

# Asterix category 007 - Transmission of Directed Interrogation Messages

**category:** 007

**edition:** 1.12

**date:** 2024-07-01

## Preamble

Surveillance data exchange.

## Description of standard data items

### I007/010 - Data Source Identifier

definition: Identification of the radar station from which the data is received.

Group

#### I007/010/SAC - System Area Code

Element

bit size: 8

Raw Content

#### I007/010/SIC - System Identification Code

Element

bit size: 8

Raw Content

**Note:**

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

### I007/020 - Type and Properties of the Target Report and Target Capabilities

definition: Type and properties of the target report and capabilities of the target.

Extended

#### I007/020/TYP

Element

bit size: 3

Values:

- 0:** No detection
- 1:** Single PSR detection
- 2:** Single SSR detection
- 3:** SSR + PSR detection
- 4:** Single ModeS All-Call
- 5:** Single ModeS Roll-Call
- 6:** ModeS All-Call + PSR
- 7:** ModeS Roll-Call + PSR

#### I007/020/SIM

Element

bit size: 1

Values:

- 0:** Actual target report

**1:** Simulated target report

**I007/020/RDP**

Element

bit size: 1

Values:

**0:** Report from RDP Chain 1

**1:** Report from RDP Chain 2

**I007/020/SPI**

Element

bit size: 1

Values:

**0:** Absence of SPI

**1:** Special Position Identification

**I007/020/RAB**

Element

bit size: 1

Values:

**0:** Report from aircraft transponder

**1:** Report from field monitor (fixed transponder)

*(FX) - extension bit*

**I007/020/TST**

Element

bit size: 1

Values:

**0:** Real target report

**1:** Test target report

**I007/020/ERR**

Element

bit size: 1

Values:

**0:** No Extended Range

**1:** Extended Range present

**I007/020/XPP**

Element

bit size: 1

Values:

**0:** No X-Pulse present

**1:** X-Pulse present

**I007/020/ME**

Element

bit size: 1

Values:

**0:** No military emergency

**1:** Military emergency

**I007/020/MI**

Element

bit size: 1

Values:

**0:** No military identification

**1:** Military identification

**I007/020/FOEFRI**

Element  
bit size: 2  
Values:  
  **0**: No Mode 4 interrogation  
  **1**: Friendly target  
  **2**: Unknown target  
  **3**: No reply

*(FX) - extension bit*

### **I007/020/ADSB - On-Site ADS-B Information**

Group

#### **I007/020/ADSB/EP - ADSB Element Populated Bit**

Element  
bit size: 1  
Values:  
  **0**: ADSB not populated  
  **1**: ADSB populated

#### **I007/020/ADSB/VAL - On-Site ADS-B Information**

Element  
bit size: 1  
Values:  
  **0**: Not available  
  **1**: Available

### **I007/020/SCN - Surveillance Cluster Network Information**

Group

#### **I007/020/SCN/EP - SCN Element Populated Bit**

Element  
bit size: 1  
Values:  
  **0**: SCN not populated  
  **1**: SCN populated

#### **I007/020/SCN/VAL - Surveillance Cluster Network Information**

Element  
bit size: 1  
Values:  
  **0**: Not available  
  **1**: Available

### **I007/020/PAI - Passive Acquisition Interface Information**

Group

#### **I007/020/PAI/EP - PAI Element Populated Bit**

Element  
bit size: 1  
Values:  
  **0**: PAI not populated  
  **1**: PAI populated

#### **I007/020/PAI/VAL - Passive Acquisition Interface Information**

Element  
bit size: 1  
Values:  
  **0**: Not available  
  **1**: Available

Spare bits: 1

*(FX) - extension bit*

### **I007/020/ACASVX - ACAS Extended Version**

Group

**I007/020/ACASVX/EP - ACASVX Element Populated Bit**

Element

bit size: 1

Values:

- 0:** ACASVX not populated
- 1:** ACASVX populated

**I007/020/ACASVX/VAL - ACAS Extended Version Value**

Element

bit size: 4

Values:

- 0:** Non-Extended Version
- 1:** ACAS Xa Version 1
- 2:** ACAS Xu Version 1
- 3:** Reserved for future versions
- 4:** Reserved for future versions
- 5:** Reserved for future versions
- 6:** Reserved for future versions
- 7:** Reserved for future versions
- 8:** Reserved for future versions
- 9:** Reserved for future versions
- 10:** Reserved for future versions
- 11:** Reserved for future versions
- 12:** Reserved for future versions
- 13:** Reserved for future versions
- 14:** Reserved for future versions
- 15:** Reserved for future versions

**I007/020/POXPR - PO Transponder Capability**

Group

**I007/020/POXPR/EP - POXPR Element Populated Bit**

Element

bit size: 1

Values:

- 0:** POXPR not populated
- 1:** POXPR populated

**I007/020/POXPR/VAL - PO Transponder Capability**

Element

bit size: 1

Values:

- 0:** PO not supported (PPM only)
- 1:** PO supported

*(FX) - extension bit*

**I007/020/POACT - PO Active for Current Plot**

Group

**I007/020/POACT/EP - POACT Element Populated Bit**

Element

bit size: 1

Values:

- 0:** POACT not populated
- 1:** POACT populated

**I007/020/POACT/VAL - PO Active for Current Plot**

Element

bit size: 1

Values:

- 0:** PO not active

**1:** PO active

### **I007/020/DTFXPR - Basic Dataflash Transponder Capability**

Group

#### **I007/020/DTFXPR/EP - DTFXPR Element Populated Bit**

Element

bit size: 1

Values:

**0:** DTFXPR not populated

**1:** DTFXPR populated

#### **I007/020/DTFXPR/VAL - Basic Dataflash Transponder Capability**

Element

bit size: 1

Values:

**0:** Basic Dataflash not supported

**1:** Basic Dataflash supported

### **I007/020/DTFACT - Basic Dataflash Active for Current Plot**

Group

#### **I007/020/DTFACT/EP - DTFACT Element Populated Bit**

Element

bit size: 1

Values:

**0:** DTFACT not populated

**1:** DTFACT populated

#### **I007/020/DTFACT/VAL - Basic Dataflash in Current Plot**

Element

bit size: 1

Values:

**0:** Basic Dataflash not active

**1:** Basic Dataflash active

Spare bits: 1

*(FX) - extension bit*

### **I007/020/IRMXPR - IRM Transponder Capability**

Group

#### **I007/020/IRMXPR/EP - IRMXPR Element Populated Bit**

Element

bit size: 1

Values:

**0:** IRMXPR not populated

**1:** IRMXPR populated

#### **I007/020/IRMXPR/VAL - Transponder IRM Capability**

Element

bit size: 1

Values:

**0:** Transponder not IRM capable

**1:** Transponder IRM capable

### **I007/020/IRMACT - IRM Active for Current Plot**

Group

#### **I007/020/IRMACT/EP - IRMACT Element Populated Bit**

Element

bit size: 1

Values:

**0:** IRMACT not populated

**1:** IRMACT populated

### **I007/020/IRMACT/VAL - IRM Active for Current Plot**

Element

bit size: 1

Values:

**0:** IRM not active

**1:** IRM active

Spare bits: 3

*(FX) - extension bit*

Notes:

1. For Mode S aircraft, the SPI information is also contained in I007/230.
2. To bits 3/2 of extension 1 (FOE/FRI): IFF interrogators supporting a three level classification of the processing of the Mode 4 interrogation result shall encode the detailed response information in data item M4E of the Reserved Expansion Field of category 007. In this case the value for FOE/FRI in I007/020 shall be set to "00". However, even those interrogators shall use I007/020 to encode the information "No reply".
3. To bit 6 of extension 1 (XPP): This bit shall always be set when the X-pulse has been extracted, independent from the Mode it was extracted with.
4. To bit 7 of extension 1 (ERR): This bit set to "1" indicates that the range of the target is beyond the maximum range in data item I007/040. In this case - and this case only - the ERR Data Item in the Reserved Expansion Field shall provide the range value of the Measured Position in Polar Coordinates.
5. To Extension 2: The EUROCONTROL Specification for European Mode S Stations Edition 4.0 (EMS 4.0) [Ref. 4] defines new functionalities that can use external data inputs. The possibilities described in EMS 4.0 cover the presence of target information acquired via the on-site ADS-B, the Surveillance Cluster Network or the Passive Acquisition Interface. The second extension provides information - per target - on whether such information is available supporting performance improvements, e.g. Passive Acquisition, and new features, e.g. detection of a potential IC Conflict.
6. To Extensions 3, 4, and 5: The transponder MOPS ED-73F/DO-181F (Minimum Operational Performance Standard [Ref. 2]) defines new optional functionalities:
  - Basic Dataflash (to reduce BDS registers extractions by groundsystems)
  - IRM (Interrogation/Reply Monitoring)
  - Phase Overlay (to convey more data within a single long Roll Call Reply, using Downlink Formats 20 and 21)
7. To Extensions 3 and 4: To populate bits in these extensions, Mode S radars will have to decode/analyse the content of BDS register 1,0 (bits 15, 42 and 44) as per [Ref. 2].

### **I007/025 - Data Destination Identifier**

definition: Identification of the radar station to which the data is sent.

Group

### **I007/025/SAC - System Area Code**

Element

bit size: 8

Raw Content

### **I007/025/SIC - System Identification Code**

Element  
bit size: 8  
Raw Content

**Note:**

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

## **I007/030 - Warning/Error Conditions**

definition: Warning/error conditions detected by a radar station for the target report involved.

Repetitive

With FX extension bit.

Element

bit size: 7

Values:

- 0:** Not defined; never used
- 1:** Multipath Reply (Reflection)
- 2:** Reply due to sidelobe interrogation/reception
- 3:** Split plot
- 4:** Second time around reply
- 5:** Angel
- 6:** Slow moving target correlated with road infrastructure (terrestrial vehicle)
- 7:** Fixed PSR plot
- 8:** Slow PSR target
- 9:** Low quality PSR plot
- 10:** Phantom SSR plot
- 11:** Non-Matching Mode-3/A Code
- 12:** Mode C code/Mode S altitude code abnormal value compared to the track
- 13:** Target in Clutter Area
- 14:** Maximum Doppler Response in Zero Filter
- 15:** Transponder anomaly detected
- 16:** Duplicated or Illegal Mode S Aircraft Address
- 17:** Mode S error correction applied
- 18:** Undecodable Mode C code/Mode S altitude code
- 19:** Birds
- 20:** Flock of Birds
- 21:** Mode 1 was present in original reply
- 22:** Mode 2 was present in original reply
- 23:** Plot potentially caused by Wind Turbine
- 24:** Helicopter
- 25:** Maximum number of re-interrogations reached (surveillance information)
- 26:** Maximum number of re-interrogations reached (BDS Extractions)
- 27:** BDS Overlay Incoherence
- 28:** Potential BDS Swap Detected
- 29:** Track Update in the Zenithal Gap
- 30:** Mode S Track re-acquired
- 31:** Duplicated Mode 5 Pair NO/PIN detected
- 32:** Wrong DF reply format detected
- 33:** Transponder anomaly (MS XPD replies with Mode A/C to Mode A/C-only all-call)
- 34:** Transponder anomaly (SI capability report wrong)
- 35:** Potential IC Conflict
- 36:** IC Conflict detection possible - no conflict currently detected

- 37:** Duplicate Mode 5 PIN (refer to the Mode 5 items in the REF)
- 64:** Ambiguous acknowledge, overlapping interrogation windows
- 65:** Ambiguous acknowledge, duplicated request for same Mode S address
- 66:** Ambiguous acknowledge, duplicated request for same track number
- 67:** Reject, unable to process
- 68:** Reject, too many parallel requests (exceeds system parameter for maximum number of requests per scan)
- 69:** Reject, duplicated request

Notes:

1. It has to be stressed that a series of one or more W/E conditions can be reported per target report.
2. Data conveyed in this item are of secondary importance, and can generally also be derived from the processing of mandatory items.
3. Definitions can be found in SUR.ET1.ST03.1000-STD-01-01 Radar Sensor Performance Analysis.
4. Warning/Error codes of 64 and higher are reserved for Directed Interrogation messages.
5. Values 25 to 30 and 32 to 36 have been defined to comply with the Edition 4.0 of the EUROCONTROL Specification for European Mode S Station (EMS) [Ref. 7] and to provide the possibility to report the following information:
  - Code 25: the maximum number of permitted re-interrogations to acquire the surveillance information has been reached;
  - Code 26: the maximum number of permitted re-interrogations to extract BDS Registers has been reached;
  - Code 27: inconsistency detected between the contents of the message and the BDS register overlayed;
  - Code 28: a BDS swap has been detected and the respective information has been discarded;
  - Code 29: the track has been updated while being in the zenithal gap (also referred to as "Cone of Silence");
  - Code 30: the radar had lost track of an aircraft and subsequently re-acquired it.
  - Code 31: ???
  - Code 32: the transponder has used a wrong Downlink Format.
  - Code 33 & 34: reporting specific Transponder Anomalies.
  - Code 35 indicates that a plot has been obtained despite a high probability of an IC Conflict with another interrogator.
  - Code 36 indicates that a plot is in a configuration that it would be possible to detect an IC Conflict with another interrogator. Currently no potential IC Conflict has been detected. NOTE: Although implementation dependent, the use of this code should be limited to the target acquisition phase.
6. Together with Codes 35 and 36 the possibility to communicate the area within which the detection of an IC Conflict is possible was implemented in the Category 034 Specification [Ref. 8] by means of Message Type 008.
7. The use of this Data Item is implementation specific and shall be described in the ICD of the system generating the Category 048 target reports.

## **I007/040 - Measured Position in Polar Co-ordinates**

definition: Measured position of an aircraft in local polar co-ordinates.

Group

### **I007/040/RHO**

Element  
bit size: 16  
Unsigned quantity  
 $LSB = 1/2^8 \text{ NM} \approx 3.90625e - 3 \text{ NM}$   
unit: "NM"  
 $\leq 256.0$

### **I007/040/THETA**

Element  
bit size: 16  
Unsigned quantity  
 $LSB = 360/2^{16} \text{ }^\circ \approx 5.4931640625e - 3 \text{ }^\circ$   
unit: "°"

Notes:

1. In case of no detection, the extrapolated position expressed in slant polar co-ordinates may be sent, except for a track cancellation message. No detection is signalled by the TYP field set to zero in I007/020 Target Report Descriptor.
2. This item represents the measured target position of the plot, even if associated with a track, for the present antenna scan. It is expressed in polar co-ordinates in the local reference system, centred on the radar station.
3. In case of combined detection by a PSR and an SSR, then the SSR position is sent.
4. For targets having a range beyond 256 NM the data item "Extended Range Report" has been added to the Reserved Expansion Field of category 007. The presence of this data item is indicated by the ERR bit set to one in data item I007/020, first extension. The ERR data item shall only be sent if the value of RHO is equal to or greater than 256NM. Please note that if this data item is used, the Encoding Rule to data item I007/040 still applies, meaning that the extra item in the Reserved Expansion Field shall be transmitted in addition to data item I007/040. If the Extended Range Report item in the Reserved Expansion Field is used, it is recommended to set the value of RHO in data item I007/040 to its maximum, meaning bits 32/17 all set to 1.

## **I007/042 - Calculated Position in Cartesian Co-ordinates**

definition: Calculated position of an aircraft in Cartesian co-ordinates.

Group

### **I007/042/X - X-Component**

Element  
bit size: 16  
Signed quantity  
 $LSB = 1/2^7 \text{ NM} \approx 7.8125e - 3 \text{ NM}$   
unit: "NM"  
 $\geq -256.0$   
 $\leq 256.0$

### **I007/042/Y - Y-Component**

Element  
bit size: 16  
Signed quantity  
 $LSB = 1/2^7 \text{ NM} \approx 7.8125e - 3 \text{ NM}$   
unit: "NM"  
 $\geq -256.0$   
 $\leq 256.0$

## **I007/050 - Mode-2 Code in Octal Representation**

definition: Reply to Mode-2 interrogation.

Group

#### **I007/050/V**

Element

bit size: 1

Values:

- 0:** Code validated
- 1:** Code not validated

#### **I007/050/G**

Element

bit size: 1

Values:

- 0:** Default
- 1:** Garbled code

#### **I007/050/L**

Element

bit size: 1

Values:

- 0:** Mode-2 code as derived from the reply of the transponder
- 1:** Smoothed Mode-2 code as provided by a local tracker

Spare bits: 1

### **I007/050/MODE2 - Mode-2 Code in Octal Representation**

Element

bit size: 12

Octal string (3-bits per char)

#### **Note:**

- Bit 15 has no meaning in the case of a smoothed Mode-2 and is set to 0 for a calculated track.

#### **Note:**

- For radar systems interrogation with various technologies (such as military radars interrogating in Mode S and Mode 5), element I007/REF/GEN07/ALTM2 provides the possibility to transmit an alternative Mode-2 value. If this Data Item carries a Mode-2 value that has been derived from a Mode 5 Reply/Report, then bit-4 in I007/REF/MD5/SF#1 and bit-4 in I007/REF/M5N/SF#1 shall be set to 1.

### **I007/055 - Mode-1 Code in Octal Representation**

definition: Reply to Mode-1 interrogation.

Group

#### **I007/055/V**

Element

bit size: 1

Values:

- 0:** Code validated
- 1:** Code not validated

#### **I007/055/G**

Element

bit size: 1

Values:

- 0:** Default

**1:** Garbled code

#### **I007/055/L**

Element

bit size: 1

Values:

**0:** Mode-1 code as derived from the reply of the transponder

**1:** Smoothed Mode-1 code as provided by a local tracker

#### **I007/055/MODE1 - Mode-1 Code**

Element

bit size: 5

Raw Content

Notes:

1. Bit 7 has no meaning in the case of a smoothed Mode-1 and is set to 0 for a calculated track.
2. The values of the bits for V, G, L, A4, A2, A1, B2 and B1 shall be identical to the values of the corresponding bits in subfield #5 of data item "MD5 - Mode 5 Reports" and in subfield #5 of data item "MD5 - Mode 5 Reports, New Format" in the Reserved Expansion Field.

#### **I007/060 - Mode-2 Code Confidence Indicator**

definition: Confidence level for each bit of a Mode-2 reply as provided by a monopulse SSR station.

Group

Spare bits: 4

#### **I007/060/QA4**

Element

bit size: 1

Values:

**0:** High quality pulse A4

**1:** Low quality pulse A4

#### **I007/060/QA2**

Element

bit size: 1

Values:

**0:** High quality pulse A2

**1:** Low quality pulse A2

#### **I007/060/QA1**

Element

bit size: 1

Values:

**0:** High quality pulse A1

**1:** Low quality pulse A1

#### **I007/060/QB4**

Element

bit size: 1

Values:

**0:** High quality pulse B4

**1:** Low quality pulse B4

#### **I007/060/QB2**

Element  
bit size: 1  
Values:  
  **0:** High quality pulse B2  
  **1:** Low quality pulse B2

#### **I007/060/QB1**

Element  
bit size: 1  
Values:  
  **0:** High quality pulse B1  
  **1:** Low quality pulse B1

#### **I007/060/QC4**

Element  
bit size: 1  
Values:  
  **0:** High quality pulse C4  
  **1:** Low quality pulse C4

#### **I007/060/QC2**

Element  
bit size: 1  
Values:  
  **0:** High quality pulse C2  
  **1:** Low quality pulse C2

#### **I007/060/QC1**

Element  
bit size: 1  
Values:  
  **0:** High quality pulse C1  
  **1:** Low quality pulse C1

#### **I007/060/QD4**

Element  
bit size: 1  
Values:  
  **0:** High quality pulse D4  
  **1:** Low quality pulse D4

#### **I007/060/QD2**

Element  
bit size: 1  
Values:  
  **0:** High quality pulse D2  
  **1:** Low quality pulse D2

#### **I007/060/QD1**

Element  
bit size: 1  
Values:  
  **0:** High quality pulse D1  
  **1:** Low quality pulse D1

### **I007/065 - Mode-1 Code Confidence Indicator**

definition: Confidence level for each bit of a Mode-1 reply as provided by a monopulse SSR station.

Group

Spare bits: 3

#### **I007/065/QA4**

Element  
bit size: 1  
Values:

- 0:** High quality pulse A4
- 1:** Low quality pulse A4

#### **I007/065/QA2**

Element  
bit size: 1  
Values:

- 0:** High quality pulse A2
- 1:** Low quality pulse A2

#### **I007/065/QA1**

Element  
bit size: 1  
Values:

- 0:** High quality pulse A1
- 1:** Low quality pulse A1

#### **I007/065/QB2**

Element  
bit size: 1  
Values:

- 0:** High quality pulse B2
- 1:** Low quality pulse B2

#### **I007/065/QB1**

Element  
bit size: 1  
Values:

- 0:** High quality pulse B1
- 1:** Low quality pulse B1

### **I007/070 - Mode-3/A Code in Octal Representation**

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

Group

#### **I007/070/V**

Element  
bit size: 1  
Values:

- 0:** Code validated
- 1:** Code not validated

#### **I007/070/G**

Element  
bit size: 1  
Values:

- 0:** Default
- 1:** Garbled code

#### **I007/070/L**

Element  
bit size: 1  
Values:

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

Spare bits: 1

#### **I007/070/MODE3A - Mode-3/A Reply in Octal Representation**

Element  
bit size: 12  
Octal string (3-bits per char)

Notes:

1. Bit 15 has no meaning in the case of a smoothed Mode-3/A code and is set to 0 for a calculated track. For Mode S, it is set to one when an error correction has been attempted.
2. For Mode S, bit 16 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).
3. For radar systems interrogation with various technologies (such as military radars interrogating in Mode S and Mode 5), element I007/REF/GEN07/ALTM3 provides the possibility to transmit an alternative Mode-3/A value. If this Data Item carries a Mode-3/A value that has been derived from a Mode 5 Reply/Report, then bit-3 in I007/REF/MD5/SF#1 or bit-3 in I048/REF/M5N/SF#1 shall be set to 1.

#### **I007/080 - Mode-3/A Code Confidence Indicator**

definition: Confidence level for each bit of a Mode-3/A reply as provided by a monopulse SSR station.

Group

Spare bits: 4

#### **I007/080/QA4**

Element  
bit size: 1  
Values:  
**0:** High quality pulse A4  
**1:** Low quality pulse A4

#### **I007/080/QA2**

Element  
bit size: 1  
Values:  
**0:** High quality pulse A2  
**1:** Low quality pulse A2

#### **I007/080/QA1**

Element  
bit size: 1  
Values:  
**0:** High quality pulse A1  
**1:** Low quality pulse A1

#### **I007/080/QB4**

Element  
bit size: 1  
Values:  
**0:** High quality pulse B4  
**1:** Low quality pulse B4

#### **I007/080/QB2**

Element  
bit size: 1  
Values:  
  **0:** High quality pulse B2  
  **1:** Low quality pulse B2

#### **I007/080/QB1**

Element  
bit size: 1  
Values:  
  **0:** High quality pulse B1  
  **1:** Low quality pulse B1

#### **I007/080/QC4**

Element  
bit size: 1  
Values:  
  **0:** High quality pulse C4  
  **1:** Low quality pulse C4

#### **I007/080/QC2**

Element  
bit size: 1  
Values:  
  **0:** High quality pulse C2  
  **1:** Low quality pulse C2

#### **I007/080/QC1**

Element  
bit size: 1  
Values:  
  **0:** High quality pulse C1  
  **1:** Low quality pulse C1

#### **I007/080/QD4**

Element  
bit size: 1  
Values:  
  **0:** High quality pulse D4  
  **1:** Low quality pulse D4

#### **I007/080/QD2**

Element  
bit size: 1  
Values:  
  **0:** High quality pulse D2  
  **1:** Low quality pulse D2

#### **I007/080/QD1**

Element  
bit size: 1  
Values:  
  **0:** High quality pulse D1  
  **1:** Low quality pulse D1

### **I007/085 - Mode 5, Extended Mode 1 and X-Pulse**

Compound

#### **I007/085/SUM - Subfield #1: Mode 5 Summary**

Group

**I007/085/SUM/M5**

Element

bit size: 1

Values:

**0:** No Mode 5 interrogation

**1:** Mode 5 interrogation

**I007/085/SUM/ID**

Element

bit size: 1

Values:

**0:** No authenticated Mode 5 ID reply

**1:** Authenticated Mode 5 ID reply

**I007/085/SUM/DA**

Element

bit size: 1

Values:

**0:** No authenticated Mode 5 Data reply or Report

**1:** Authenticated Mode 5 Data reply or Report (i.e. any valid Mode 5 reply type other than ID)

**I007/085/SUM/M1**

Element

bit size: 1

Values:

**0:** Mode 1 code not present or not from Mode 5 reply

**1:** Mode 1 code from Mode 5 reply

**I007/085/SUM/M2**

Element

bit size: 1

Values:

**0:** Mode 2 code not present or not from Mode 5 reply

**1:** Mode 2 code from Mode 5 reply

**I007/085/SUM/M3**

Element

bit size: 1

Values:

**0:** Mode 3 code not present or not from Mode 5 reply

**1:** Mode 3 code from Mode 5 reply

**I007/085/SUM/MC**

Element

bit size: 1

Values:

**0:** Mode C altitude not present or not from Mode 5 reply

**1:** Mode C altitude from Mode 5 reply

Spare bits: 1

**I007/085/PMN - Subfield #2: Mode 5 PIN/National Origin/Mission Code**

Group

Spare bits: 2

**I007/085/PMN/PIN - PIN Code**

Element  
bit size: 14  
Raw Content

Spare bits: 3

**I007/085/PMN/NAT - National Origin**

Element  
bit size: 5  
Raw Content

Spare bits: 2

**I007/085/PMN/MIS - Mission Code**

Element  
bit size: 6  
Raw Content

**I007/085/POS - Subfield #3: Mode 5 Reported Position**

Group

**I007/085/POS/LAT - Latitude in WGS 84**

Element  
bit size: 24  
Signed quantity  
LSB =  $180/2^23$  °  $\approx 2.1457672119140625e - 5$  °  
unit: "°"  
>= -90.0  
≤ 90.0

**I007/085/POS/LON - Longitude in WGS 84**

Element  
bit size: 24  
Signed quantity  
LSB =  $180/2^23$  °  $\approx 2.1457672119140625e - 5$  °  
unit: "°"  
>= -180.0  
≤ 180.0

**I007/085/GA - Subfield #4: Mode 5 GNSS-derived Altitude**

Group

Spare bits: 1

**I007/085/GA/RES - Resolution with which the GNSS-derived Altitude (GA) is Reported**

Element  
bit size: 1  
Values:

**0:** GA reported in 100 ft increments

**1:** GA reported in 25 ft increments

**I007/085/GA/GA - GNSS-derived Altitude of Target, Expressed as Height Above WGS 84 Ellipsoid**

Element  
bit size: 14  
Signed quantity  
LSB = 25 ft  $\approx 25.0$  ft  
unit: "ft"  
≥ -1000.0

**I007/085/EM1 - Subfield #5: Extended Mode 1 Code in Octal Representation**

Group

**I007/085/EM1/V**

Element  
bit size: 1  
Values:

- 0:** Code not validated
- 1:** Code validated

#### **I007/085/EM1/G**

Element  
bit size: 1  
Values:  
**0:** Default  
**1:** Garbled code

#### **I007/085/EM1/L**

Element  
bit size: 1  
Values:  
**0:** Mode-1 code derived from the reply of the transponder  
**1:** Mode-1 code not extracted during the last scan

Spare bits: 1

#### **I007/085/EM1/EM1 - Extended Mode 1 Code in Octal Representation**

Element  
bit size: 12  
Octal string (3-bits per char)

#### **I007/085/TOS - Subfield #6: Time Offset for POS and GA**

Element  
bit size: 8  
Signed quantity  
 $LSB = 1/2^7 \text{ s} \approx 7.8125e - 3 \text{ s}$   
unit: "s"

#### **I007/085/XP - Subfield #7: X Pulse Presence**

Group  
Spare bits: 3

**I007/085/XP/X5 - X-pulse from Mode 5 Data Reply or Report**

Element  
bit size: 1  
Values:  
**0:** X-pulse set to zero or no authenticated Data reply or Report received  
**1:** X-pulse set to one (present)

#### **I007/085/XP/XC - X-pulse from Mode C Reply**

Element  
bit size: 1  
Values:  
**0:** X-pulse set to zero or no Mode C reply  
**1:** X-pulse set to one (present)

#### **I007/085/XP/X3 - X-pulse from Mode 3/A Reply**

Element  
bit size: 1  
Values:  
**0:** X-pulse set to zero or no Mode 3/A reply  
**1:** X-pulse set to one (present)

#### **I007/085/XP/X2 - X-pulse from Mode 2 Reply**

Element  
bit size: 1  
Values:  
**0:** X-pulse set to zero or no Mode 2 reply

**1:** X-pulse set to one (present)

#### **I007/085/XP/X1 - X-pulse from Mode 1 Reply**

Element

bit size: 1

Values:

**0:** X-pulse set to zero or no Mode 1 reply

**1:** X-pulse set to one (present)

#### **I007/090 - Flight Level in Binary Representation**

definition: Flight Level converted into binary representation.

Group

##### **I007/090/V**

Element

bit size: 1

Values:

**0:** Code validated

**1:** Code not validated

##### **I007/090/G**

Element

bit size: 1

Values:

**0:** Default

**1:** Garbled code

##### **I007/090/FL - Flight Level**

Element

bit size: 14

Signed quantity

LSB =  $1/2^2$  FL  $\approx 0.25$  FL

unit: "FL"

Notes:

1. When Mode C code / Mode S altitude code is present but not decodable, the "Undecodable Mode C code / Mode S altitude code" Warning/Error should be sent in I007/030.
2. When local tracking is applied and the received Mode C code / Mode S altitude code corresponds to an abnormal value (the variation with the previous plot is estimated too important by the tracker), the "Mode C code / Mode S altitude code abnormal value compared to the track" Warning/Error should be sent in I007/030.
3. The value shall be within the range described by ICAO Annex 10
4. For Mode S, bit 15 (G) is set to one when an error correction has been attempted.
5. For radar systems interrogating with various technologies (such as military radars interrogating in Mode S and Mode 5), element I007/REF/GEN07/ALTFL provides the possibility to transmit an alternative Flight Level value. If this Data Item carries a Flight Level value that has been derived from a Mode 5 Reply/Report, then bit-2 in I007/REF/MD5/SF#1 and in bit-2 in I007/REF/M5N/SF#1 shall be set to 1.

#### **I007/100 - Mode-C Code and Code Confidence Indicator**

definition: Mode-C height in Gray notation as received from the transponder together with the confidence level for each reply bit as provided by a MSSR/Mode S station.

Group

## **I007/100/V**

Element  
bit size: 1  
Values:  
  **0:** Code validated  
  **1:** Code not validated

## **I007/100/G**

Element  
bit size: 1  
Values:  
  **0:** Default  
  **1:** Garbled code

Spare bits: 2

## **I007/100/MODEC - Mode-C Reply in Gray Notation**

Element  
bit size: 12  
Raw Content

Spare bits: 4

## **I007/100/QC1**

Element  
bit size: 1  
Values:  
  **0:** High quality pulse C1  
  **1:** Low quality pulse C1

## **I007/100/QA1**

Element  
bit size: 1  
Values:  
  **0:** High quality pulse A1  
  **1:** Low quality pulse A1

## **I007/100/QC2**

Element  
bit size: 1  
Values:  
  **0:** High quality pulse C2  
  **1:** Low quality pulse C2

## **I007/100/QA2**

Element  
bit size: 1  
Values:  
  **0:** High quality pulse A2  
  **1:** Low quality pulse A2

## **I007/100/QC4**

Element  
bit size: 1  
Values:  
  **0:** High quality pulse C4  
  **1:** Low quality pulse C4

## **I007/100/QA4**

Element  
bit size: 1  
Values:

**0:** High quality pulse A4  
**1:** Low quality pulse A4

#### **I007/100/QB1**

Element  
bit size: 1  
Values:  
**0:** High quality pulse B1  
**1:** Low quality pulse B1

#### **I007/100/QD1**

Element  
bit size: 1  
Values:  
**0:** High quality pulse D1  
**1:** Low quality pulse D1

#### **I007/100/QB2**

Element  
bit size: 1  
Values:  
**0:** High quality pulse B2  
**1:** Low quality pulse B2

#### **I007/100/QD2**

Element  
bit size: 1  
Values:  
**0:** High quality pulse D2  
**1:** Low quality pulse D2

#### **I007/100/QB4**

Element  
bit size: 1  
Values:  
**0:** High quality pulse B4  
**1:** Low quality pulse B4

#### **I007/100/QD4**

Element  
bit size: 1  
Values:  
**0:** High quality pulse D4  
**1:** Low quality pulse D4

Notes:

1. For Mode S, D1 is also designated as Q, and is used to denote either 25ft or 100ft reporting.
2. For Mode S, bit-31 (G) is set when an error correction has been attempted.

### **I007/110 - Height Measured by a 3D Radar**

definition: Height of a target as measured by a 3D radar. The height shall use mean sea level as the zero reference level.

Group

Spare bits: 2

#### **I007/110/3DH - 3D-Height**

Element  
bit size: 14  
Signed quantity  
LSB = 25 ft  $\approx$  25.0 ft  
unit: "ft"

## **I007/120 - Radial Doppler Speed**

definition: Information on the Doppler Speed of the target report.  
Compound

### **I007/120/CAL - Subfield #1: Calculated Doppler Speed**

Group

#### **I007/120/CAL/D**

Element  
bit size: 1  
Values:  
0: Doppler speed is valid  
1: Doppler speed is doubtful

Spare bits: 5

#### **I007/120/CAL/CAL - Calculated Doppler Speed**

Element  
bit size: 10  
Signed quantity  
LSB = 1 m/s  $\approx$  1.0 m/s  
unit: "m/s"

### **I007/120/RDS - Subfield #2: Raw Doppler Speed**

Repetitive  
Regular, 1 byte(s) REP field size.  
Group

#### **I007/120/RDS/DOP - Doppler Speed**

Element  
bit size: 16  
Unsigned quantity  
LSB = 1 m/s  $\approx$  1.0 m/s  
unit: "m/s"

#### **I007/120/RDS/AMB - Ambiguity Range**

Element  
bit size: 16  
Unsigned quantity  
LSB = 1 m/s  $\approx$  1.0 m/s  
unit: "m/s"

#### **I007/120/RDS/FRQ - Transmitter Frequency**

Element  
bit size: 16  
Unsigned quantity  
LSB = 1 MHz  $\approx$  1.0 MHz  
unit: "MHz"

## **I007/130 - Radar Plot Characteristics**

definition: Additional information on the quality of the target report.  
Compound

### **I007/130/SRL - Subfield #1: SSR Plot Runlength**

Element  
 bit size: 8  
 Unsigned quantity  
 $LSB = 360/2^13 \text{ } \circ \approx 4.39453125e - 2 \text{ } \circ$   
 unit: "°"

**I007/130/SRR - Subfield #2: Number of Received Replies for (M)SSR**

Element  
 bit size: 8  
 Unsigned integer

**I007/130/SAM - Subfield #3: Amplitude of Received Replies for (M)SSR**

Element  
 bit size: 8  
 Signed quantity  
 $LSB = 1 \text{ dBm} \approx 1.0 \text{ dBm}$   
 unit: "dBm"

**I007/130/PRL - Subfield #4: PSR Plot Runlength**

Element  
 bit size: 8  
 Unsigned quantity  
 $LSB = 360/2^13 \text{ } \circ \approx 4.39453125e - 2 \text{ } \circ$   
 unit: "°"

**I007/130/PAM - Subfield #5: PSR Amplitude**

Element  
 bit size: 8  
 Signed quantity  
 $LSB = 1 \text{ dBm} \approx 1.0 \text{ dBm}$   
 unit: "dBm"

**I007/130/RPD - Subfield #6: Difference in Range Between PSR and SSR Plot**

Element  
 bit size: 8  
 Signed quantity  
 $LSB = 1/2^8 \text{ NM} \approx 3.90625e - 3 \text{ NM}$   
 unit: "NM"

**I007/130/APD - Subfield #7: Difference in Azimuth Between PSR and SSR Plot**

Element  
 bit size: 8  
 Signed quantity  
 $LSB = 360/2^14 \text{ } \circ \approx 2.197265625e - 2 \text{ } \circ$   
 unit: "°"

Notes:

1. The total range covered is therefore from 0 to  $11.21 \text{ } \circ$ .
2. Negative values are coded in two's complement form.
3. The total range covered is therefore from 0 to  $11.21 \text{ } \circ$ .
4. Negative values are coded in two's complement form.
5. Negative values are coded in two's complement form.
6. The covered range difference is  $\pm 0.5 \text{ NM}$ .
7. Sending the maximum value means that the difference in range is equal or greater than the maximum value.
8. Negative values are coded in two's complement form.
9. The covered azimuth difference is  $\pm 360/2^7 = \pm 2.8125 \text{ } \circ$ .
10. Sending the maximum value means that the difference in range is equal or greater than the maximum value.

## **I007/140 - Time of Day**

definition: Absolute time stamping expressed as Co-ordinated Universal Time (UTC).

Element

bit size: 24

Unsigned quantity

LSB =  $1/2^7$  s  $\approx 7.8125e - 3$  s

unit: "s"

< 86400.0

Notes:

1. The time of day value is reset to 0 each day at midnight.
2. Every radar station using ASTERIX should be equipped with at least one synchronised time source

## **I007/161 - Track Number**

definition: An integer value representing a unique reference to a track record within a particular track file.

Group

Spare bits: 4

### **I007/161/TN - Track Number**

Element

bit size: 12

Raw Content

## **I007/170 - Track Status**

definition: Status of monoradar track (PSR and/or SSR updated).

Extended

### **I007/170/CNF - Confirmed Vs. Tentative Track**

Element

bit size: 1

Values:

**0:** Confirmed Track

**1:** Tentative Track

### **I007/170/RAD - Type of Sensor(s) Maintaining Track**

Element

bit size: 2

Values:

**0:** Combined Track

**1:** PSR Track

**2:** SSR/Mode S Track

**3:** Invalid

### **I007/170/DOU - Signals Level of Confidence in Plot to Track Association Process**

Element

bit size: 1

Values:

**0:** Normal confidence

**1:** Low confidence in plot to track association

### **I007/170/MAH - Manoeuvre Detection in Horizontal Sense**

Element

bit size: 1

Values:

**0:** No horizontal manoeuvre sensed

**1:** Horizontal manoeuvre sensed

### **I007/170/CDM - Climbing/Descending Mode**

Element

bit size: 2

Values:

**0:** Maintaining

**1:** Climbing

**2:** Descending

**3:** Unknown

*(FX) - extension bit*

### **I007/170/TRE - Signal for End\_of\_Track**

Element

bit size: 1

Values:

**0:** Track still alive

**1:** End of track lifetime (last report for this track)

### **I007/170/GHO - Ghost Vs. True Target**

Element

bit size: 1

Values:

**0:** True target track

**1:** Ghost target track

### **I007/170/SUP - Track Maintained with Track Information from Neighbouring Node B on the Cluster, or Network**

Element

bit size: 1

Values:

**0:** No

**1:** Yes

### **I007/170/TCC - Type of Plot Coordinate Transformation Mechanism**

Element

bit size: 1

Values:

**0:** Tracking performed in so-called 'Radar Plane', i.e. neither slant range correction nor stereographical projection was applied

**1:** Slant range correction and a suitable projection technique are used to track in a 2D reference plane, tangential to the earth model at the Radar Site co-ordinates

Spare bits: 3

*(FX) - extension bit*

### **I007/200 - Calculated Track Velocity in Polar Co-ordinates**

definition: Calculated track velocity expressed in polar co-ordinates.

Group

### **I007/200/GSP - Calculated Groundspeed**

Element  
bit size: 16  
Unsigned quantity  
 $LSB = 1/2^{14} \text{ NM/s} \approx 6.103515625e - 5 \text{ NM/s}$   
unit: "NM/s"

### **I007/200/HDG - Calculated Heading**

Element  
bit size: 16  
Unsigned quantity  
 $LSB = 360/2^{16} \text{ }^{\circ} \approx 5.4931640625e - 3 \text{ }^{\circ}$   
unit: "°"

Notes:

- The calculated heading is related to the geographical North at the aircraft position.

### **I007/210 - Track Quality**

definition: Track quality in the form of a vector of standard deviations.

Group

#### **I007/210/SIGX - Standard Deviation on the Horizontal Axis of the Local Grid System**

Element  
bit size: 8  
Unsigned quantity  
 $LSB = 1/2^7 \text{ NM} \approx 7.8125e - 3 \text{ NM}$   
unit: "NM"

#### **I007/210/SIGY - Standard Deviation on the Vertical Axis of the Local Grid System**

Element  
bit size: 8  
Unsigned quantity  
 $LSB = 1/2^7 \text{ NM} \approx 7.8125e - 3 \text{ NM}$   
unit: "NM"

#### **I007/210/SIGV - Standard Deviation on the Groundspeed Within the Local Grid System**

Element  
bit size: 8  
Unsigned quantity  
 $LSB = 1/2^{14} \text{ NM/s} \approx 6.103515625e - 5 \text{ NM/s}$   
unit: "NM/s"

#### **I007/210/SIGH - Standard Deviation on the Heading Within the Local Grid System**

Element  
bit size: 8  
Unsigned quantity  
 $LSB = 360/2^{12} \text{ }^{\circ} \approx 8.7890625e - 2 \text{ }^{\circ}$   
unit: "°"

Notes:

1. The standard deviation is per definition a positive value, hence the range covered is :  $0 \leq \text{Sigma}(X) < 2 \text{ NM}$
2. The standard deviation is per definition a positive value, hence the range covered is :  $0 \leq \text{Sigma}(Y) < 2 \text{ NM}$

3. The standard deviation is per definition a positive value, hence the range covered is:  $0 \leq \text{Sigma (V)} < 56.25 \text{ Kt}$
4. The standard deviation is per definition a positive value; hence the range covered is:  $0 \leq \text{sigma (H)} < 22.5 \text{ degrees}$ .

### **I007/220 - Aircraft Address**

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

Element  
bit size: 24  
Raw Content

### **I007/230 - Communications/ACAS Capability and Flight Status**

definition: Communications capability of the transponder, capability of the on-board ACAS equipment and flight status.

Group

#### **I007/230/COM - Communications Capability of the Transponder**

Element  
bit size: 3  
Values:  
**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:** Not Assigned  
**6:** Not Assigned  
**7:** Not Assigned

#### **I007/230/STAT - Flight Status**

Element  
bit size: 3  
Values:  
**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:** Not Assigned  
**7:** Unknown

#### **I007/230/SI - SI/II Transponder Capability**

Element  
bit size: 1  
Values:  
**0:** SI-Code Capable  
**1:** II-Code Capable

Spare bits: 1

#### **I007/230/MSSC - Mode-S Specific Service Capability**

Element  
bit size: 1  
Values:  
**0:** No

**1:** Yes

#### **I007/230/ARC - Altitude Reporting Capability**

Element

bit size: 1

Values:

**0:** 100 ft resolution

**1:** 25 ft resolution

#### **I007/230/AIC - Aircraft Identification Capability**

Element

bit size: 1

Values:

**0:** No

**1:** Yes

#### **I007/230/B1A - BDS 1,0 Bit 16**

Element

bit size: 1

Raw Content

#### **I007/230/B1B - BDS 1,0 Bits 37/40**

Element

bit size: 4

Raw Content

#### **Note:**

- This item shall be present in every ASTERIX record conveying data related to a Mode S target. If the datalink capability has not been extracted yet, bits 16/14 shall be set to zero.

#### **I007/240 - Aircraft Identification**

definition: Aircraft identification (in 8 characters) obtained from an aircraft equipped with a Mode S transponder.

Element

bit size: 48

ICAO string (6-bits per char)

Notes:

1. This data item contains the flight identification as available in the respective Mode S transponder registers.

#### **I007/250 - Mode S MB Data**

definition: Mode S Comm B data as extracted from the aircraft transponder.

Repetitive

Regular, 1 byte(s) REP field size.

Group

#### **I007/250/MBDATA - Mode S Comm B Message Data**

Element

bit size: 56

Raw Content

#### **I007/250/BDS1 - Comm B Data Buffer Store 1 Address**

Element  
bit size: 4  
Raw Content

### **I007/250/BDS2 - Comm B Data Buffer Store 2 Address**

Element  
bit size: 4  
Raw Content

Notes:

1. For the transmission of BDS Register 2,0, Data Item I007/240 is used.
2. For the transmission of BDS Register 3,0, Data Item I007/260 is used.
3. In case of data extracted via Comm-B broadcast, all bits of fields BDS1 and BDS2 are set to 0; in case of data extracted via GICB requests, the fields BDS1 and BDS2 correspond to the GICB register number.

### **I007/260 - ACAS Resolution Advisory Report**

definition: Currently active Resolution Advisory (RA), if any, generated by the ACAS associated with the transponder transmitting the report and threat identity data.

Element  
bit size: 56  
Raw Content

Notes:

1. Refer to ICAO Draft SARPs for ACAS for detailed explanations.

### **I007/400 - Directed Interrogation Request Number**

definition: Directed interrogation request number  
Group

#### **I007/400/PRI - Priority of Command**

Element  
bit size: 1  
Values:

**0:** Normal Priority, surveillance function has priority  
**1:** High Priority, Directed interrogation has priority over surveillance

#### **I007/400/RN - Request Number**

Element  
bit size: 15  
Raw Content

Notes:

1. The Request Number is created by the client, which directs the sensor to perform an interrogation.
2. The sensor will use the same request number for all subsequent messages related to the respective directed interrogation.
3. The sensor will not accept a request number which is currently processed.
4. In some cases (e.g. overlapping of directed interrogation windows with partially equal mode combinations) the sensor cannot determine which request number to assign to target reports due to ambiguity. In this case one matching request number will be used and the sensor has to generate an "ambiguous acknowledge" message when accepting the command.

5. A value of 0 for the Request Number will cause an Interrogation reject by the sensor. Therefore, the Request Number shall always be greater than or equal to 1.

### **I007/410 - Directed Interrogation Message Type**

definition: Directed interrogation message type

Element

bit size: 8

Values:

- 0:** Acknowledge
- 1:** Reject
- 2:** Interrogation Finished
- 3:** Interrogation Completed
- 4:** Target Report
- 5:** Interrogation Request Type A
- 6:** Interrogation Request Type B
- 7:** Interrogation Request Type C
- 8:** Selective BDS-Register Request

Notes:

1. Using the Acknowledge the sensor will confirm the receipt of the directed interrogation command.
2. After the sensor has completed the interrogation, i.e. the interrogations are transmitted, the sensor will report an Interrogation Finished message.
3. When no further targets for a directed interrogation are expected, an Interrogation Completed message will be issued by the interrogator.
4. Although each Directed Interrogation should result in exactly one target report, cases may occur resulting in error conditions. These potential error conditions are signalled with item I007/030.

### **I007/415 - Required Interrogation Modes**

definition: Directed Interrogation MIPs

Compound

*Spare*

*Spare*

*Spare*

*Spare*

*Spare*

*Spare*

### **I007/415/RIM - Subfield #1: Required Interrogation Modes**

Group

Spare bits: 7

### **I007/415/RIM/LO - Lockout Override**

Element

bit size: 1

Values:

- 0:** No lockout override
- 1:** Lockout override

### **I007/415/RIM/MSPROB - Probability of Reply If Mode S UF11 or Combined Modes Are Used**

Element

bit size: 3

Values:

**0:** 1  
**1:** 1/2  
**2:** 1/4  
**3:** 1/8  
**4:** 1/16

**I007/415/RIM/M5FORMAT - Mode 5 Format**

Element  
bit size: 5  
Raw Content

**I007/415/RIM/M4CS - Mode 4 Code Selection**

Element  
bit size: 2  
Values:  
**0:** Code A  
**1:** Code B  
**2:** Defined by sensor

**I007/415/RIM/M5S - M5\_SUPERMODE\_S**

Element  
bit size: 1  
Raw Content

**I007/415/RIM/SM5S - M5\_SUPERMODE\_S**

Element  
bit size: 1  
Raw Content

**I007/415/RIM/SM54 - M5\_SUPERMODE\_4**

Element  
bit size: 1  
Raw Content

**I007/415/RIM/SM5C - M5\_SUPERMODE\_C**

Element  
bit size: 1  
Raw Content

**I007/415/RIM/SM53 - M5\_SUPERMODE\_3A**

Element  
bit size: 1  
Raw Content

**I007/415/RIM/SM52 - M5\_SUPERMODE\_2**

Element  
bit size: 1  
Raw Content

**I007/415/RIM/SM51 - M5\_SUPERMODE\_1**

Element  
bit size: 1  
Raw Content

Spare bits: 1

**I007/415/RIM/M5 - MODE\_5**

Element  
bit size: 1  
Raw Content

**I007/415/RIM/RCMA - MODE S ROLL\_CALL**

Element  
bit size: 1  
Raw Content

**I007/415/RIM/RCMC - MODE S ROLL\_CALL**

Element  
bit size: 1  
Raw Content

**I007/415/RIM/CMC - COMBINED\_C**

Element  
bit size: 1  
Raw Content

**I007/415/RIM/CM3A - COMBINED\_3A**

Element  
bit size: 1  
Raw Content

**I007/415/RIM/MS - MODE\_S**

Element  
bit size: 1  
Raw Content

**I007/415/RIM/M4S - M4\_SUPERMODE\_**

Element  
bit size: 1  
Raw Content

**I007/415/RIM/SMC - SUPERMODE\_C**

Element  
bit size: 1  
Raw Content

**I007/415/RIM/SM3A - SUPERMODE\_3A**

Element  
bit size: 1  
Raw Content

**I007/415/RIM/SM2 - SUPERMODE\_2**

Element  
bit size: 1  
Raw Content

**I007/415/RIM/SM1 - SUPERMODE\_1**

Element  
bit size: 1  
Raw Content

**I007/415/RIM/MCO - MODE\_C\_ONLY**

Element  
bit size: 1  
Raw Content

**I007/415/RIM/M3O - MODE\_3A\_ONLY**

Element  
bit size: 1  
Raw Content

**I007/415/RIM/MCS - MODE\_C\_S**

Element  
bit size: 1  
Raw Content

**I007/415/RIM/M3S - MODE\_3A\_S**

Element  
bit size: 1  
Raw Content

**I007/415/RIM/MD - MODE\_D**

Element  
bit size: 1  
Raw Content

**I007/415/RIM/MC - MODE\_C**

Element  
bit size: 1  
Raw Content

**I007/415/RIM/MB - MODE\_B**

Element  
bit size: 1  
Raw Content

**I007/415/RIM/M4 - MODE\_4**

Element  
bit size: 1  
Raw Content

**I007/415/RIM/M3A - MODE\_3A**

Element  
bit size: 1  
Raw Content

**I007/415/RIM/M2 - MODE\_2**

Element  
bit size: 1  
Raw Content

**I007/415/RIM/M1 - MODE\_1**

Element  
bit size: 1  
Raw Content

**I007/415/MIPT - Subfield #2: MIP Table**

Element  
bit size: 8  
Raw Content

**I007/420 - Directed Interrogation Window**

definition: Geographical window defined in polar co-ordinates  
Group

**I007/420/RS - Rho-Start**

Element  
bit size: 16  
Unsigned quantity  
 $LSB = 1/2^8 \text{ NM} \approx 3.90625e - 3 \text{ NM}$   
unit: "NM"  
 $< 256.0$

**I007/420/RE - Rho-End**

Element  
bit size: 16  
Unsigned quantity  
 $LSB = 1/2^8 \text{ NM} \approx 3.90625e - 3 \text{ NM}$   
unit: "NM"  
 $< 256.0$

**I007/420/TS - Theta-Start**

Element  
bit size: 16  
Unsigned quantity  
 $LSB = 360/2^{16} \text{ }^\circ \approx 5.4931640625e - 3 \text{ }^\circ$   
unit: "°"

**I007/420/TE - Theta-End**

Element  
bit size: 16  
Unsigned quantity  
 $LSB = 360/2^{16} \text{ }^\circ \approx 5.4931640625e - 3 \text{ }^\circ$   
unit: "°"

Notes:

1. When present, this window defines the area which should be interrogated and for which the target reports are expected.
2. The sensor shall use this window to determine the azimuth range for the directed interrogation.
3. The sensor may use this window to tag the extracted targets within this window with the request number.
4. In case multiple request windows overlap, the sensor may respond with an Ambiguous Acknowledge. It shall be noted, that internally generated expectation windows for directed interrogations related to targets/tracks may also lead to Ambiguous Acknowledge Responses.
5. The target window is meant within a NE related coordinated system with the point of origin at the radar head.

### **I007/440 - Directed Interrogation BDS Register Request**

definition: Directed Interrogation BDS Register Request

Repetitive

Regular, 1 byte(s) REP field size.

Group

#### **I007/440/BDS1 - Comm B Data Buffer Store 1 Address**

Element

bit size: 4

Raw Content

#### **I007/440/BDS2 - Comm B Data Buffer Store 2 Address**

Element

bit size: 4

Raw Content

Notes:

1. A Directed Interrogation BDS request will only be performed once. If it is not successful it will not be repeated automatically but has to be re-ordered.

### **I007/450 - Directed Interrogation Result**

definition: Directed Interrogation Result

Compound

#### **I007/450/TR - Subfield #1: Truncation**

Group

Spare bits: 4

#### **I007/450/TR/N - Interrogation Was Not Executed**

Element

bit size: 1

Raw Content

#### **I007/450/TR/T - Interrogation Scheduler Has Truncated the All Call Request**

Element

bit size: 1

Raw Content

#### **I007/450/TR/A - Interrogation Scheduler Has Activated the Request At Least Once**

Element  
bit size: 1  
Raw Content

**I007/450/TR/C - Interrogation Scheduler Has Activated the Request During All Its Validity**

Element  
bit size: 1  
Raw Content

**I007/450/M4 - Subfield #2: Mode 4 Interrogations**

Element  
bit size: 8  
Raw Content

**I007/450/M5 - Subfield #3: Mode 5 Interrogations**

Element  
bit size: 8  
Raw Content

**I007/450/MS - Subfield #4: Mode S All Call Interrogations**

Group

Spare bits: 6

**I007/450/MS/LO - Lockout**

Element  
bit size: 2  
Values:

- 0:** No Lockout used by Interrogation Scheduler
- 1:** Lockout used by Interrogation Scheduler
- 2:** Lockout-Override applied

**I007/450/MS/NB - Number of Mode S All Calls Performed for the Request**

Element  
bit size: 8  
Raw Content

**I007/450/MX - Subfield #5: Mark X Interrogations**

Element  
bit size: 8  
Raw Content

**I007/450/SMS - Subfield #6: Selective Mode S Interrogations**

Element  
bit size: 8  
Raw Content

**I007/REF - Reserved Expansion Field**

Explicit (ReservedExpansion)

**I007/SPF - Special Purpose Field**

Explicit (SpecialPurpose)

**User Application Profile**

This category has multiple UAPs.

UAP selection is based on the value of: 410

- 0  
downlink
- 1  
downlink
- 2  
downlink
- 3  
downlink
- 4  
downlink
- 5  
uplink
- 6  
uplink
- 7  
uplink
- 8  
uplink

## **downlink**

- 1: I007/010 - Data Source Identifier
- 2: I007/025 - Data Destination Identifier
- 3: I007/410 - Directed Interrogation Message Type
- 4: I007/140 - Time of Day
- 5: I007/400 - Directed Interrogation Request Number
- 6: I007/020 - Type and Properties of the Target Report and Target Capabilities
- 7: I007/040 - Measured Position in Polar Co-ordinates
- (FX) - Field extension indicator
- 8: I007/070 - Mode-3/A Code in Octal Representation
- 9: I007/090 - Flight Level in Binary Representation
- 10: I007/130 - Radar Plot Characteristics
- 11: I007/220 - Aircraft Address
- 12: I007/240 - Aircraft Identification
- 13: I007/250 - Mode S MB Data
- 14: I007/161 - Track Number
- (FX) - Field extension indicator
- 15: I007/042 - Calculated Position in Cartesian Co-ordinates
- 16: I007/200 - Calculated Track Velocity in Polar Co-ordinates
- 17: I007/170 - Track Status
- 18: I007/210 - Track Quality
- 19: I007/030 - Warning/Error Conditions
- 20: I007/080 - Mode-3/A Code Confidence Indicator
- 21: I007/100 - Mode-C Code and Code Confidence Indicator
- (FX) - Field extension indicator
- 22: I007/110 - Height Measured by a 3D Radar
- 23: I007/120 - Radial Doppler Speed
- 24: I007/230 - Communications/ACAS Capability and Flight Status
- 25: I007/260 - ACAS Resolution Advisory Report
- 26: I007/055 - Mode-1 Code in Octal Representation
- 27: I007/050 - Mode-2 Code in Octal Representation
- 28: I007/065 - Mode-1 Code Confidence Indicator
- (FX) - Field extension indicator
- 29: I007/060 - Mode-2 Code Confidence Indicator
- 30: I007/450 - Directed Interrogation Result
- 31: I007/085 - Mode 5, Extended Mode 1 and X-Pulse
- *Spare*
- *Spare*
- 34: I007/SPF - Special Purpose Field
- 35: I007/REF - Reserved Expansion Field

- (FX) - Field extension indicator

## uplink

- 1: I007/010 - Data Source Identifier
- 2: I007/025 - Data Destination Identifier
- 3: I007/410 - Directed Interrogation Message Type
- 4: I007/140 - Time of Day
- 5: I007/400 - Directed Interrogation Request Number
- 6: I007/040 - Measured Position in Polar Co-ordinates
- 7: I007/220 - Aircraft Address
- (FX) - Field extension indicator
- 8: I007/161 - Track Number
- 9: I007/042 - Calculated Position in Cartesian Co-ordinates
- 10: I007/200 - Calculated Track Velocity in Polar Co-ordinates
- 11: I007/415 - Required Interrogation Modes
- 12: I007/420 - Directed Interrogation Window
- 13: I007/440 - Directed Interrogation BDS Register Request
- *Spare*
- (FX) - Field extension indicator
- *Spare*
- *Spare*
- *Spare*
- *Spare*
- 20: I007/SPF - Special Purpose Field
- 21: I007/REF - Reserved Expansion Field
- (FX) - Field extension indicator