Asterix expansion 048 - Monoradar Target Reports Appendix A: Reserved Expansion Field

category: 048

edition: 1.11

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Description of asterix expansion

Compound item (fspec=8 bits)

I048/MD5 - *Mode 5 Reports*

Compound item (FX)

I048/MD5/SUM - *Mode 5 Summary*

I048/MD5/SUM/M5

- 1 bit [.]
- values:
  - 0: No Mode 5 interrogation
  - 1: Mode 5 interrogation

I048/MD5/SUM/ID

- 1 bit [.]
- values:
  - 0: No authenticated Mode 5 ID reply/report
  - 1: Authenticated Mode 5 ID reply/report

I048/MD5/SUM/DA

- 1 bit [.]
- values:
  - 0: No authenticated Mode 5 Data reply/report
  - 1: Authenticated Mode 5 Data reply/report (i.e any valid Mode 5 reply type other than ID)

I048/MD5/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

I048/MD5/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

I048/MD5/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

I048/MD5/SUM/MC

- 1 bit [.]
- values:

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

I048/MD5/SUM/(spare)

- 1 bit [.]

remark Notes:
1. The flags M2, M3, MC refer to the contents of data items I048/050, I048/070 and I048/090 respectively. The flag M1 refers to the contents of data item I048/055, Mode 1 Code in Octal Representation, and to the contents of the Subitem #5 (Extended Mode 1 Code in Octal Representation).
2. If an authenticated Mode 5 reply/report is received with the Emergency bit set, then the Military Emergency bit (ME) in Data Item I048/020, Target Report Descriptor, shall be set.
3. If an authenticated Mode 5 reply/report is received with the Identification of Position bit set, then the Special Position Identification bit (SPI) in Data Item I048/020, Target Report Descriptor, shall be set.

I048/MD5/PMN - *PIN/ National Origin/Mission Code*

I048/MD5/PMN/(spare)

- 2 bits [. .]

I048/MD5/PMN/PIN - *PIN Code*

- 14 bits [. . . . .]
- raw value

I048/MD5/PMN/(spare)

- 2 bits [. .]

I048/MD5/PMN/NAV - *Validity of NAT*

- 1 bit [.]
- values:

    0: National Origin is valid
    1: National Origin is invalid

I048/MD5/PMN/NAT - *National Origin*

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

I048/MD5/PMN/(spare)

- 2 bits [. .]

I048/MD5/PMN/MIS - *Mission Code*

- 6 bits [. . . . . .]
- raw value

remark Note: Bit 14 (NAV) is set to 1 if the value for National Origin is not known or invalid. Under certain conditions PIN is available but NAT is not available. NAV then indicates that the NAT field was not actively populated.

I048/MD5/POS - *Mode 5 Reported Position*

I048/MD5/POS/LAT - *Latitude in WGS 84*

- 24 bits [. . . . .]
- signed quantity
- unit: "°"
- LSB $= 180/2^23$ ° $\approx 2.15e-5$ °
- value $>= -90/1$ °

- value $<= 90/1$ °

I048/MD5/POS/LON - *Longitude in WGS 84*

- 24 bits [. . . . .]
- signed quantity
- unit: "°"
- LSB = $180/2^23$ ° $\approx 2.15e-5$ °
- value $>= -180/1$ °
- value $<= 180/1$ °

remark Notes: Latitude in WGS 84 is expressed as a 24-bit two's complement number. Range -90° ≤ latitude ≤ 90°. Sign convention: North is positive. LSB = 180/223 degrees = 2.145767*10-05 degrees.
Longitude in WGS 84 is expressed as a 24-bit two's complement number. Range -180° ≤ longitude < 180°. Sign convention: East is positive. LSB = 180/223 degrees = 2.145767*10-05 degrees. The resolution implied by the LSB is better than the resolution with which Mode 5 position reports are transmitted from aircraft transponders using currently defined formats.

I048/MD5/GA - *Mode 5 GNSS-derived Altitude*

I048/MD5/GA/(spare)

- 1 bit [.]

I048/MD5/GA/RES
"Resolution with which the GNSS-derived Altitude (GA) is reported"

- 1 bit [.]
- values:

    0: GA reported in 100 ft increments
    1: GA reported in 25 ft increments

I048/MD5/GA/GA
"GNSS-derived Altitude of target, expressed as height above WGS 84 ellipsoid"

- 14 bits [. . . . .]
- signed quantity
- unit: "ft"
- LSB = 25 ft
- value $>= -1000$ ft

I048/MD5/EM1 - *Extended Mode 1 Code in Octal Representation*

I048/MD5/EM1/V

- 1 bit [.]
- values:

    0: Code not validated
    1: Code validated

I048/MD5/EM1/G

- 1 bit [.]
- values:

    0: Default
    1: Garbled code

I048/MD5/EM1/L

- 1 bit [.]
- values:

    0: Mode 1 Code derived from the reply of the transponder
    1: Mode 1 Code not extracted during the last scan

I048/MD5/EM1/(spare)

- 1 bit [.]

I048/MD5/EM1/EM1 - *Extended Mode 1 Code in Octal Representation*

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

remark Notes:
1. If Subitem #1 is present, the M1 bit in Subitem #1 indicates whether the Extended Mode 1 Code is from a Mode 5 reply or a Mode 1 reply. If Subitem #1 is not present, the Extended Mode 1 Code is from a Mode 1 reply.
2. For reasons of backwards compatibility the logic for the setting of the V-bit was inverted compared to other similar data items.
3. 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 data item I048/055.

I048/MD5/TOS - *Time Offset for POS and GA*

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

   remark Note: TOS shall be assumed to be zero if Subitem #6 is not present.

I048/MD5/XP - *X Pulse Presence*

I048/MD5/XP/(spare)

- 2 bits [. .]

I048/MD5/XP/XP - *X-pulse from Mode 5 PIN Reply/Report*

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

I048/MD5/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)

I048/MD5/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)

I048/MD5/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)

I048/MD5/XP/X2 - *X-pulse from Mode 2 Reply*

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

I048/MD5/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 **Note:** Within Mode 5 replies/reports, the X-Pulse can be set for the following cases: 1. In a combined Mode 1 and Mode 2 reply/report: in this case the X5 bit and the X2 bit shall be set; 2. In a combined Mode 3 and Mode C reply/report: in this case the X5 bit and the X3 bit shall be set; 3. In a Mode 5 PIN data reply/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.

remark **Note:** In 2011 NATO has modified the format of the National Origin information available in subitem 2 of the Mode 5 data item in this Reserved Expansion Field. The information for National Origin and Mission Code were combined into a 11-bit long field. In order to maintain backwards compatibility and to ease the use of the new layout, the original Mode 5 data item was copied and the layout of subitem #2 adapted. The new layout is reflected in the data item M5N and shall be used by equipment prepared for the new National Origin system. Equipment certified to the previous encoding shall continue to use the data item MD5 corresponding to the 5-bit National Origin / 6-bit Mission Code.

I048/M5N - *Mode 5 Reports, New Format*

Compound item (FX)

I048/M5N/SUM - *Mode 5 Summary*

I048/M5N/SUM/M5

- 1 bit [.]
- values:

  0: No Mode 5 interrogation
  1: Mode 5 interrogation

I048/M5N/SUM/ID

- 1 bit [.]
- values:

  0: No authenticated Mode 5 ID reply/report
  1: Authenticated Mode 5 ID reply/report

I048/M5N/SUM/DA

- 1 bit [.]
- values:

  0: No authenticated Mode 5 Data reply/report
  1: Authenticated Mode 5 Data reply/report (i.e any valid Mode 5 reply type other than ID)

I048/M5N/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

I048/M5N/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

I048/M5N/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

I048/M5N/SUM/MC

- 1 bit [.]
- values:

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

I048/M5N/SUM/(spare)

- 1 bit [.]

remark Notes:
4. The flags M2, M3, MC refer to the contents of data items I048/050, I048/070 and I048/090 respectively. The flag M1 refers to the contents of data item I048/055, Mode 1 Code in Octal Representation, and to the contents of the Subitem #5 (Extended Mode 1 Code in Octal Representation).
5. If an authenticated Mode 5 reply/report is received with the Emergency bit set, then the Military Emergency bit (ME) in Data Item I048/020, Target Report Descriptor, shall be set.
6. If an authenticated Mode 5 reply/report is received with the Identification of Position bit set, then the Special Position Identification bit (SPI) in Data Item I048/020, Target Report Descriptor, shall be set.

I048/M5N/PMN - *PIN/ National Origin/Mission Code*

I048/M5N/PMN/(spare)

- 2 bits [..]

I048/M5N/PMN/PIN - *PIN Code*

- 14 bits [..............]
- raw value

I048/M5N/PMN/(spare)

- 4 bits [....]

I048/M5N/PMN/NOV - *Validity of NO*

- 1 bit [.]
- values:

    0: National Origin is valid
    1: National Origin is invalid

I048/M5N/PMN/NO - *National Origin*

- 11 bits [...........]
- raw value

remark Note: Bit 12 (NOV) is set to 1 if the value for National Origin is not known or invalid. Under certain conditions PIN is available but NO is not available. NOV then indicates that the NO field was not actively populated.

I048/M5N/POS - *Mode 5 Reported Position*

I048/M5N/POS/LAT - *Latitude in WGS 84*

- 24 bits [........................]
- signed quantity
- unit: ”°”
- LSB = $180/2^23$ ° ≈ $2.15e - 5$ °
- value $>= -90/1$ °
- value $<= 90/1$ °

I048/M5N/POS/LON - *Longitude in WGS 84*

- 24 bits [........................]
- signed quantity
- unit: ”°”
- LSB = $180/2^23$ ° ≈ $2.15e - 5$ °
- value $>= -180/1$ °

- value $<= 180/1$ °

remark Notes: Latitude in WGS 84 is expressed as a 24-bit two's complement number. Range -90° ≤ latitude ≤ 90°. Sign convention: North is positive. LSB = 180/223 degrees = 2.145767*10-05 degrees

Longitude in WGS 84 is expressed as a 24-bit two's complement number. Range -180° ≤ longitude < 180°. Sign convention: East is positive. LSB = 180/223 degrees = 2.145767*10-05 degrees

The resolution implied by the LSB is better than the resolution with which Mode 5 position reports are transmitted from aircraft transponders using currently defined formats.

I048/M5N/GA - *Mode 5 GNSS-derived Altitude*

I048/M5N/GA/(spare)

- 1 bit [.]

I048/M5N/GA/RES

Resolution with which the GNSS-derived Altitude (GA) is reported

- 1 bit [.]
- values:

  0: GA reported in 100 ft increments
  1: GA reported in 25 ft increments

I048/M5N/GA/GA

GNSS-derived Altitude of target, expressed as height above WGS 84 ellipsoid

- 14 bits [..............]
- signed quantity
- unit: "ft"
- LSB = 25 ft
- value $>= -1000$ ft

I048/M5N/EM1 - *Extended Mode 1 Code in Octal Representation*

I048/M5N/EM1/V

- 1 bit [.]
- values:

  0: Code not validated
  1: Code validated

I048/M5N/EM1/G

- 1 bit [.]
- values:

  0: Default
  1: Garbled code

I048/M5N/EM1/L

- 1 bit [.]
- values:

  0: Mode 1 Code derived from the reply of the transponder
  1: Mode 1 Code not extracted during the last scan

I048/M5N/EM1/(spare)

- 1 bit [.]

I048/M5N/EM1/EM1 - *Extended Mode 1 Code in Octal Representation*

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

remark Notes:

1. If Subitem #1 is present, the M1 bit in Subitem #1 indicates whether the Extended Mode 1 Code is from a Mode 5 reply or a Mode 1 reply. If Subitem #1 is not present, the Extended Mode 1 Code is from a Mode 1 reply.

2. For reasons of backwards compatibility the logic for the setting of the V-bit was inverted compared to other similar data items.
3. 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 data item I048/055.

I048/M5N/TOS - *Time Offset for POS and GA*

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

   remark Note: TOS shall be assumed to be zero if Subitem #6 is not present.

I048/M5N/XP - *X Pulse Presence*

   I048/M5N/XP/(spare)
   - 2 bits [. .]

   I048/M5N/XP/XP - *X-pulse from Mode 5 PIN Reply/Report*
   - 1 bit [.]
   - values:
      0: X-Pulse not present
      1: X-pulse present

   I048/M5N/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)

   I048/M5N/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)

   I048/M5N/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)

   I048/M5N/XP/X2 - *X-pulse from Mode 2 Reply*
   - 1 bit [.]
   - values:
      0: X-pulse set to zero or no Mode 2 reply
      1: X-pulse set to one (present)

   I048/M5N/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 Note: Within Mode 5 replies/reports, the X-Pulse can be set for the following cases: 1. In a combined Mode 1 and Mode 2 reply/report: in this case the X5 bit and the X2 bit shall be set; 2. In a combined Mode 3 and Mode C reply/report: in this case the X5 bit and the X3 bit shall be set; 3. In a Mode 5 PIN data reply/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.

I048/M5N/FOM - *Figure of Merit*

    I048/M5N/FOM/(spare)

- 3 bits [. . .]

    I048/M5N/FOM/FOM

Figure of Merit. Position Accuracy as extracted and provided by a Mode 5 transponder.

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

remark Note: In 2011 NATO has modified the format of the National Origin information available in subitem 2 of the Mode 5 data item in this Reserved Expansion Field. The information for National Origin and Mission Code were combined into a 11-bit long field. In order to maintain backwards compatibility and to ease the use of the new layout, the original Mode 5 data item was copied and the layout of subitem #2 adapted. The new layout is reflected in the data item M5N and shall be used by equipment prepared for the new National Origin system. Equipment certified to the previous encoding shall continue to use the data item MD5 corresponding to the 5-bit National Origin / 6-bit Mission Code.

I048/M4E - *Extended Mode 4 Report*

Extended item.

    I048/M4E/(spare)

- 5 bits [. . . . .]

    I048/M4E/FOEFRI - *Indication Foe/Friend (Mode4)*

- 2 bits [. .]
- values:

        0: No Mode 4 interrogation
        1: Possibly friendly target
        2: Probably friendly target
        3: Friendly target

(FX)

- extension bit

        0: End of data item
        1: Extension into next extent

I048/RPC - *Radar Plot Characteristics*

Compound item (FX)

    I048/RPC/SCO - *Score*

The score describes the number of raw responses used to create the plot.

- 8 bits [. . . . .]
- unsigned integer

    I048/RPC/SRC - *Signal/Clutter Ratio*

The Signal / Clutter Ratio describes the difference in signal strength between the signal constituting the raw plot and the signal of the clutter.

- 16 bits [. . . . .]
- unsigned quantity
- unit: "dB"
- LSB = $1/10$ dB ≈ 0.10 dB
- value $>= 1/10$ dB
- value $<= 2550$ dB

I048/RPC/RW - *Range Width*

The Range Width defines the difference in range between the closest proximity to the radar of the raw response and the point farthest away from the radar.

- 16 bits [. . . . .]
- unsigned quantity
- unit: "NM"
- LSB = $1/2^8$ NM $\approx 3.91e - 3$ NM
- value $<= 256/1$ NM

I048/RPC/AR - *Ambiguous Range*

The Ambiguous Range describes the Pulse Repetition Interval of the radar in range.

- 16 bits [. . . . .]
- unsigned quantity
- unit: "NM"
- LSB = $1/2^8$ NM $\approx 3.91e - 3$ NM
- value $<= 256/1$ NM

I048/ERR - *Extended Range Report*

- 24 bits [. . . .]

- unsigned quantity

- unit: "NM"

- LSB = $1/2^8$ NM $\approx 3.91e - 3$ NM

- value $<= 65535$ NM

   remark Notes:
   1. For radars with an operational range beyond 256 NM data item I048/040 is insufficient. These radars may use this extension to provide the target position equal to or beyond 256 NM. In such cases, data item I048/040 shall be transmitted in addition to this extension. In this case it is recommended to set bits 32/17 in data item I048/040 to "1".
   2. The Encoding Rule for data item I048/040 still applies.
   3. 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.
   4. In case of combined detection by a PSR and an SSR, then the SSR position is sent.
   5. Before migrating an ASTERIX encoder to Edition 1.10 of this specification, care has to be taken that receiving decoders allow the presence of the value 256 NM in the record. Systems applying a range check may otherwise suppress the record.

I048/RTC - *Radar Track Characteristics*

Compound item (FX)

I048/RTC/PTL - *Plot/Track Link*

Providing link between a track and its associated plot.

   I048/RTC/PTL/(spare)
   - 3 bits [. . .]

   I048/RTC/PTL/SCN - *Track / SCN Association*
   - 1 bit [.]
   - values:

      0: Track is not associated with an SCN Plot
      1: Track is associated with an SCN Plot

I048/RTC/PTL/RC - *Roll Call Component*

- 1 bit [.]
- values:

    0: Associated Plot does not contain a Roll Call component
    1: Associated Plot contains at least a Roll Call component

I048/RTC/PTL/AC - *All Call Component*

- 1 bit [.]
- values:

    0: Associated Plot does not contain an All Call component
    1: Associated Plot contains at least an All Call component

I048/RTC/PTL/SSR - *SSR Component*

- 1 bit [.]
- values:

    0: Associated Plot does not contain an SSR component
    1: Associated Plot contains at least an SSR component

I048/RTC/PTL/PSR - *PSR Component*

- 1 bit [.]
- values:

    0: Associated Plot does not contain a PSR component
    1: Associated Plot contains at least a PSR component

I048/RTC/PTL/PLOTNR
Unique reference to the associated plot record

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

remark Notes:
    1. (to bits-16/1): If SCN = 0, PLOTNR shall be set to 0.
    2. (to bit-21): If SCN = 1, I048/020/SCN#VAL – if implemented - shall be set to "1".

I048/RTC/ATL - *ADS-B/Track Link*

Providing link between a track and its associated ADS-B Report.

Repetitive item, repetition factor 8 bits.

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

remark Note: The presence of this information shall be communicated in Data Item I048/020 by setting I048/020/ADSB#VAL – if implemented - = 1.

I048/RTC/TRN - *Turn State*

Turn State with probability with regards to track evolution hypothesis (Circular model).

- 8 bits [. . . . .]
- unsigned quantity
- unit: "%"
- LSB = 1 %
- value $<= 100$ %

I048/RTC/NPP - *Next Predicted Position*

Next predicted position for a track update at the next expected antenna rotation in reference to the current track update.

I048/RTC/NPP/PREDRHO - *Predicted Range*

- 16 bits [. . . . .]
- unsigned quantity
- unit: "NM"
- LSB = $1/2^7$ NM $\approx 7.81e-3$ NM

I048/RTC/NPP/PREDTHETA - *Predicted Azimuth*

11

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

I048/RTC/NPP/EVOLRHOSTART - *Predicted Closest Range*

- 16 bits [. . . . .]
- unsigned quantity
- unit: "NM"
- LSB = $1/2^7$ NM $\approx 7.81e - 3$ NM

I048/RTC/NPP/EVOLRHOEND - *Predicted Largest Range*

- 16 bits [. . . . .]
- unsigned quantity
- unit: "NM"
- LSB = $1/2^7$ NM $\approx 7.81e - 3$ NM

I048/RTC/NPP/EVOLTHETASTART - *Predicted Smallest Azimuth*

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

I048/RTC/NPP/EVOLTHETAEND - *Predicted Largest Azimuth*

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

I048/RTC/NPP/NOISERHOSTART - *Predicted Closest Range*

- 16 bits [. . . . .]
- unsigned quantity
- unit: "NM"
- LSB = $1/2^7$ NM $\approx 7.81e - 3$ NM

I048/RTC/NPP/NOISERHOEND - *Predicted Largest Range*

- 16 bits [. . . . .]
- unsigned quantity
- unit: "NM"
- LSB = $1/2^7$ NM $\approx 7.81e - 3$ NM

I048/RTC/NPP/NOISETHETASTART - *Predicted Smallest Azimuth*

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

I048/RTC/NPP/NOISETHETAEND - *Predicted Largest Azimuth*

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

I048/RTC/NPP/PREDTIME - *Predicted Detection Time*

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

remark Notes:

1. When the area crosses North, THETASTART is larger than THETAEND.
2. Next detection = Time of Day of current track record + PREDTIME.

I048/RTC/DLK - *Data Link Characteristics*

Active message list for the aircraft for the current scan.

Repetitive item, repetition factor 8 bits.

I048/RTC/DLK/TYPE
Type of Message Protocol

- 4 bits [. . . .]
- values:

    0: Surveillance Mode A (alert bit or periodic)
    1: Comm-A
    2: Ground Initiated Comm-B
    3: Air Initiated Comm-B
    4: Broadcast Comm-B
    5: Comm-C
    6: Comm-D
    7: Reserved for future use
    8: Reserved for future use
    9: Reserved for future use
    10: Reserved for future use
    11: Reserved for future use
    12: Reserved for future use
    13: Reserved for future use
    14: Reserved for future use
    15: Reserved for future use

I048/RTC/DLK/ORIGIN
Frame Detection

- 2 bits [. .]
- values:

    0: From previous scan
    1: New in current scan
    2: Requested in the beam by transponder
    3: Invalid ASTERIX value

I048/RTC/DLK/STATE
Frame state at aircraft release

- 2 bits [. .]
- values:

    0: In progress
    1: Completed
    2: Cancelled
    3: Invalid ASTERIX value

I048/RTC/LCK - *Lockout Characteristics*
Lockout State and remaining Lockout Time

I048/RTC/LCK/LS - *Lockout State*

- 1 bit [.]
- values:

    0: Target not locked out by this radar
    1: Target locked out by this radar

I048/RTC/LCK/LOCTIM - *Lockout Time*

- 15 bits [. . . . .]
- unsigned quantity
- unit: ”ms”
- LSB = 1 ms

I048/RTC/TC - *Transition Code*
Indication and Counter of Transition Codes for Modes 1, 2, and 3

I048/RTC/TC/(spare)

- 7 bits [. . . . . . .]

I048/RTC/TC/TCOUNT1
Number of scans with transient Mode 1 Code

- 4 bits [. . . .]

- unsigned integer

I048/RTC/TC/TCODE1
Transient Mode 1 Code

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

I048/RTC/TC/TCOUNT2
Number of scans with transient Mode 2 Code

- 4 bits [....]
- unsigned integer

I048/RTC/TC/TCODE2
Transient Mode 2 Code

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

I048/RTC/TC/TCOUNT3
Number of scans with transient Mode 3 Code

- 4 bits [....]
- unsigned integer

I048/RTC/TC/TCODE3
Transient Mode 3 Code

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

remark Notes:
  1. This item indicates a difference in the value for TCODEX between the code in the track file and the code from the latest plot updating the track.
  2. If TCOUNTX is set to 0 then TCODEX is meaningless and all bits shall be set to 0.
  3. The meaning of the individual bits in TCODEX is described in ICAO Annex 10 Volume 4 Chapter 3.1.1.6.2.

I048/RTC/TLC - *Track Life Cycle*
Acquisition Status of the Track and Track Life Cycle Counters

I048/RTC/TLC/ACQI
Acquisition Status Indicator

- 2 bits [..]
- values:

    0: Tentative Track with One Plot
    1: Tentative Track with at least Two Plots
    2: Pre-Confirmed Track
    3: Confirmed Track

I048/RTC/TLC/TRKUPDCTR
Track Update Counter

- 14 bits [..............]
- unsigned integer

I048/RTC/TLC/LASTTRKUPD
Time since last Track Update

- 16 bits [................]
- unsigned quantity
- unit: "ms"
- LSB = 1 ms

remark Notes:
  1. When Subitem #8 is included, each element shall be properly populated.
  2. The setting of bits 32/31 is implementation dependent and shall be described in the ICD of the system generating the ASTERIX record.

3. The TRKUPDCTR is initiated with a value of 1 and it is incremented by 1 each time a track is updated.
4. The LASTTRKUPD is set to 0 each time a track is updated.

I048/RTC/ASI - *Adjacent Sensor Information*

Adjacent Sensor information (received via SCN) for the respective Mode S address

Repetitive item, repetition factor 8 bits.

I048/RTC/ASI/SACADJS - *SAC of the Adjacent Sensor*

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

I048/RTC/ASI/SICADJS - *SIC of the Adjacent Sensor*

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

I048/RTC/ASI/TIMEOFDAYSCN - *Absolute Timestamp in UTC Provided by the SCN*

- 16 bits [. . . . .]
- unsigned quantity
- unit: ”s”
- LSB = $1/2^7$ s $\approx 7.81e - 3$ s

I048/RTC/ASI/DATAUSE - *Use of Adjacent Sensor Data*

- 7 bits [. . . . . . .]
- values:
    - 0: Data used by Tracker
    - 1: Data not used by Tracker
    - 2: 2-127: Reserved for future use

I048/RTC/ASI/DRNA - *DRN Availability*

- 1 bit [.]
- values:
    - 0: DRN not available
    - 1: DRN available

I048/RTC/ASI/DRN

Duplicate Address Reference Number uniquely identifying the aircraft in case of a duplicate Mode S Address

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

I048/RTC/TES - *Track Extrapolation Source*

Source for the extrapolation of the track information

- 8 bits [. . . . .]
- values:
    - 0: Radar tracker calculation
    - 1: Integrated ADS-B
    - 2: External ADS-B
    - 3: SCN

I048/RTC/IR - *Identity Requested*

Information whether during latest scan the Mode 3/A Code was requested

I048/RTC/IR/IR

Identity Requested during latest scan

- 1 bit [.]
- values:
    - 0: Identity not requested
    - 1: Identity requested

I048/RTC/IR/M3A - *Age of Mode 3/A Code (I048/070)*

- 7 bits [. . . . . . .]

- unsigned quantity
- unit: "s"
- LSB = 1 s

I048/CPC - *Common and Plot Characteristics*

Compound item (FX)

> **I048/CPC/PNB** - *Plot Number*
>
> Unique reference to a Plot Record
>
> - 16 bits [. . . . .]
> - raw value
>
> **I048/CPC/RPL** - *Replies/Plot Link*
>
> Link between a Plot and its Replies
>
> Repetitive item, repetition factor 8 bits.
>
> > **I048/CPC/RPL/TYPE** - *Reply Type*
> >
> > - 8 bits [. . . . .]
> > - values:
> >
> > > 0: PSR Echo
> > > 1: SSR Reply
> > > 2: All Call Reply
> > > 3: Roll Call Reply
> >
> > **I048/CPC/RPL/REPLYNBR**
> >
> > Unique reference to a plot record
> >
> > - 16 bits [. . . . .]
> > - raw value
>
> **I048/CPC/SNB** - *Scan Number*
>
> Scan Number
>
> - 8 bits [. . . . .]
> - unsigned integer
>
> > **remark Note:** The Scan Number ranges from 1 to 127 and is incremented when the radar passes North. Once SCANNBR reached 127 it will restarted at 1 with the next scan.
>
> **I048/CPC/DATE** - *Common and Plot Characteristics Date*
>
> Current Date in the form YYYYMMDD
>
> > **I048/CPC/DATE/Y1**
> >
> > First digit of year
> >
> > - 4 bits [. . . .]
> > - unsigned integer
> > - value $>= 0$
> > - value $<= 10$
> >
> > **I048/CPC/DATE/Y2**
> >
> > Second digit of year
> >
> > - 4 bits [. . . .]
> > - unsigned integer
> > - value $>= 0$
> > - value $<= 10$
> >
> > **I048/CPC/DATE/Y3**
> >
> > Third digit of year
> >
> > - 4 bits [. . . .]
> > - unsigned integer
> > - value $>= 0$
> > - value $<= 10$
> >
> > **I048/CPC/DATE/Y4**
> >
> > Fourth digit of year

- 4 bits [....]
- unsigned integer
- value $>= 0$
- value $<= 10$

I048/CPC/DATE/M1
First digit of month

- 4 bits [....]
- unsigned integer
- value $>= 0$
- value $<= 1$

I048/CPC/DATE/M2
Second digit of month

- 4 bits [....]
- unsigned integer
- value $>= 0$
- value $<= 10$

I048/CPC/DATE/D1
First digit of day

- 4 bits [....]
- unsigned integer
- value $>= 0$
- value $<= 3$

I048/CPC/DATE/D2
Second digit of day

- 4 bits [....]
- unsigned integer
- value $>= 0$
- value $<= 10$

remark Note: The day is incremented at midnight UTC.