

cat021 expansion specification

Release 2018-03-08, 1.4

ADS-B Target Reports Expansion

2018-03-08

CONTENTS:

1	Description of asterix expansion	3
2	Indices and tables	13

category: 021

edition: 1.4

date: 2018-03-08

DESCRIPTION OF ASTERIX EXPANSION

Compound item (fspec=8 bits)

I021/BPS - *Barometric Pressure Setting*

I021/BPS/(spare)

- 4 bits [. . . .]

I021/BPS/BPS - *Barometric Pressure Setting*

- 12 bits [.]
- unsigned quantity
- scaling factor: 0.1
- fractional bits: 0
- unit: "hPa"
- LSB = 0.1 hPa
- value ≥ 0 hPa
- value ≤ 409.5 hPa

remark Notes:

- BPS is the barometric pressure setting of the aircraft minus 800 hPa
- A value of "0" indicates that in the aircraft a value of 800 hPa or less has been selected.
- A value of "409.5" indicates that in the aircraft a value of 1209.5 hPa or more has been selected.

I021/SH - *Selected Heading*

I021/SH/(spare)

- 4 bits [. . . .]

I021/SH/HDR - *Horizontal Reference Direction*

- 1 bit [.]
- values:
 - 0: True North
 - 1: Magnetic North

I021/SH/STAT - *Selected Heading Status*

- 1 bit [.]
- values:

- 0: Data is either unavailable or invalid.
- 1: Data is available and valid.

I021/SH/SH - *Selected Heading*

- 10 bits [.....]
- unsigned quantity
- scaling factor: 45
- fractional bits: 6
- unit: “deg”
- $\text{LSB} = 45/2^6 \text{ deg} = 45/64 \text{ deg} \approx 0.703125 \text{ deg}$

remark On many aircraft, the ADS-B Transmitting Subsystem receives Selected Heading from a Mode Control Panel / Flight Control Unit (MCP / FCU). Users of this data are cautioned that the Selected Heading value transmitted by the ADS-B Transmitting Subsystem does not necessarily reflect the true intention of the airplane during certain flight modes (e.g., during LNAV mode).

I021/NAV - *Navigation Mode***I021/NAV/AP** - *Autopilot*

- 1 bit [.]
- values:
 - 0: Autopilot not engaged
 - 1: Autopilot engaged

I021/NAV/VN - *Vertical Navigation*

- 1 bit [.]
- values:
 - 0: Vertical Navigation not active
 - 1: Vertical Navigation active

I021/NAV/AH - *Altitude Hold*

- 1 bit [.]
- values:
 - 0: Altitude Hold not engaged
 - 1: Altitude Hold engaged

I021/NAV/AM - *Approach Mode*

- 1 bit [.]
- values:
 - 0: Approach Mode not active
 - 1: Approach Mode active

I021/NAV/(spare)

- 4 bits [....]

remark This data-item should only be transmitted if an ADS-B indication has been received that the mode bits have been “actively populated”.by the avionics (1090 ES version 2 (as defined in I021/210) BDS 6,2, subtype 1, bit 47: “Status of MCP / FCU Mode Bits”)

I021/GAO - *GPS Antenna Offset*

- 8 bits [.]
- raw value

remark The value of this field is copied from the respective bits 33-40 of version 2 (as defined in I021/210) of 1090 ES BDS register 6,5 (Aircraft Operational Status)

I021/SGV - Surface Ground Vector

Extended item with first part 16 bits long and optional 8 bits extends.

I021/SGV/STP

- 1 bit [.]
- values:
 - 0: Aircraft has not stopped
 - 1: Aircraft has stopped

I021/SGV/HTS

- 1 bit [.]
- values:
 - 0: Heading/Ground Track data is not valid
 - 1: Heading/Ground Track data is valid

I021/SGV/HTT

- 1 bit [.]
- values:
 - 0: Heading data provided
 - 1: Ground Track provided

I021/SGV/HRD

- 1 bit [.]
- values:
 - 0: True North
 - 1: Magnetic North

I021/SGV/GSS - Ground speed

- 11 bits [.]
- unsigned quantity
- scaling factor: 1
- fractional bits: 3
- unit: "kts"
- $\text{LSB} = 1/2^3 \text{ kts} = 1/8 \text{ kts} \approx 0.125 \text{ kts}$

(FX)

- extension bit
 - 0: End of data item
 - 1: Extension into next extent

I021/SGV/HGT - Heading/Ground Track information

- 7 bits [.]
- unsigned quantity

- scaling factor: 45
- fractional bits: 4
- unit: “deg”
- $\text{LSB} = 45/2^4 \text{ deg} = 45/16 \text{ deg} \approx 2.8125 \text{ deg}$

(FX)

- extension bit
 - 0: End of data item
 - 1: Extension into next extent

I021/STA - Aircraft Status

Extended item with first part 8 bits long and optional 8 bits extends.

I021/STA/ES

- 1 bit [.]
- values:
 - 0: Target is not 1090 ES IN capable
 - 1: Target is 1090 ES IN capable

I021/STA/UAT

- 1 bit [.]
- values:
 - 0: Target is not UAT IN capable
 - 1: Target is UAT IN capable

I021/STA/(spare)

- 5 bits [.....]

(FX)

- extension bit
 - 0: End of data item
 - 1: Extension into next extent

I021/TNH - True North Heading

- 16 bits [.....]
- unsigned quantity
- scaling factor: 360
- fractional bits: 16
- unit: “deg”
- $\text{LSB} = 360/2^{16} \text{ deg} = 360/65536 \text{ deg} \approx 0.0054931640625 \text{ deg}$

remark Magnetic Heading is defined in I021/152.

I021/MES - Military Extended Squitter

Compound item (FX)

I021/MES/SUM - Mode 5 Summary

I021/MES/SUM/M5

- 1 bit [.]
- values:

0: No Mode 5 interrogation

1: Mode 5 interrogation

I021/MES/SUM/ID

- 1 bit [.]

- values:

0: No authenticated Mode 5 ID reply/report

1: Authenticated Mode 5 ID reply/report

I021/MES/SUM/DA

- 1 bit [.]

- 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)

I021/MES/SUM/M1

- 1 bit [.]

- values:

0: Mode 1 code not present or not from Mode 5 reply/report

1: Mode 1 code from Mode 5 reply/report.

I021/MES/SUM/M2

- 1 bit [.]

- values:

0: Mode 2 code not present or not from Mode 5 reply/report

1: Mode 2 code from Mode 5 reply/report.

I021/MES/SUM/M3

- 1 bit [.]

- values:

0: Mode 3 code not present or not from Mode 5 reply/report

1: Mode 3 code from Mode 5 reply/report.

I021/MES/SUM/MC

- 1 bit [.]

- values:

0: Flightlevel not present or not from Mode 5 reply/report

1: Flightlevel from Mode 5 reply/report

I021/MES/SUM/PO

- 1 bit [.]

- values:

0: Position not from Mode 5 report (ADS-B report)

1: Position from Mode 5 report

remark Notes:

1. The flag M2 refers to the contents of Subfield #6 below, M3, MC refer to the contents of data items I021/070 and I021/145 respectively. The flag M1 refers to the contents of Subfield #3 below (Extended Mode 1 Code in Octal Representation).
2. If a Mode 5 reply/report is received with the Emergency bit set, then the Military Emergency bit (ME) in Data Item I021/200, Target Status, shall be set.
3. If a Mode 5 reply/report is received with the Identification of Position bit set, then the Special Position Identification bit (SPI) in Data Item I021/200, Target Status, shall be set.
4. If a Mode 5 report (ID or Data) is received and fulfill the authentication criteria the corresponding authentication bit shall be set.

I021/MES/PNO - Mode 5 PIN /National Origin**I021/MES/PNO/(spare)**

- 2 bits [. .]

I021/MES/PNO/PIN - PIN Code

- 14 bits [.]
- raw value

I021/MES/PNO/(spare)

- 5 bits [.]

I021/MES/PNO/NO - National Origin Code

- 11 bits [.]
- raw value

I021/MES/EM1 - Extended Mode 1 Code in Octal Representation**I021/MES/EM1/V**

- 1 bit [.]
- values:
 - 0: Code validated
 - 1: Code not validated

I021/MES/EM1/(spare)

- 1 bit [.]

I021/MES/EM1/L

- 1 bit [.]
- values:
 - 0: Mode 1 code as derived from the report of the transponder
 - 1: Smoothed Mode 1 code as provided by a local tracker

I021/MES/EM1/(spare)

- 1 bit [.]

I021/MES/EM1/EM1 - *Extended Mode 1 Code in Octal Representation*

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

remark Notes:

- Subfield #1 is present, the M1 bit in Subfield #1 indicates whether the Extended Mode 1 Code is from a Mode 5 reply or a Mode 1 reply. If Subfield #1 is not present, the Extended Mode 1 Code is from a Mode 1 reply.
- If Subfield #3 is not present the Mode 1 Code was not reported or all Code Bits were equal to 0.
- The valid bit is set if the Code was only reported once for that target.

I021/MES/XP - *X Pulse Presence***I021/MES/XP/(spare)**

- 2 bits [.]

I021/MES/XP/XP - *X-pulse from Mode 5 PIN reply/report*

- 1 bit [.]
- values:
 - 0: X-Pulse not present.
 - 1: X-pulse present.

I021/MES/XP/X5 - *X-pulse from Mode 5 Data reply or Report.*

- 1 bit [.]
- values:
 - 0: X-pulse set to zero or no authenticated Data reply or Report received.
 - 1: X-pulse set to one (present).

I021/MES/XP/XC - *X-pulse from Mode C reply*

- 1 bit [.]
- values:
 - 0: X-pulse set to zero or no Mode C reply
 - 1: X-pulse set to one (present)

I021/MES/XP/X3 - *X-pulse from Mode 3/A reply*

- 1 bit [.]
- values:
 - 0: X-pulse set to zero or no Mode 3/A reply"
 - 1: X-pulse set to one (present)

I021/MES/XP/X2 - *X-pulse from Mode 2 reply*

- 1 bit [.]
- values:
 - 0: 0 X-pulse set to zero or no Mode 2 reply
 - 1: X-pulse set to one (present)

I021/MES/XP/X1 - *X-pulse from Mode 1 reply*

- 1 bit [.]
- values:
 - 0: X-pulse set to zero or no Mode 1 reply
 - 1: X-pulse set to one (present)

remark Within Mode 5 reports, the X-Pulse can be set for the following cases:

1. In a combined Mode 1 and Mode 2 report: in this case the X5 bit and the X2 bit shall be set;
2. In a combined Mode 3 and Mode C report: in this case the X5 bit and the X3 bit shall be set;
3. In a Mode 5 PIN data report: in this case the X5 bit and the XP bit shall be set. The X1 bit and the XC bit are meaningless as in Mode 1 and Mode C replies/reports the X Pulse is not defined. They are kept for compatibility reasons.

I021/MES/FOM - *Figure of Merit***I021/MES/FOM/(spare)**

- 3 bits [...]

I021/MES/FOM/FOM - *Figure of Merit*

- 5 bits [.....]
- raw value

I021/MES/M2 - *Mode 2 Code in Octal Representation***I021/MES/M2/V**

- 1 bit [.]
- values:
 - 0: Code validated
 - 1: Code not validated

I021/MES/M2/(spare)

- 1 bit [.]

I021/MES/M2/L

- 1 bit [.]
- values:
 - 0: Mode-2 code as derived from the reply of the transponder
 - 1: Smoothed Mode-2 code as provided by a local tracker

I021/MES/M2/(spare)

- 1 bit [.]

I021/MES/M2/MODE2 - *Mode 2 Code in Octal Representation*

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

remark If Subfield 6 is not present the Mode 2 Code was no reported or all Code Bits were equal to 0.

remark Notes:

- The Reserved Expansion Field is optional. When used to transmit MES, it shall be sent when the targets are represented by Mode 5 Level 2 reports.
- The information contained in this data item is specific to 1090MHz Extended Squitter messages transmitted by military aircraft (Mode 5 Level 2 squitter).

INDICES AND TABLES

- genindex
- modindex
- search