# Asterix category 017 - Mode S Surveillance Coordination Function Messages

**category**: 017

**edition**: 1.3

**date**: 2009-01-01

## Preamble

Surveillance data exchange.

## Description of standard data items

### I017/000 - Message Type

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

*Structure*:

- 8 bits [ . . . . . . . . ]
- values:

  0: Network information
  10: Track data
  20: Track data request
  21: Track data stop
  22: Cancel track data request
  23: Track data stop acknowledgement
  30: New Node / Change-over Initial or intermediate message segment
  31: New Node / Change-over Final or only message segment
  32: New Node / Change-over Initial or intermediate message segment reply
  33: 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

**NOTE:**
- Message types 30 to 33 are specific to POEMS stations.

### I017/010 - Data Source Identifier

*Definition*: Identification of the source node for the SCN data

*Structure*:

**I017/010/SAC** - *System Area Code*

- 8 bits [ . . . . . . . . ]
- raw value

**I017/010/SIC** - *System Identification Code*

- 8 bits [ . . . . . . . . ]
- raw value

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

## I017/012 - Data Destination Identifier

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

*Structure*:

**I017/012/SAC** - *System Area Code*

- 8 bits [ . . . . . . . . ]
- raw value

**I017/012/SIC** - *System Identification Code*

- 8 bits [ . . . . . . . . ]
- raw value

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

## I017/045 - Calculated Position in WGS-84 Coordinates

*Definition*: Calculated Position in WGS-84 Coordinates.

*Structure*:

**I017/045/LAT** - *Latitude*

- 24 bits [ . . . . . . . . . . . . . . . . . . . . . . . . ]
- signed quantity
- unit: "°"
- LSB = $180/2^2 5$ ° $\approx 5.36e - 6$ °
- value $>= -90$ °
- value $<= 90$ °

**I017/045/LON** - *Longitude*

- 24 bits [ . . . . . . . . . . . . . . . . . . . . . . . . ]
- signed quantity
- unit: "°"
- LSB = $180/2^2 5$ ° $\approx 5.36e - 6$ °
- value $>= -180$ °
- value $< 180$ °

**NOTE:**
- See Annex A for calculation details

## I017/050 - Flight Level in Binary Representation

*Definition*: Flight Level of the Aircraft

*Structure*:

**I017/050/V**

- 1 bit [ . ]
- values:

    0: Code validated
    1: Code not validated

**I017/050/G**

- 1 bit [.]
- values:

    0: Default
    1: Garbled code / Error correction applied

**I017/050/ALT** - *Altitude*

- 14 bits [. . . . . . . . . . . . . .]
- unsigned quantity
- unit: "FL"
- LSB = $1/2^2$ FL $\approx$ 0.25 FL

**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 he 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.


**I017/070 - Mode 3/A Code in Octal Representation**

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

*Structure*:

**I017/070/V**

- 1 bit [.]
- values:

    0: Code validated
    1: Code not validated

**I017/070/G**

- 1 bit [.]
- values:

    0: Default
    1: Garbled code

**I017/070/L**

- 1 bit [.]
- values:

    0: Mode-3/A code derived from the reply of the transponder
    1: Smoothed Mode-3/A code not extracted during the last scan

**I017/070/(spare)**

- 1 bit [.]

**I017/070/MODE3A** - *Mode 3/A Reply in Octal Representation*

- 12 bits [. . . . . . . . . . . .]
- Octal string (3-bits per digit)

**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

**I017/140 - Time of Day**

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

*Structure*:

- 24 bits [. . . . . . . . . . . . . . . . . . . . . . .]
- unsigned quantity
- unit: "s"
- LSB = $1/2^7$ s $\approx 7.81e - 3$ s
- value $< 86400$ s

**NOTE:**
   - The time of day is reset to zero each day at midnight

**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.

*Structure*:

**I017/200/GSP** - *Calculated Groundspeed*

- 16 bits [. . . . . . . . . . . . . . . .]
- unsigned quantity
- unit: "NM/s"
- LSB = $1/2^14$ NM/s $\approx 6.10e - 5$ NM/s

**I017/200/HDG** - *Calculated Heading*

- 16 bits [. . . . . . . . . . . . . . . .]
- unsigned quantity
- unit: "°"
- LSB = $360/2^16$ ° $\approx 5.49e - 3$ °

**I017/210 - Mode S Address List**

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

*Structure*:

Repetitive item, repetition factor 8 bits.

- 24 bits [. . . . . . . . . . . . . . . . . . . . . . .]
- raw value

**NOTE:**
   - 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.

**I017/220 - Aircraft Address**

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

*Structure*:

- 24 bits [. . . . . . . . . . . . . . . . . . . . . . .]
- raw value

**I017/221 - Duplicate Address Reference Number (DRN)**

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

*Structure*:

- 16 bits [. . . . . . . . . . . . . . . .]
- raw value

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

**I017/230 - Transponder Capability**

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

*Structure*:

**I017/230/CA** - *Communications Capability of the Transponder*

- 3 bits [. . .]
- values:

  0: 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 SI/II-capabilities of the Transponder

**I017/230/SI** - *SI/II-capabilities of the Transponder*

- 1 bit [.]
- values:

  0: Transponder SI capable
  1: Transponder not SI capable

**I017/230/(spare)**

- 4 bits [. . . .]

**I017/240 - Track Status**

*Definition*: Status of the track position

*Structure*:

**I017/240/CST** - *Track Coasted*

- 1 bit [.]
- values:
      0: Measured position
      1: No measured position (coasted)

**I017/240/FLT** - *Flight Level Tracking*

- 1 bit [.]
- values:
      0: Last Measured Flight Level
      1: Predicted Flight Level

**I017/240/(spare)**

- 6 bits [ . . . . . . ]

**NOTE:**
- This item shall not be sent when CST and FLT equal zero.

**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.

*Structure*:

Repetitive item, repetition factor 8 bits.

**I017/350/SAC** - *System Area Code*

- 8 bits [ . . . . . . . . ]
- raw value

**I017/350/SIC** - *System Identification Code*

- 8 bits [ . . . . . . . . ]
- raw value

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

**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.

*Structure*:

- 8 bits [ . . . . . . . . ]
- raw value

**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.

**I017/SP - Special Purpose Field**

*Definition*: Special Purpose Field

*Structure*:

Explicit item (SP)


# User Application Profile for Category 017

- (1) I017/010 - Data Source Identifier
- (2) I017/012 - Data Destination Identifier
- (3) I017/000 - Message Type
- (4) I017/350 - Cluster Station/Node List
- (5) I017/220 - Aircraft Address
- (6) I017/221 - Duplicate Address Reference Number (DRN)
- (7) I017/140 - Time of Day
- (FX) - Field extension indicator
- (8) I017/045 - Calculated Position in WGS-84 Coordinates
- (9) I017/070 - Mode 3/A Code in Octal Representation
- (10) I017/050 - Flight Level in Binary Representation
- (11) I017/200 - Track Velocity in Polar Co-ordinates
- (12) I017/230 - Transponder Capability
- (13) I017/240 - Track Status
- (14) I017/210 - Mode S Address List
- (FX) - Field extension indicator
- (15) I017/360 - Cluster Controller Command State
- (16) (spare)
- (17) (spare)
- (18) (spare)
- (19) (spare)
- (20) (spare)
- (21) I017/SP - Special Purpose Field
- (FX) - Field extension indicator