Asterix category 015 - Independent Non-Cooperative Surveillance System Target Reports

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Preamble

Surveillance data exchange.

Description of standard data items

I015/000 - Message Type

Definition: This data item conveys the report type and whether the output is periodically updated or asynchronous depending upon external events.

Structure:

I015/000/MT - *Message Type*

- 7 bits [. . . . . . .]
- values:

  1: Measurement Plot
  2: Measurement Track
  3: Sensor Centric Plot
  4: Sensor Centric Track
  5: Track End Message

I015/000/RG - *Report Generation*

- 1 bit [.]
- values:

  0: Periodic Report
  1: Event Driven Report

Note 1: See Section 4.7 and ANNEX A for definitions of the Message Types.

Note 2: Values 6 to 127 are reserved for future use

Note 3: Periodic Report: A periodic report is one transmitted periodically with an independently configurable period.

Note 4: Event Driven Report: An Event Driven Report is one generated in response to the occurrence of an external event such as an RF echo off a target.

I015/010 - Data Source Identifier

Definition: Identification of the sensor from which the data is received.

Structure:

I015/010/SAC - *System Area Code*

- 8 bits [. . . . .]

- raw value

I015/010/SIC - *System Identification Code*

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

Note 1: The up-to-date list of SACs is published on the EUROCONTROL Web Site (http://www.eurocontrol.int/asterix).

Note 2: The SICs are allocated by the national authority responsible for the surveillance infrastructure.

Note 3: The SIC and SAC values shall be formatted as binary unsigned integers.

I015/015 - Service Identification

Definition: Identification of the service provided to one or more users.

Structure:

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

Note 1: The Service Identification is allocated by the system.

Note 2: The SID value shall be formatted as binary unsigned integers.

I015/020 - Target Report Descriptor

Definition: Type and characteristics of the data as transmitted by a system.

Structure:

Extended item.

I015/020/MOMU - *Mono-Static Target Report or Multi-Static Target Report*

- 2 bits [..]
- values:

  0: Mono-Static Sensor
  1: Multi-Static Sensor
  2: Other
  3: Unknown

I015/020/TTAX - *Target Taxonomy*

- 2 bits [..]
- values:

  0: Actual Target Report
  1: Reference Target
  2: Synthetic Target
  3: Simulated / Replayed Target

I015/020/SCD - *Scanning Direction*

- 2 bits [..]
- values:

0: Unknown
1: Forward
2: Backward
3: Static

I015/020/(spare)

- 1 bit [.]

(FX)

- extension bit

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

Note 1: The MoMu bit is used to indicate whether the target report was constructed from a multi-static (including bi-static) or mono-static sensor. Its setting dictates the interpretation of data items I015/625 and I015/626. The meaning of the value “other” shall be described in the system ICD.

Note 2: In this context, a Reference Target Report stems from a non-aircraft target based on RF received externally to the system boundary. This may be generated, for example, by an external RF generator or a Permanent Echo or from a device, which is deployed in line of sight of the sensor.

Note 3: A synthetic target is an internally generated diagnostic signal prior to the generation of the ASTERIX Category 015 target report. For example used to support test processes.

Note 4: This value is used to represent externally generated targets or recorded data injected into the output data stream of the INCS system e.g. for test or training purposes.

Note 5: This indication is used to inform about the scanning direction of the system (e.g. left/right, up/down, clockwise/anti-clockwise). It’s exact meaning is implementation dependent and shall be described in the system ICD.

I015/030 - Warning/Error Conditions

Definition: Warning/error conditions detected by a system for the target report involved.

Structure:

Repetitive item with FX extension

- 7 bits [.......]
- raw value

Note 1: It has to be stressed that a series of one or more W/E conditions can be reported per target report.

Note 2: The nature of the warning / error condition may differ between sensor types and the declaration and use of such alerts is driven by end user requirements.

Note 3: Potential applications could be to indicate that the target report correlates with road infrastructure (terrestrial vehicles) or a wind turbine or that it is a fixed or slow moving return or originating from an area of high clutter. Such data items could also be used to indicate the presence of interference – either deliberate or accidental.

Note 4: The Warning/Error Condition Values from 1-31 are reserved for designation by the ASTERIX Maintenance Group. System implementers are free to use values of 32 and above. The allocation of the remaining values of this data item shall be defined in a local Interface Control Document.

Note 5: The value of “0” must not be assigned.

I015/050 - Update Period

Definition: Period until next expected output of a target report for this target.

Structure:

I015/050/(spare)

- 2 bits [..]

I015/050/UPD - *Update Period*

- 14 bits [..............]
- unsigned quantity
- unit: "s"
- LSB = $1/2^7$ s $\approx 7.81e-3$ s
- value $<= 128$ s

Note 1: It is not necessary that all targets detected by the INCS sensor have target reports generated at the same update period.

Note 2: This data item indicates the period until the next expected output of a target report for this target relative to the Time of Applicability contained in data item I015/145

I015/145 - Time of Applicability

Definition: Absolute time stamping for applicability of the measured information expressed as UTC.

Structure:

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

Note 1: The Time of Applicability refers to the information contained in data item I015/600, I015/601, I015/625, I015/626, I015/627, I015/628 whichever is available. In case of a Track End Message (Message Type = 5) it refers to the time at which the track is terminated and the track number (data item I015/161) is released for re-use.

Note 2: A distributed sensor, such as an MSPSR, may have multiple elements that are each individually time stamped which are consolidated in to a target report. Rather than provide details of each time stamped message, this data item conveys the time of applicability of position of the target report.

Note 3: The Time of Applicability value is reset to zero each day at midnight.

Note 4: The Time of Applicability value shall be formatted as a binary unsigned integer.

I015/161 - Track/Plot Number

Definition: An integer value representing a unique reference to a track/plot record.

Structure:

- 16 bits [................]
- unsigned integer
- value $<= 65535$

Note 1: Track numbers are required for Sensor and Measurement Tracks. However, for Sensor and Measurement Plots the inclusion of a track number is optional – depending upon whether the INCS sensor has used tracking processing to reduce the false alarm rates.

Note 2: The track number is allocated by the system.

Note 3: The track number value shall be formatted as binary unsigned integers.

I015/170 - Track/Plot Status

Definition: Status of Track/Plot.

Structure:

Extended item.

I015/170/BIZ

- 1 bit [.]
- values:

  0: Target not in Blind Zone
  1: Target in Blind Zone

I015/170/BAZ

- 1 bit [.]
- values:

  0: Target not in Blanked Zone
  1: Target in Blanked Zone

I015/170/TUR

- 1 bit [.]
- values:

  0: Track Alive
  1: Track Terminated by User Request

I015/170/(spare)

- 1 bit [.]

I015/170/CSTP - *Coasted - Position*

- 1 bit [.]
- values:

  0: Not extrapolated
  1: Extrapolated

I015/170/CSTH - *Coasted – Height*

- 1 bit [.]
- values:

  0: Not extrapolated
  1: Extrapolated

I015/170/CNF - *Confirmed vs. Tentative Track*

- 1 bit [.]
- values:

0: Confirmed Track
1: Tentative Track

(FX)

- extension bit

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

Note 1: The indication for CSTP and/or CSTH applies only to data items I015/600 and I015/605 respectively. In case one of these data items is not present, CSTP and/or CSTH has no meaning.

Note 2: A coasted track is one for which the sensor detections have been interrupted and whose position/height is being predicted based on the previously received responses.

Note 3: The blind zone or blanked zone are predictable zones where no detection is predicted. If bit 5 is set and TTS = 1 then the track is coasted because it is in a blind zone or sector blank zone.

Note 4: The indication TUR=1 shall be sent only with Message Type = 5 “Track End Message”.

I015/270 - Target Size & Orientation

Definition: Data item containing the size and orientation information of the target.

Structure:

Compound item (FX)

I015/270/LEN - *Target Length*

The target length is the longest dimension in the targets direction of motion

- 16 bits [................]
- unsigned quantity
- unit: ”m”
- LSB = $1/100$ m $\approx 1.00e-2$ m
- value $<= 13107/20$ m

I015/270/WDT - *Target Width*

The target width is the longest dimension orthogonal to the targets direction of motion

- 16 bits [................]
- unsigned quantity
- unit: ”m”
- LSB = $1/100$ m $\approx 1.00e-2$ m
- value $<= 13107/20$ m

I015/270/HGT - *Target Height*

The target height is the longest dimension in the vertical direction.

- 16 bits [................]
- unsigned quantity
- unit: ”m”
- LSB = $1/100$ m $\approx 1.00e-2$ m
- value $<= 13107/20$ m

I015/270/ORT - *Target Orientation*

The orientation gives the direction, which the target nose is pointing, relative to the Geographical North.

- 16 bits [................]

- unsigned quantity
- unit: "°"
- LSB = $360/2^16$ ° $\approx 5.49e-3$ °
- value $<= 360$ °

  remark Note: The orientation shall increment in a clockwise manner relative to Geographic North.

Note: If length and width cannot be clearly determined, the greater value of the two shall be transmitted as length.

I015/300 - Object Classification

Definition: Classification result of the object detection.

Structure:

Repetitive item, repetition factor 8 bits.

I015/300/CLS - *Classification*

- 9 bits [.........]
- unsigned integer

I015/300/PRB - *Probability*

- 7 bits [.......]
- unsigned integer

Note 1: INCS processing may be able to provide an indication of the nature of the target e.g. road vehicle or aircraft with the potential for further discrimination in the type of the aircraft e.g. two engine, fixed wing/helicopter etc. Before including requirements for target classification it is necessary to consider the operational manner in which such information would be used and how/if such data would be made available to the controllers.

Note 2: Target classification is attributing, with an acceptable degree of confidence, a target report as having originated from a specific object or target type e.g. fixed wing aircraft, flock of birds etc. (It should be noted that the probabilities assigned to a target do not necessarily need to add up to 100%) The ability of an INCS sensor to classify the targets it detects is dependent upon the systems capabilities and is driven by end user requirements. The use of this optional data item is to be agreed between parties such as the system manufacturer, the system operator agency and the end user. The allocation of the CLS octet is to be defined in a local Interface Control Document that shall be agreed by both parties.

Note 3: If this functionality is implemented in the sensor, the classification result (CLS), PRB and REP value shall be formatted as a binary unsigned integer.

I015/400 - Measurement Identifier

Definition: An identifier pointing to a measurement that was created from a specific contributing Tx/Rx Pair where the Pair Identifier refers to the index which details both the transmitter characteristics (DVB-T, DAB, FM, dedicated etc.) and the receiver characteristics. These are defined in ASTERIX Category 016 – Data Item I016/300).

Structure:

I015/400/PID - *Pair Identifier*

- 16 bits [................]
- unsigned integer

I015/400/ON - *Observation Number*

- 24 bits [........................]
- unsigned integer

Note 1: INCS sensors may achieve their operational requirements based upon different techniques and technologies. Some may utilise multiple transmitter stations or multiple receiver stations. This data items provides the means for subsequent processing stages to be able to analyse the target report data based upon the system components that contributed to the formation of the target report. See ANNEX A for further details.

Note 2: The Pair Identifier shall be defined in ASTERIX Category 016 (Data Item I016/300).

Note 3: The Observation Number is identifying an element of 'raw data' information. The sensor plots and sensor tracks are usually composed of several

I015/480 - Associations

Definition: Information on which Measurement Identifiers contributed to the Sensor Centric Plot / Sensor Centric Track.

Structure:

Repetitive item, repetition factor 8 bits.

- 40 bits [`... 40 bits ...`]
- raw value

I015/600 - Horizontal Position Information

Definition: Data item containing the horizontal position information of the target.

Structure:

Compound item (FX)

I015/600/P84 - *Horizontal Position in WGS-84 Coordinates*

Position of a target in WGS-84 Coordinates.

I015/600/P84/LATITUDE

Latitude in WGS-84, in Two's complement.

- 32 bits [................................]
- signed quantity
- unit: "°"
- LSB = $180/2^31$ ° $\approx 8.38e-8$ °
- value $>= -90$ °
- value < 90 °

I015/600/P84/LONGITUDE

Longitude in WGS-84, in Two's complement.

- 32 bits [................................]
- signed quantity
- unit: "°"
- LSB = $180/2^31$ ° $\approx 8.38e-8$ °
- value $>= -180$ °
- value < 180 °

remark Note: The LSB provides a resolution of 1cm. Positive longitude indicates East. Positive latitude indicates North.

I015/600/HPR - *Horizontal Position Resolution*

A horizontal 2D dimensional area (ellipse) within which the sensor is unable to resolve two separate targets.

I015/600/HPR/RSHPX

Horizontal position resolution of the target in target centric Cartesian coordinates (X-component)

- 16 bits [................]
- unsigned quantity
- unit: "m"
- LSB = $1/2$ m ≈ 0.50 m
- value $<= 32767$ m

I015/600/HPR/RSHPY

Horizontal position resolution of the target in target centric Cartesian coordinates (Y-component)

- 16 bits [................]
- unsigned quantity
- unit: "m"
- LSB = $1/2$ m ≈ 0.50 m
- value $<= 32767$ m

I015/600/HPR/CORSHPXY

Correlation of horizontal position resolution of X and Y components, in Two's complement.

- 8 bits [........]
- signed quantity
- LSB = $1/2^7 \approx 7.81e-3$

I015/600/HPP - *Horizontal Position Precision*

The distribution of horizontal position random errors.

I015/600/HPP/SDHPX

Standard Deviation of horizontal position of the target in target centric Cartesian coordinates (X-component)

- 16 bits [................]
- unsigned quantity
- unit: "m"
- LSB = $1/2^2$ m ≈ 0.25 m
- value $<= 65535/4$ m

I015/600/HPP/SDHPY

Standard Deviation of horizontal position of the target in target centric Cartesian coordinates (Y-component)

- 16 bits [................]
- unsigned quantity
- unit: "m"
- LSB = $1/2^2$ m ≈ 0.25 m
- value $<= 65535/4$ m

I015/600/HPP/COSDHPXY

Correlation of standard deviation of horizontal position of X and Y components, in Two's complement

- 8 bits [........]
- signed quantity
- LSB = $1/2^7 \approx 7.81e-3$

I015/601 - Geometric Height Information

Definition: Data item containing the geometric height information of the target in WGS 84 height above ellipsoid.

Structure:

Compound item (FX)

I015/601/GH - *Geometric Height (WGS-84)*

Vertical distance between the target and the projection of its position on the earth's ellipsoid, as defined by WGS-84, in Two's complement form.

- 24 bits [........................]
- signed quantity
- unit: "m"
- LSB = $1/100$ m $\approx 1.00e-2$ m
- value $>= -83286$ m
- value $<= 83286$ m

I015/601/RSGH - *Geometric Height Resolution*

Vertical distance within which the sensor is unable to resolve two separate targets.

- 24 bits [........................]
- unsigned quantity
- unit: "m"
- LSB = $1/100$ m $\approx 1.00e-2$ m
- value $<= 3355443/20$ m

I015/601/SDGH - *Geometric Height Precision*

The distribution of random Geometric Height errors (see also the definition of Precision in the appendix).

- 24 bits [........................]
- unsigned quantity
- unit: "m"
- LSB = $1/100$ m $\approx 1.00e-2$ m
- value $<= 3355443/20$ m

I015/601/CI6 - *Confidence Interval for Geometric Height (67%)*

A measure of the uncertainty within which 67% of geometric height measurements will be contained.

I015/601/CI6/UCI6

Upper confidence interval for Geometric Height (67%)

- 12 bits [............]
- unsigned quantity
- unit: "m"
- LSB = 16 m
- value $<= 65520$ m

I015/601/CI6/LCI6

Lower confidence interval for Geometric Height (67%)

- 12 bits [............]
- unsigned quantity
- unit: "m"
- LSB = 16 m
- value $<= 65520$ m

I015/601/CI9 - *Confidence Interval for Geometric Height (95%)*

A measure of the certainty within which 95% of geometric height measurements will be contained.

I015/601/CI9/UCI9

Upper confidence interval for Geometric Height (95%)

- 12 bits [. . . . .]
- unsigned quantity
- unit: "m"
- LSB = 16 m
- value $<= 65520$ m

I015/601/CI9/LCI9

Lower confidence interval for Geometric Height (95%)

- 12 bits [. . . . .]
- unsigned quantity
- unit: "m"
- LSB = 16 m
- value $<= 65520$ m

I015/601/COGHHP - *Correlation of Geometric Height and Horizontal Position*

Correlation of Geometric Height converted into metres and Horizontal Position of X/Y-components.

I015/601/COGHHP/X

Correlation of Geometric Height converted into metres and Horizontal Position of (X-component), in Two's complement

- 8 bits [. . . . .]
- signed quantity
- LSB = $1/2^7 \approx 7.81e-3$

I015/601/COGHHP/Y

Correlation of Geometric Height converted into metres and Horizontal Position of (Y-component), in Two's complement

- 8 bits [. . . . .]
- signed quantity
- LSB = $1/2^7 \approx 7.81e-3$

I015/601/COGHHV - *Correlation of Geometric Height and Horizontal Velocity*

Correlation of Geometric Height converted into metres and Horizontal Velocity.

I015/601/COGHHV/X

Correlation of Geometric Height converted into metres and Horizontal Velocity of (X-component), in Two's complement

- 8 bits [. . . . .]
- signed quantity
- LSB = $1/2^7 \approx 7.81e-3$

I015/601/COGHHV/Y

Correlation of Geometric Height converted into metres and Horizontal Velocity of (Y-component), in Two's complement

- 8 bits [. . . . .]
- signed quantity
- LSB = $1/2^7 \approx 7.81e-3$

I015/601/COGHHA - *Correlation of Geometric Height and Horizontal Acceleration*

Correlation of Geometric Height converted into metres and Horizontal Acceleration of X/Y-components.

I015/601/COGHHA/X

Correlation of Geometric Height converted into metres and Horizontal Acceleration of (X-component), in Two's complement

- 8 bits [. . . . .]

- signed quantity
- LSB = $1/2^7 \approx 7.81e-3$

I015/601/COGHHA/Y

Correlation of Geometric Height converted into metres and Horizontal Acceleration of (Y-component), in Two's complement

- 8 bits [........]
- signed quantity
- LSB = $1/2^7 \approx 7.81e-3$

I015/602 - Horizontal Velocity Information

Definition: Magnitude of the Horizontal Velocity Vector.

Structure:

Compound item (FX)

I015/602/HV - *Horizontal Velocity Vector*

Horizontal velocity vector expressed in target centric Cartesian coordinates.

I015/602/HV/X

Horizontal Velocity (X-component), in Two's complement

- 20 bits [....................]
- signed quantity
- unit: "m/s"
- LSB = $1/100$ m/s $\approx 1.00e-2$ m/s
- value $>= -524287/100$ m/s
- value $<= 524287/100$ m/s

I015/602/HV/Y

Horizontal Velocity in (Y-component), in Two's complement

- 20 bits [....................]
- signed quantity
- unit: "m/s"
- LSB = $1/100$ m/s $\approx 1.00e-2$ m/s
- value $>= -524287/100$ m/s
- value $<= 524287/100$ m/s

I015/602/RSHV - *Horizontal Velocity Resolution*

Minimum difference in Horizontal Velocity at which a sensor system is able to distinguish two targets with otherwise identical parameters in range and angular domain (under ideal measurement).

I015/602/RSHV/X

Horizontal velocity resolution of the target in target centric Cartesian coordinates (X-component)

- 16 bits [................]
- unsigned quantity
- unit: "m/s"
- LSB = $1/100$ m/s $\approx 1.00e-2$ m/s
- value $<= 13107/20$ m/s

I015/602/RSHV/Y

Horizontal velocity resolution of the target in target centric Cartesian coordinates (Y-component)

- 16 bits [................]
- unsigned quantity
- unit: "m/s"

- LSB = $1/100$ m/s $\approx 1.00e-2$ m/s
- value $<= 13107/20$ m/s

I015/602/RSHV/CORSHVXY

Correlation of horizontal position resolution of X and Y components, in Two's complement.

- 8 bits [. . . . .]
- signed quantity
- LSB = $1/2^7 \approx 7.81e-3$

remark Note: The velocity resolution describes the capability of a sensor to be able to separate two closely located targets in the velocity domain. The velocity resolution for an INCS system depends on the signal integration time as well as the transmit frequency. A longer integration time or a higher transmit frequency leads to a better velocity resolution. Depending on the specific INCS application, a better velocity resolution may be more important than a high sensor refresh rate. The velocity resolution might also alleviate the limitations on the range resolution, in order to make small bandwidth applications possible.

I015/602/SDHV - *Horizontal Velocity Precision*

Root-mean-square (rms) error of the Horizontal Velocity estimate provided by a sensor system.

I015/602/SDHV/X

Standard Deviation of horizontal velocity (X-component)

- 16 bits [. . . . .]
- unsigned quantity
- unit: "m/s"
- LSB = $1/100$ m/s $\approx 1.00e-2$ m/s
- value $<= 13107/20$ m/s

I015/602/SDHV/Y

Standard Deviation of horizontal velocity (Y-component)

- 16 bits [. . . . .]
- unsigned quantity
- unit: "m/s"
- LSB = $1/100$ m/s $\approx 1.00e-2$ m/s
- value $<= 13107/20$ m/s

I015/602/SDHV/COHVXY

Correlation of standard deviation of horizontal velocity of X and Y components, in Two's complement

- 8 bits [. . . . .]
- signed quantity
- LSB = $1/2^7 \approx 7.81e-3$

I015/602/COHVHP - *Correlation of Horizontal Velocity and Horizontal Position*

Correlation of the errors associated with the estimates of Horizontal Velocity and Horizontal Position provided by a sensor system.

I015/602/COHVHP/COHVXHPX

Correlation of Horizontal Velocity (X-component) and Horizontal Position (X-component), in Two's complement

- 8 bits [. . . . .]
- signed quantity
- LSB = $1/2^7 \approx 7.81e-3$

I015/602/COHVHP/COHVXHPY

Correlation of Horizontal Velocity (X-component) and Horizontal Position (Y-component), in Two's complement

- 8 bits [........]
- signed quantity
- LSB = $1/2^7 \approx 7.81e-3$

I015/602/COHVHP/COHVYHPX

Correlation of Horizontal Velocity (Y-component) and Horizontal Position (X-component), in Two's complement

- 8 bits [........]
- signed quantity
- LSB = $1/2^7 \approx 7.81e-3$

I015/602/COHVHP/COHVYHPY

Correlation of Horizontal Velocity (Y-component) and Horizontal Position (Y-component), in Two's complement

- 8 bits [........]
- signed quantity
- LSB = $1/2^7 \approx 7.81e-3$

I015/603 - Horizontal Acceleration Information

Definition: Magnitude of the Horizontal Acceleration Vector.

Structure:

Compound item (FX)

I015/603/HA - *Horizontal Acceleration Vector*

Horizontal acceleration vector expressed in target centric local Cartesian coordinates, in Two's complement representation.

I015/603/HA/X

Horizontal Acceleration (X-component), in Two's complement

- 12 bits [............]
- signed quantity
- unit: "m/s²"
- LSB = $1/2^4$ m/s² $\approx 6.25e-2$ m/s²
- value $>= -128$ m/s²
- value $<= 128$ m/s²

I015/603/HA/Y

Horizontal Acceleration (Y-component), in Two's complement

- 12 bits [............]
- signed quantity
- unit: "m/s²"
- LSB = $1/2^4$ m/s² $\approx 6.25e-2$ m/s²
- value $>= -128$ m/s²
- value $<= 128$ m/s²

I015/603/SDHA - *Horizontal Acceleration Precision*

Root-mean-square (rms) error of the Horizontal Acceleration estimate provided by a sensor system.

I015/603/SDHA/X

Standard Deviation of Horizontal Acceleration (X-component)

- 12 bits [............]
- unsigned quantity
- unit: "m/s²"
- LSB = $1/2^4$ m/s² $\approx 6.25e-2$ m/s²
- value $<= 4095/16$ m/s²

I015/603/SDHA/Y

Standard Deviation of Horizontal Acceleration (Y-component)

- 12 bits [. . . . .]
- unsigned quantity
- unit: "m/s²"
- LSB = $1/2^4$ m/s² $\approx 6.25e-2$ m/s²
- value $<= 4095/16$ m/s²

I015/603/SDHA/COHAXY

Correlation of standard deviation of Horizontal Acceleration of X and Y components, in Two's complement

- 8 bits [. . . . .]
- signed quantity
- LSB = $1/2^7 \approx 7.81e-3$

I015/603/COHAHP - *Correlation of Horizontal Acceleration and Horizontal Position*

Correlation of the errors associated with the estimates of Horizontal Acceleration and Horizontal Position provided by a sensor system.

I015/603/COHAHP/COHAXHPX

Correlation of Horizontal Acceleration (X-component) and Horizontal Position (X-component), in Two's complement

- 8 bits [. . . . .]
- signed quantity
- LSB = $1/2^7 \approx 7.81e-3$

I015/603/COHAHP/COHAXHPY

Correlation of Horizontal Acceleration (X-component) and Horizontal Position (Y-component), in Two's complement

- 8 bits [. . . . .]
- signed quantity
- LSB = $1/2^7 \approx 7.81e-3$

I015/603/COHAHP/COHAYHPX

Correlation of Horizontal Acceleration (Y-component) and Horizontal Position (X-component), in Two's complement

- 8 bits [. . . . .]
- signed quantity
- LSB = $1/2^7 \approx 7.81e-3$

I015/603/COHAHP/COAYHPY

Correlation of Horizontal Acceleration (Y-component) and Horizontal Position (Y-component), in Two's complement

- 8 bits [. . . . .]
- signed quantity
- LSB = $1/2^7 \approx 7.81e-3$

I015/603/COHAHV - *Correlation of Horizontal Acceleration and Horizontal Velocity*

Correlation of the errors associated with the estimates of Horizontal Acceleration and Horizontal Velocity provided by a sensor system.

I015/603/COHAHV/COHAXHVX

Correlation of Horizontal Acceleration (X-component) and Horizontal Velocity (X-component), in Two's complement

- 8 bits [. . . . .]
- signed quantity
- LSB = $1/2^7 \approx 7.81e-3$

I015/603/COHAHV/COHAXHVY

Correlation of Horizontal Acceleration (X-component) and Horizontal Velocity (Y-component), in Two's complement

- 8 bits [. . . . .]
- signed quantity
- LSB = $1/2^7 \approx 7.81e-3$

I015/603/COHAHV/COHAYHVX

Correlation of Horizontal Acceleration (Y-component) and Horizontal Velocity (X-component), in Two's complement

- 8 bits [. . . . .]
- signed quantity
- LSB = $1/2^7 \approx 7.81e-3$

I015/603/COHAHV/COHAYHVY

Correlation of Horizontal Acceleration (Y-component) and Horizontal Velocity (Y-component), in Two's complement

- 8 bits [. . . . .]
- signed quantity
- LSB = $1/2^7 \approx 7.81e-3$

I015/604 - Vertical Velocity Information

Definition: Vertical velocity as given by the rate of change of the Geometric Height.

Structure:

Compound item (FX)

I015/604/VV - *Vertical Velocity*

Vertical velocity as given by the rate of change of the Geometric Height expressed in Two's Complement.

- 24 bits [. . . . .]
- signed quantity
- unit: "m/s"
- LSB = $1/100$ m/s $\approx 1.00e-2$ m/s
- value $>= -8388607/100$ m/s
- value $<= 8388607/100$ m/s

  remark Note: Positive values indicates climbing target and negative values indicates descending target.

I015/604/RSVV - *Vertical Velocity Resolution*

Minimum difference in Vertical Velocity at which a sensor system is able to distinguish two targets with otherwise identical parameters in range and angular domain (under ideal measurement).

- 16 bits [. . . . .]
- unsigned quantity
- unit: "m/s"
- LSB = $1/100$ m/s $\approx 1.00e-2$ m/s
- value $<= 13107/20$ m/s

I015/604/SDVV - *Vertical Velocity Precision*

Root-mean-square (rms) error of the Vertical Velocity estimate provided by a sensor system.

I015/604/SDVV/SDVV

Standard Deviation of Vertical Velocity

- 16 bits [. . . . .]
- unsigned quantity
- unit: "m/s"
- LSB = $1/100$ m/s $\approx 1.00e-2$ m/s
- value $<= 13107/20$ m/s

I015/604/SDVV/COVVGH

Correlation of Vertical Velocity and Geometric Height, in Two's complement

- 8 bits [. . . . .]
- signed quantity
- LSB = $1/2^7 \approx 7.81e-3$

I015/604/COVVHP - *Correlation of Vertical Velocity and Horizontal Position*

Correlation of the errors associated with the estimates of Vertical Velocity converted in to metres/sec and Horizontal Position provided by a sensor system.

I015/604/COVVHP/X

Correlation of Vertical Velocity and Horizontal Position (X-component), in Two's complement

- 8 bits [. . . . .]
- signed quantity
- LSB = $1/2^7 \approx 7.81e-3$

I015/604/COVVHP/Y

Correlation of Vertical Velocity and Horizontal Position (Y-component), in Two's complement

- 8 bits [. . . . .]
- signed quantity
- LSB = $1/2^7 \approx 7.81e-3$

I015/604/COVVHV - *Correlation of Vertical Velocity and Horizontal Velocity*

Correlation of the errors associated with the estimates of Vertical Velocity converted in to metres/sec and Horizontal Velocity provided by a sensor system.

I015/604/COVVHV/X

Correlation of Vertical Velocity and Horizontal Velocity (X-component)), in Two's complement

- 8 bits [. . . . .]
- signed quantity
- LSB = $1/2^7 \approx 7.81e-3$

I015/604/COVVHV/Y

Correlation of Vertical Velocity and Horizontal Velocity (Y-component)), in Two's complement

- 8 bits [. . . . .]
- signed quantity
- LSB = $1/2^7 \approx 7.81e-3$

I015/604/COVVHA - *Correlation of Vertical Velocity and Horizontal Acceleration*

Correlation of the errors associated with the estimates of Vertical Velocity converted in to metres/sec and Horizontal Acceleration provided by a sensor system.

I015/604/COVVHA/X

Correlation of Vertical and Horizontal Acceleration (X-component)), in Two's complement

- 8 bits [. . . . .]

- signed quantity
- LSB = $1/2^7 \approx 7.81e-3$

I015/604/COVVHA/Y

Correlation of Vertical Velocity and Horizontal Acceleration (Y-component)), in Two's complement

- 8 bits [. . . . .]
- signed quantity
- LSB = $1/2^7 \approx 7.81e-3$

I015/605 - Vertical Velocity Information

Definition: Compound data item, comprising a primary subfield of one-octet, followed by one or more defined subfields.

Structure:

Compound item (FX)

I015/605/VA - *Vertical Acceleration*

Vertical acceleration information expressed in Two's complement.

- 16 bits [. . . . .]
- signed quantity
- unit: "m/s²"
- LSB = $1/100$ m/s² $\approx 1.00e-2$ m/s²
- value $>= -32767/100$ m/s²
- value $<= 32767/100$ m/s²

  remark Note: Positive values indicates accelerating during climb or descent and negative values indicates deceleration during climb or descent.

I015/605/RSVA - *Vertical Acceleration Precision*

Root-mean-square (rms) error of the Vertical Acceleration estimate provided by a sensor system.

I015/605/RSVA/SDVA

Standard Deviation of Vertical Acceleration

- 16 bits [. . . . .]
- unsigned quantity
- unit: "m/s²"
- LSB = $1/100$ m/s² $\approx 1.00e-2$ m/s²
- value $<= 3355443/20$ m/s²

I015/605/RSVA/COVAGH

Correlation of Vertical Acceleration and Geometric Height, in Two's complement

- 8 bits [. . . . .]
- signed quantity
- LSB = $1/2^7 \approx 7.81e-3$

I015/605/RSVA/COVAVV

Correlation of Vertical Acceleration and Vertical Velocity, in Two's complement

- 8 bits [. . . . .]
- signed quantity
- LSB = $1/2^7 \approx 7.81e-3$

I015/605/COVAHP - *Correlation of Vertical Acceleration and Horizontal Position*

Correlation of the errors associated with the estimates of Vertical Acceleration and Horizontal Position provided by a sensor system.

I015/605/COVAHP/X

Correlation of Vertical Acceleration and Horizontal Position (X-component), in Two's complement

- 8 bits [. . . . .]
- signed quantity
- LSB = $1/2^7 \approx 7.81e-3$

I015/605/COVAHP/Y

Correlation of Vertical Acceleration and Horizontal Position (Y-component), in Two's complement

- 8 bits [. . . . .]
- signed quantity
- LSB = $1/2^7 \approx 7.81e-3$

I015/605/COVAHV - *Correlation of Vertical Acceleration and Horizontal Velocity*

Correlation of the errors associated with the estimates of Vertical Acceleration and Horizontal Velocity provided by a sensor system.

I015/605/COVAHV/X

Correlation of Vertical Acceleration and Horizontal Velocity (X-component), in Two's complement

- 8 bits [. . . . .]
- signed quantity
- LSB = $1/2^7 \approx 7.81e-3$

I015/605/COVAHV/Y

Correlation of Vertical Acceleration and Horizontal Velocity (Y-component), in Two's complement

- 8 bits [. . . . .]
- signed quantity
- LSB = $1/2^7 \approx 7.81e-3$

I015/605/COVAHA - *Correlation of Vertical Acceleration and Horizontal Acceleration*

Correlation of the errors associated with the estimates of Vertical Acceleration and Horizontal Acceleration provided by a sensor system.

I015/605/COVAHA/X

Correlation of Vertical Acceleration and Horizontal Acceleration (X-component), in Two's complement

- 8 bits [. . . . .]
- signed quantity
- LSB = $1/2^7 \approx 7.81e-3$

I015/605/COVAHA/Y

Correlation of Vertical Acceleration and Horizontal Acceleration (Y-component), in Two's complement

- 8 bits [. . . . .]
- signed quantity
- LSB = $1/2^7 \approx 7.81e-3$

I015/625 - Range Information

Definition: The targets range information is given relative to the sensor reference point(s).

Structure:

Compound item (FX)

I015/625/R - *Range*

Measured range between a target object and a pre-defined point associated with the sensor system (e.g., for a mono-static radar system the phase centre of the antenna aperture) or measured bistatic range between a pre-defined point associated with the transmitter station, the target object position and a pre-defined point associated with the sensor system (e.g., for a bistatic radar system the phase centres of the transmitter and receiver antenna aperture).

- 24 bits [........................]
- signed quantity
- unit: "m"
- LSB = $1/10$ m ≈ 0.10 m
- value $>= -8388607/10$ m
- value $<= 8388607/10$ m

I015/625/RSR - *Range Resolution*

Minimum difference in Range at which a sensor system is able to distinguish two targets with otherwise identical parameters in velocity and angular domain (under ideal measurement).

- 24 bits [........................]
- unsigned quantity
- unit: "m"
- LSB = $1/10$ m ≈ 0.10 m
- value $<= 3355443/2$ m

remark Note: This may differ from the cell size applied within the Sensor.

I015/625/SDR - *Range Precision*

Root-mean-square (rms) error of the Range estimate provided by a sensor system.

- 24 bits [........................]
- unsigned quantity
- unit: "m"
- LSB = $1/10$ m ≈ 0.10 m
- value $<= 3355443/2$ m

I015/625/RR - *Range Rate*

The range rate is derived from different range measurements.

- 24 bits [........................]
- signed quantity
- unit: "m/s"
- LSB = $1/10$ m/s ≈ 0.10 m/s
- value $>= -8388607/10$ m/s
- value $<= 8388607/10$ m/s

remark Note: The range rate is the first derivative computed from the range. In contrast, the Doppler velocity in I015/626 is actually measured through Doppler.

I015/625/RSRR - *Range Rate Resolution*

Minimum difference in Range Rate at which a sensor system is able to distinguish two targets with otherwise identical parameters in position and angular domain (under ideal measurement).

- 24 bits [. . . . .]
- unsigned quantity
- unit: "m/s"
- LSB = $1/10$ m/s ≈ 0.10 m/s
- value $<= 3355443/2$ m/s

I015/625/SDRR - *Range Rate Precision*

Root-mean-square (rms) error of the Range Rate estimate provided by a sensor system.

I015/625/SDRR/SDRR

Standard Deviation of Range Rate

- 24 bits [. . . . .]
- unsigned quantity
- unit: "m/s"
- LSB = $1/10$ m/s ≈ 0.10 m/s
- value $<= 3355443/2$ m/s

I015/625/SDRR/CORRR

Correlation of Range Rate and Range, in Two's complement

- 8 bits [. . . . .]
- signed quantity
- LSB = $1/2^7 \approx 7.81e-3$

I015/625/RA - *Range Acceleration*

The range acceleration is derived from different range rates.

- 16 bits [. . . . .]
- signed quantity
- unit: "m/s²"
- LSB = $1/2^6$ m/s² $\approx 1.56e-2$ m/s²
- value $>= -512$ m/s²
- value $<= 512$ m/s²

I015/625/SDRA - *Range Acceleration Precision*

Root-mean-square (rms) error of the Range Acceleration determined by the sensor system.

I015/625/SDRA/SDRA

Standard Deviation of Range Acceleration

- 16 bits [. . . . .]
- unsigned quantity
- unit: "m/s²"
- LSB = $1/2^7$ m/s² $\approx 7.81e-3$ m/s²
- value $<= 512$ m/s²

I015/625/SDRA/CORAR

Correlation of Range Acceleration and Range, in Two's complement

- 8 bits [. . . . .]
- signed quantity
- LSB = $1/2^7 \approx 7.81e-3$

I015/625/SDRA/CORARR

Correlation of Range Acceleration and Range Rate, in Two's complement

- 8 bits [. . . . .]
- signed quantity

- LSB = $1/2^7 \approx 7.81e-3$

Note 1: Depending upon its design the manner in which the positional data is declared by an INCS sensor may be expressed in WGS-84 (I015/ 600) or sensor centric coordinate system based upon the 'system reference point' of the sensor (I015/625).

Note 2: The optional 'precision' fields (in Data Items I015/600 – I015/625) provide a measure of the accuracy the INCS system has assigned to positional data contained in the target report. Such information can be used to improve the quality with which the INCS target report data is integrated in to the subsequent processing stages of the ATM infrastructure. However a consideration of the sensor characteristics and capabilities, the manner in which INCS data is used operationally, the weighting assigned to INCS data within a multi-sensor tracker and the credibility assigned to the covariance data items should be made to support the decision of whether these optional covariance data items are required or whether the basic data items provide sufficient performance. Whilst not an operational consideration the additional costs that may be associated with the provision and use of such data items should also be weighed against the potential performance benefits that would be achieved through the inclusion of these Data Items in performance specifications.

Note 3: If I015/020 MoMu indicates that the target report is Bi-Static (MoMu =1) then the range information is the difference between the path from the transmitter to target to the receiver less the distance between the transmitter and receiver. In this case, the reference points referred to above are the positions of the transmitter and receiver. If I015/020 MoMu indicates that the target report is Mono-Static (MoMu =0) then the range information is the distance between the sensor and the target. In this case, the reference point referred to above is the position of the mono-static sensor.

Note 4: The meaning of range in Category 015 is significantly broader than the traditional hence the different INCS working principles. This is especially true for bi-static and multi-static radars. For readability the field is still called range and not mono-/bi-/multi-static range or pseudo-range. For radar the measured range is calculated from time differences of signals assumed to be transmitted/received at the sensor reference point(s). As noted above for bi-static radars the reference points are the positions of the transmitter and receiver. Moreover multi-static radars may receive identical signals from other transmitters than the assumed reference transmitter (e.g. passive INCS which are using single frequency networks as illuminators) and therefore may calculate negative values for bi-static range measurement data.

I015/626 - Doppler Information

Definition: Doppler measurement of the Target.

Structure:

Compound item (FX)

I015/626/DV - *Doppler Velocity*

Radial velocity or bistatic velocity of a target object measured by a sensor system via a corresponding Doppler frequency shift.

- 24 bits [........................]
- signed quantity
- unit: "m/s"
- LSB = $1/100$ m/s $\approx 1.00e-2$ m/s
- value $>= -8388607/100$ m/s
- value $<= 8388607/100$ m/s

remark Note: The radial velocity is the magnitude of the 3-dimensional velocity vector (i.e., the time derivative of the 3-dimensional position vector) projected onto the line between target object and sensor. The bistatic velocity is the magnitude of the 3-dimensional velocity vector projected onto the line between transmitter station and target object plus the magnitude of the 3-dimensional velocity vector projected onto the line between target object and sensor.

I015/626/SDDV - *Precision of Doppler Velocity*

Root-mean-square (rms) error of the Doppler Velocity measured by the sensor system.

- 16 bits [. . . . .]
- unsigned quantity
- unit: "m/s"
- LSB = $1/2^6$ m/s $\approx 1.56e-2$ m/s
- value $<= 1024$ m/s

I015/626/DA - *Doppler Acceleration*

Radial acceleration or bistatic acceleration of a target object measured by a sensor system via a corresponding Doppler frequency shift and a subsequent difference operation.

- 16 bits [. . . . .]
- signed quantity
- unit: "m/s²"
- LSB = $1/2^6$ m/s² $\approx 1.56e-2$ m/s²
- value $>= -512$ m/s²
- value $<= 512$ m/s²

  remark Note: The radial acceleration is the magnitude of the 3-dimensional acceleration vector (i.e., the time derivative of the 3-dimensional velocity vector) projected onto the line between target object and sensor. The bistatic acceleration is the magnitude of the 3-dimensional acceleration vector projected onto the line between transmitter station and target object plus the magnitude of the 3-dimensional acceleration vector projected onto the line between target object and sensor.

I015/626/SDDA - *Precision of Doppler Acceleration*

Root-mean-square (rms) error of the Doppler Velocity measured by the sensor system.

I015/626/SDDA/SDDA

Standard Deviation of Doppler Acceleration

- 16 bits [. . . . .]
- unsigned quantity
- unit: "m/s²"
- LSB = $1/2^6$ m/s² $\approx 1.56e-2$ m/s²
- value $<= 1024$ m/s²

I015/626/SDDA/CODADV

Correlation of Doppler Acceleration and Doppler Velocity, in Two's complement

- 8 bits [. . . . .]
- signed quantity
- LSB = $1/2^7 \approx 7.81e-3$

I015/626/CODVR - *Correlation of Doppler Velocity and Range*

Correlation of Doppler Velocity and Range (e.g. bistatic range).

- 8 bits [. . . . .]
- signed quantity
- LSB = $1/2^7 \approx 7.81e-3$

I015/626/CODVRR - *Correlation of Doppler Velocity and Range Rate*

Correlation of Doppler Velocity and Range Rate.

- 8 bits [........]
- signed quantity
- LSB = $1/2^7 \approx 7.81e-3$

I015/626/CODVRA - *Correlation of Doppler Velocity and Range Acceleration*

Correlation of Doppler Velocity and Range (e.g. bistatic range).

- 8 bits [........]
- signed quantity
- LSB = $1/2^7 \approx 7.81e-3$

I015/626/CODAR - *Correlation of Doppler Acceleration and Range*

Correlation of Doppler Acceleration and Range (e.g. bistatic range).

- 8 bits [........]
- signed quantity
- LSB = $1/2^7 \approx 7.81e-3$

I015/626/CODARR - *Correlation of Doppler Acceleration and Range Rate*

Correlation of Doppler Acceleration and Range Rate.

- 8 bits [........]
- signed quantity
- LSB = $1/2^7 \approx 7.81e-3$

I015/626/CODARA - *Correlation of Doppler Acceleration and Range Acceleration*

Correlation of Doppler Acceleration and Range Acceleration.

- 8 bits [........]
- signed quantity
- LSB = $1/2^7 \approx 7.81e-3$

I015/627 - Azimuth Information

Definition: Azimuth information that is provided relative to the sensor or component reference point.

Structure:

Compound item (FX)

I015/627/AZ - *Azimuth*

Target angle relative to geographic North in the local reference system centred on the sensor.

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

  remark Note: The azimuth shall increment in a clockwise manner relative to geographic North.

I015/627/RSAZ - *Azimuth Resolution*

Minimum angle in order to separate targets by the sensor in the azimuth dimension.

- 16 bits [. . . . .]
- unsigned quantity
- unit: "°"
- LSB = $45/2^16$ ° $\approx 6.87e-4$ °
- value $<= 45$ °

I015/627/SDASZ - *Standard Deviation of Azimuth*

Estimated standard deviation of the azimuth angle.

- 16 bits [. . . . .]
- unsigned quantity
- unit: "°"
- LSB = $45/2^16$ ° $\approx 6.87e-4$ °
- value $<= 45$ °

I015/627/AZR - *Azimuth Rate*

Rate of change of the azimuth angle.

- 16 bits [. . . . .]
- signed quantity
- unit: "°"
- LSB = $180/2^16$ ° $\approx 2.75e-3$ °
- value $>= -90$ °
- value $<= 90$ °

I015/627/SDAZR - *Standard Deviation of Azimuth Rate*

Estimated standard deviation of the azimuth angle rate.

I015/627/SDAZR/SDAZR
Standard Deviation of Azimuth Rate

- 16 bits [. . . . .]
- unsigned quantity
- unit: "°"
- LSB = $45/2^16$ ° $\approx 6.87e-4$ °
- value $<= 45$ °

I015/627/SDAZR/COAZRAZ
Correlation of Azimuth Rate and Azimuth, in Two's complement

- 8 bits [. . . . .]
- signed quantity
- LSB = $1/2^7 \approx 7.81e-3$

I015/627/AZEX - *Azimuth Extent*

Target size in the azimuth angle dimension. The target extends between start angle and end angle traversed clockwise.

I015/627/AZEX/S
Azimuth Extent Start

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

I015/627/AZEX/E
Azimuth Extent End

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

- value $<= 360$ °

Note: The Sensor Reference Point is detailed in ASTERIX Category 016 – where there is also provision for including the reference points for the transmitter(s) and receiver(s) that are used within the sensor configuration. The Sensor Reference Point is also contained in ASTERIX Category 025.

I015/628 - Elevation Information

Definition: Information related to the elevation angle provided by the sensor. (Predominantly used by electro-optic sensors).

Structure:

Compound item (FX)

I015/628/EL - *Elevation*

The elevation shall be given with respect to the horizontal plane of the sensor expressed in Two's Complement.

- 16 bits [. . . . .]
- signed quantity
- unit: "°"
- LSB = $180/2^16$ ° $\approx 2.75e-3$ °
- value $>= -90$ °
- value $<= 90$ °

  remark Note: The elevation shall be given with respect to the local WGS-84 tangential plane of the receiver dedicated by I015/400. Note: For targets above the horizontal plane the elevation angle is positive and for targets below negative.

I015/628/RSEL - *Elevation Resolution*

Minimum angle in order to separate targets by the sensor in the elevation dimension.

- 16 bits [. . . . .]
- unsigned quantity
- unit: "°"
- LSB = $45/2^16$ ° $\approx 6.87e-4$ °
- value $<= 45$ °

I015/628/SDEL - *Standard Deviation of Elevation*

Estimated standard deviation of the elevation angle.

- 16 bits [. . . . .]
- unsigned quantity
- unit: "°"
- LSB = $45/2^16$ ° $\approx 6.87e-4$ °
- value $<= 45$ °

I015/628/ER - *Elevation Rate*

Rate of change of the elevation angle.

- 16 bits [. . . . .]
- signed quantity
- unit: "°/s"
- LSB = $180/2^16$ °/s $\approx 2.75e-3$ °/s
- value $>= -90$ °/s
- value $<= 90$ °/s

I015/628/SDER - *Standard Deviation of Elevation Rate*

Estimated standard deviation of the elevation angle rate.

I015/628/SDER/SDELR

Standard Deviation of Elevation Rate

- 16 bits [. . . . .]
- unsigned quantity
- unit: "°/s"
- LSB = $45/2^16$ °/s $\approx 6.87e-4$ °/s

I015/628/SDER/COELREL

Correlation of Elevation Rate and Elevation, in Two's complement

- 8 bits [. . . . .]
- signed quantity
- LSB = $1/2^7 \approx 7.81e-3$

I015/628/ELEX - *Elevation Extent*

Target size in the elevation angle dimension. The target extends between start angle and end angle.

I015/628/ELEX/S

Elevation Extent Start, in Two's complement

- 16 bits [. . . . .]
- signed quantity
- unit: "°"
- LSB = $180/2^16$ ° $\approx 2.75e-3$ °
- value $>= -90$ °
- value $<= 90$ °

I015/628/ELEX/E

Elevation Extent End, in Two's complement

- 16 bits [. . . . .]
- signed quantity
- unit: "°"
- LSB = $180/2^16$ ° $\approx 2.75e-3$ °
- value $>= -90$ °
- value $<= 90$ °

I015/630 - Path Quality

Definition: Measure characterising the signal quality associated with a specific target echo signal.

Structure:

Compound item (FX)

I015/630/DPP - *Direct Path - Power*

Signal power measured for the direct signal received from a specific transmitter station.

- 8 bits [. . . . .]
- signed quantity
- unit: "dB"
- LSB = 1 dB
- value $>= -128$ dB
- value $<= 127$ dB

I015/630/DPS - *Direct Path - Signal to Noise Ratio (SNR)*

Signal to noise ratio measured for the direct signal received from a specific transmitter station.

- 8 bits [. . . . .]
- signed quantity
- unit: "dB"
- LSB = 1 dB
- value $>= -128$ dB
- value $<= 127$ dB

I015/630/RPP - *Reflected Path - Power*

Signal power measured for a specific target echo signal found within range-Doppler matrix (associated with a specific transmitter station).

I015/630/RPP/(spare)

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

I015/630/RPP/RPP

Power of reflected path, in Two's complement"

- 9 bits [. . . . .]
- signed quantity
- unit: "dB"
- LSB = 1 dB
- value $>= -256$ dB
- value $<= 255$ dB

I015/630/RPS - *Reflected Path - Signal to Noise Ratio (SNR)*

Signal to noise ratio measured for a specific target echo signal found within range-Doppler matrix (associated with a specific transmitter station).

- 8 bits [. . . . .]
- signed quantity
- unit: "dB"
- LSB = 1 dB
- value $>= -128$ dB
- value $<= 127$ dB

Notes: Some INCS sensors may be capable of outputting an indication of the signal quality based upon the received echo signal strength for that target. Before including the provision of such data items in the technical specification, it is advised that the cost and operational benefits of the availability of such data is assessed.

I015/631 - Contour (Azimuth, Elevation Angle, Range Extent)

Definition: Azimuth, elevation angles and range extent of all elementary presences constituting a plot.

Structure:

Repetitive item, repetition factor 8 bits.

I015/631/AZCON

Azimuth Contour

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

I015/631/ELCON

Elevation Contour, in Two's complement

- 16 bits [................]
- signed quantity
- unit: "°"
- LSB = $180/2^16$ ° $\approx 2.75e-3$ °
- value $<= -90$ °
- value $>= 90$ °

I015/631/RGCONSTOP

Range Contour Stop

- 16 bits [................]
- unsigned quantity
- unit: "m"
- LSB = $10000/2^16$ m ≈ 0.15 m

I015/631/RGCONSTART

Range Contour Start

- 16 bits [................]
- unsigned quantity
- unit: "m"
- LSB = $10000/2^16$ m ≈ 0.15 m

Note 1: The azimuth shall increment in a clockwise manner relative to geographic North centred at the System Reference Point.

Note 2: The elevation shall be given with respect to the local WGS-84 tangential plane of the receiver dedicated by I015/400.

Note 3: If populated, the range contour requires a start and stop point. The stop point is to be greater or equal than the start point.

I015/SP - Special Purpose Field

Definition: Special Purpose Field

Structure:

Explicit item (SP)

User Application Profile for Category 015

- (1) `I015/010` - Data Source Identifier
- (2) `I015/000` - Message Type
- (3) `I015/015` - Service Identification
- (4) `I015/020` - Target Report Descriptor
- (5) `I015/030` - Warning/Error Conditions
- (6) `I015/145` - Time of Applicability
- (7) `I015/161` - Track/Plot Number
- `(FX)` - Field extension indicator
- (8) `I015/170` - Track/Plot Status

- (9) `I015/050` - Update Period
- (10) `I015/270` - Target Size & Orientation
- (11) `I015/300` - Object Classification
- (12) `I015/400` - Measurement Identifier
- (13) `I015/600` - Horizontal Position Information
- (14) `I015/601` - Geometric Height Information
- `(FX)` - Field extension indicator
- (15) `I015/602` - Horizontal Velocity Information
- (16) `I015/603` - Horizontal Acceleration Information
- (17) `I015/604` - Vertical Velocity Information
- (18) `I015/605` - Vertical Velocity Information
- (19) `I015/480` - Associations
- (20) `I015/625` - Range Information
- (21) `I015/626` - Doppler Information
- `(FX)` - Field extension indicator
- (22) `I015/627` - Azimuth Information
- (23) `I015/628` - Elevation Information
- (24) `I015/630` - Path Quality
- (25) `I015/631` - Contour (Azimuth, Elevation Angle, Range Extent)
- (26) `I015/SP` - Special Purpose Field
- (27) `(spare)`
- (28) `(spare)`
- `(FX)` - Field extension indicator