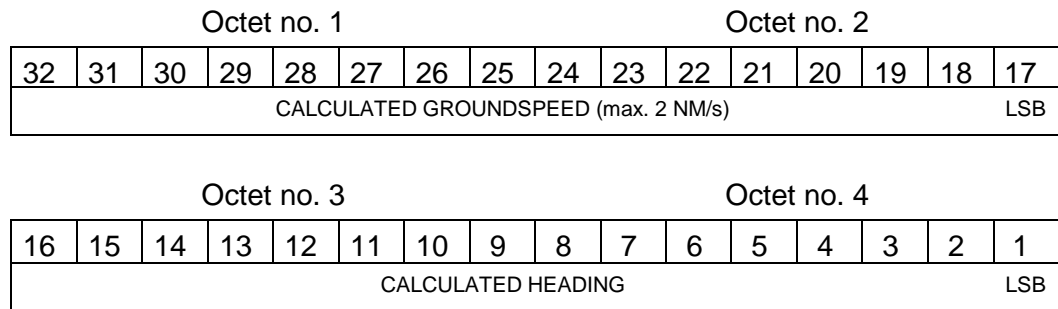
The time of day is reset to zero each day at midnight.

5.2.8 Data Item I017/200, Track Velocity in Polar Co-ordinates

Definition: Calculated track velocity expressed in polar co-ordinates. The heading is the heading with respect to the geographical north at the aircraft position. For clarification see annex A, paragraph5.

Format: Four-octet fixed length Data Item.

Structure:



$$\text{bit-17 (LSB)} = (2^{-14}) \text{ NM/s} = 0.22 \text{ kt}$$

$$\text{bit-1 (LSB)} = 360^\circ / (2^{16}) = 0.0055^\circ$$

Encoding Rules:

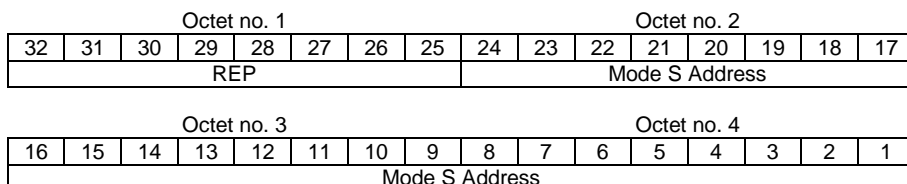
See table 3 in 5.3.2

5.2.9 Data Item I017/210, Mode S Address List

Definition: List of technical Mode S addresses.

Format: Repetitive Data Item starting with a one-octet Repetition Factor followed by at least one Mode S Address of 3-octets length.

Structure:



bits-32/25 (REP)

Repetition factor

bits-24/1

24-bits Mode S address, A23 to A0

Encoding Rules:

See table 3 in 5.3.2

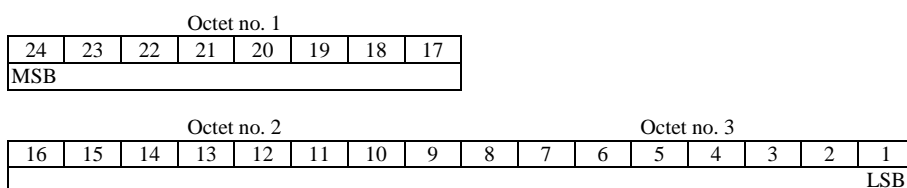
This data item shall be sent even if there is no Mode S Address. In this case it is reduced in length to one octet only (REP =0) with all bits set to zero.

5.2.10 Data Item I017/220, Aircraft Address

Definition: Aircraft address (24-bits Mode S address) assigned uniquely to each aircraft.

Format: Three-octets fixed length Data Item.

Structure:



bits-24/1

24-bits Mode S address, A23 to A0

Encoding Rules:

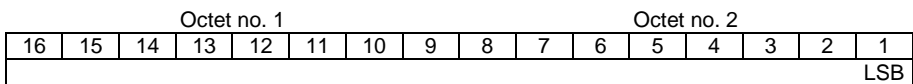
See table 3 in 5.3.2

5.2.11 Data Item I017/221, Duplicate Address Reference Number (DRN)

Definition: A number uniquely identifying the aircraft in case the Mode-S Address is not unique.

Format: Two-octets fixed length Data Item.

Structure:



bits-16/1

16-bits Duplicate Address Reference Number.

Encoding Rules:

See table 3 in 5.3.2

1. The DRN shall be added to the Track Data message, if the radar node, which is sending the Track Data messages, detects two or more aircraft with the same mode-S address in its coverage. How the numbers are generated is determined by the sending station.
2. The radar node receiving the Track Data Messages containing a DRN shall add this DRN in the corresponding "Cancellation of Track Data" message.

Notes:

1. The DRN is used to associate the "Cancellation of Track Data" message with the corresponding "Track Data" messages.
2. The cluster controller node will not use the DRN in the track data message, because there is no cancellation.

5.2.12 Data Item I017/230, Transponder Capability

Definition: Communications capability of the transponder received in the All-Call reply when the aircraft is initially acquired.

Format: One-octet fixed length Data Item.

Structure:

| Octet no. 1 | | | | | | | |
|-------------|---|---|----|-------|---|---|---|
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |
| CA | | | SI | spare | | | |

| | | | |
|----------|---------|-----|--|
| bits-8/6 | (CA) | = 0 | Communications capability of the transponder No communications capability (surveillance only), no ability to set CA code 7 either airborne or on the ground |
| | | = 1 | Reserved |
| | | = 2 | Reserved |
| | | = 3 | Reserved |
| | | = 4 | at least Comm. A and Comm. B capability and the ability to set CA code 7 and on the ground |
| | | = 5 | at least Comm. A and Comm. B capability and the ability to set CA code 7 and airborne |
| | | = 6 | at least Comm. A and Comm. B capability and the ability to set CA code 7 and either airborne or on the ground |
| | | = 7 | signifies the DR field is not equal to 0 or the FS field equals 2, 3, 4 or 5 and either airborne or on the ground |
| bit 5 | (SI) | = 0 | SI/II-capabilities of the transponder transponder SI capable |
| | | = 1 | transponder not SI capable |
| bits-5/1 | (SPARE) | | spare bits set to zero |

Encoding Rules:

See table 3 in 5.3.2

5.2.13 Data Item I017/240, Track Status**Definition:** Status of the track position**Format:** One-octet fixed length Data Item.**Structure:**

| Octet no. 1 | | | | | | | |
|-------------|-----|-------|---|---|---|---|---|
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |
| CST | FLT | spare | | | | | |

| | | |
|----------|---------|------------------------------------|
| bit-8 | (CST) | Track Coasted |
| | | = 0 Measured position |
| | | = 1 No measured position (coasted) |
| bit-7 | (FLT) | Flight Level Tracking |
| | | = 0 Last Measured Flight Level |
| | | = 1 Predicted Flight Level |
| bits-6/1 | (SPARE) | spare bits set to zero |

Encoding Rules:

See table 3 in 5.3.2

This item shall not be sent when CST and FLT equal zero.

5.2.14 Data Item I017/350, Cluster Station/Node List

Definition: List of stations/nodes stored in the known network topology maintained by NMP. The topology to be reported is as defined in the SCN ICD.

Format: Repetitive Data Item starting with a one-octet Repetition Factor followed by at least one radar station identifier of two-octets length.

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 |
| SAC | | | | | | | | | SIC | | | | | | |

| | | |
|------------|-------|--|
| bits-24/17 | (REP) | Repetition factor (Number of stations / nodes) |
| bits-16/1 | | Identifier of first adjacent station / node |
| bits-16/9 | (SAC) | System Area Code |
| bits-8/1 | (SIC) | System Identification Code |

Encoding Rules:

See table 3 in 5.3.2

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

5.2.15 Data Item I017/360, Cluster Controller Command State

Definition: Defines the current mode and state in which a cluster station, the radar node taking part in the cluster, should be operating.

Format: One-octet fixed length Data Item.

Structure:

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

bits-8/1

Station state
Value (0 -255) of state number to be selected

Encoding Rules:

See table 3 in 5.3.2

NOTE - The Cluster Controller will use this field to select the state in which a cluster station should be operating and the cluster station will use this field to indicate to the cluster controller the adopted state.

5.3 Transmission of Surveillance Co-ordination Function Messages

5.3.1 User Application Profile

The following User Application Profile shown in Table 2 shall be used for the transmission of Surveillance Co-ordination Function Messages.

Table 2 - UAP for Surveillance Co-ordination Function Messages

| FRN | Data Item | Information | Length in octets |
|-----|-----------|---|------------------|
| 1 | I017/010 | Data Source Identifier | 2 |
| 2 | I017/012 | Data Destination Identifier | 2 |
| 3 | I017/000 | Message Type | 1 |
| 4 | I017/350 | Cluster station / node list | 1 + 2*n |
| 5 | I017/220 | Aircraft Address | 3 |
| 6 | I017/221 | Duplicate address reference number | 2 |
| 7 | I017/140 | Time of Day | 3 |
| FX | - | Field extension indicator | - |
| 8 | I017/045 | Aircraft position in WGS 84 co-ordinates | 6 |
| 9 | I017/070 | Mode 3/A code in octal representation | 2 |
| 10 | I017/050 | Flight Level in Binary Representation | 2 |
| 11 | I017/200 | Track velocity in polar co-ordinates | 4 |
| 12 | I017/230 | Transponder capability | 1 |
| 13 | I017/240 | Track status | 1 |
| 14 | I017/210 | Mode-S address list | 1+3*n |
| FX | - | Field extension indicator | - |
| 15 | I017/360 | Cluster controller command state | 1 |
| 16 | - | Spare | - |
| 17 | - | Spare | - |
| 18 | - | Spare | - |
| 19 | - | Spare | - |
| 20 | - | Spare | - |
| 21 | - | Reserved for Special Purpose Indicator (SP) | - |
| 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.

The maximum length of the corresponding FSPEC is three octets.

5.3.2 Encoding Rules

The use of the different Data Items of Category 017 shall be as described in Table 3.

Table 3, first part - Use of Data Items of Category 017

| Data Item | Network Information Messages | Track Data Messages | Track Data Request Messages | Cancel-lation of Track Data Messages | Track Data Stop Messages | Track Data Stop Ack Messages |
|---|------------------------------|---------------------|-----------------------------|--------------------------------------|--------------------------|------------------------------|
| I017/010 | * | * | * | * | * | * |
| I017/012 | * | * | * | * | * | * |
| I017/000 | = 000 | = 010 | = 020 | = 022 | = 021 | = 023 |
| I017/350 | * | | | | | |
| I017/220 | | * | * | * | * | * |
| I017/221 | | if needed | | if needed | | |
| I017/140 | | * | | | | |
| I017/045 | | * | | | | |
| I017/070 | | * | | | | |
| I017/050 | | * | | | | |
| I017/200 | | * | | | | |
| I017/230 | | * | | | | |
| I017/240 | | * | | | | |
| I017/210 | | | | | | |
| I017/360 | | | | | | |
| Maximum length of the corresponding FSPEC | 1 octet | 2 octets | 1 octet | 1 octets | 1 octet | 1 octet |

Table 3, second part - Use of Data Items of Category 017

| Data Item | New Node / Change-over initial or intermediate Message segment | New Node / Change-over final or only Message segment | New Node / Change-over initial or intermediate Message segment reply | New Node / Change-over final or only Message segment reply | Move Node to new cluster state Messages | Move Node to new cluster state Ack |
|--|---|--|--|---|--|---|
| I017/010 | * | * | * | * | * | * |
| I017/012 | * | * | * | * | * | * |
| I017/000 | = 030 | = 031 | = 032 | = 033 | = 110 | = 111 |
| I017/350 | | | | | | |
| I017/220 | | | | | | |
| I017/221 | | | | | | |
| I017/140 | | | | | | |
| I017/045 | | | | | | |
| I017/070 | | | | | | |
| I017/050 | | | | | | |
| I017/200 | | | | | | |
| I017/230 | | | | | | |
| I017/240 | | | | | | |
| I017/210 | * | * | * | * | | |
| I017/360 | | | | | * | * |
| Maximum length of the corresponding FSPEC | 2 octets | 2 octets | 2 octets | 2 octets | 3 octets | 3octets |

NOTE - “*” denotes a data item that shall be present in each ASTERIX record.