



AISG Extension Alignment Sensor Device

Alignment Sensor Device Extension to the Control Interface for Antenna Line Devices

Extension to AISG version 2.0

Revision History

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1. FOREWORD

The Antenna Interface Standards Group (AISG) published the AISG standard to facilitate the introduction of antenna line products with remote control and monitoring facilities. The purpose of that standard is to ensure basic interoperability of antennas and control infrastructure. The AISG standard covers two basic types of Antenna Line Devices: Actuators capable of altering the electrical downtilt of the antenna and tower mounted amplifiers.

It has become evident that commercial antenna line devices are evolving beyond this set of capabilities. The AISG has decided to publish extensions to the basic standard rather than adding all possible branches to the core specification. For purposes of compliance, users should note that this entire Extension Standard is *optional*. However, once a given Extension Standard is elected for inclusion in a device, the entire option becomes mandatory.

This extension to the AISG standard adds procedures for antenna line devices that implement monitoring of an antenna's alignment, including mechanical azimuth, mechanical tilt, and mechanical roll. Wireless offerings and their delivery systems are becoming increasingly sophisticated, providing more bandwidth, capabilities, and better quality of service to the end user, while increasing capacity and lowering maintenance costs for the carrier. One physical enclosure often contains antenna elements for multiple operating frequencies and radio technologies. These new antenna systems require precise alignment and are prone to installation error, exposed to harsh conditions, and are often hard to reach. Alignment Sensor Devices help solve these challenges.

2. SCOPE

This document contains extensions to layers 2 and 7 of AISG specification, version 2.0 [1], devices implementing Alignment Sensor Device (ASD).

3. REFERENCES

This AISG standard incorporates provisions from other publications. These are cited in the text and the referenced publications are listed below. Where references are dated, subsequent amendments or revisions of these publications apply only when specifically incorporated by amendment or revision of this AISG extension. For undated references the latest edition of the publication referred to applies.

- 1 AISG Version 2.0, "Control Interface for Antenna Line Devices"
- 2 3GPP TS25.460 UTRAN Iu-nt Interface General Aspects and Principles Release 6
- 3 3GPP TS25.461 UTRAN Iu-nt Interface Layer 1, Release 6
- 4 3GPP TS25.462 UTRAN Iu-nt Interface Signalling Transport, Release 6
- 5 [Not used]
- 6 3GPP TS25.463 UTRAN Iu-nt Interface: Application Part, Release 6



Note the 3GPP references are to Release 6 unless otherwise indicated. These documents are referred to in AISG Version 2.0, although they may have been superseded.

4. ABBREVIATIONS

Where abbreviations or acronyms are used in this document they have the following meanings:

ASD	Alignment Sensor Device
TCP	Time Consuming Procedure
UTC	Universal Time Coordinated

5. TERMINOLOGY AND DEFINITIONS

Where the following terms are used in this document, they have the meanings listed below.

Mechanical Azimuth	Heading angle of the ASD in the horizontal plane. In the case of a directional antenna, the ASD is referenced to the bore sight of the physical antenna assembly. The Mechanical Azimuth is equal to the direction of RF propagation when zero electrical tilt, azimuth steering, or phase shifting has been applied. Azimuth is reported in the range 0 – 359.9 degrees East of True North, in decimal degrees to one decimal place of accuracy, and then multiplied by 10 so that it may be represented by an integer.
Mechanical Tilt	Tilt angle of the ASD in the vertical plane. Tilt at an angle below straight and level shall be represented by a positive number (down-tilt), while tilt at an angle above straight and level shall be represented by a negative number. Tilt is reported in decimal degrees, to one decimal place of accuracy, and then multiplied by 10 so that it may be represented by an integer.
Mechanical Roll	Roll angle of the ASD in the vertical plane between the vertical and physical axes of the antenna. In the case of a directional antenna, while facing in the direction of Mechanical Azimuth, roll at an angle clockwise from the vertical shall be represented by a positive number, while roll in the counter-clockwise direction shall be represented by a negative number. Roll is reported in decimal degrees, to one decimal place of accuracy, and then multiplied by 10 so that it may be represented by an integer.



Target Azimuth / Tilt / Roll	A value representing the target alignment of an antenna in one of the three axes measured by the ASD (azimuth, tilt, roll).
Calculated Azimuth / Tilt / Roll	A value representing the 'best estimate' of an antenna in one of the three axes measured by the ASD (azimuth, tilt, roll). This value is the result of averaging historical data, or any other means of calculation deemed appropriate by the ASD vendor for producing a consistently accurate result.
Azimuth / Tilt / Roll Precision	Precision is represented by the standard deviation of values from their arithmetic mean in one of the three axes measured by the ASD (azimuth, tilt, roll). This value may be used to judge the credibility of calculated measurements.
Lowest Calculated Azimuth / Tilt / Roll	A value that represents the lowest calculated result in one of the three axes measured by the ASD (azimuth, tilt, roll) since the ASD was last layer-7 reset. It may be used to analyze the effects of sway or other mechanical inputs.
Highest Calculated Azimuth / Tilt / Roll	A value that represents the highest calculated result in one of the three axes measured by the ASD (azimuth, tilt, roll) since the ASD was last layer-7 reset. It may be used to analyze the effects of sway or other mechanical inputs.
Upper Azimuth / Tilt / Roll Threshold	A delta value that when added to the Target Azimuth, Tilt, or Roll equals the highest measurement permitted without triggering an alarm condition. An Upper Threshold is given in decimal degrees to one decimal place of accuracy, and then multiplied by 10 so that it may be represented by an integer. A value of -1 indicates there is no threshold, and this alarm is disabled.
Lower Azimuth / Tilt / Roll Threshold	A delta value that when subtracted from the Target Azimuth, Tilt, or Roll equals the lowest measurement permitted without triggering an alarm condition. A Lower Threshold is given in decimal degrees to one decimal place of accuracy, and then multiplied by 10 so that it may be represented by an integer.
UTC Date/Time	The date and time in Universal Time Coordinated. UTC Date/Time is not affected by local daylight saving time regulations.



6. LAYER 1

All definitions and specifications for RET devices in the reference [1], [2] and [3] regarding layer 1 apply to ASD devices complying with this Extension Standard unless otherwise stated by requirements in this document.

6.1. DC supply

6.1.1. ASD DC power consumption

Power consumption shall be given by the product data sheet.

6.1.2. ASD Power-up characteristics

Devices complying with this Extension Standard shall have a maximum power-up period of 3 seconds.

After the power-up period, the device shall be fully functional.

6.2. Resumption of operation after interruption of supply

Normal operation shall be resumed after restoration of the power supply after any interruption or arbitrary reduction of the voltage supplied (brown-out) in accordance with [3].

NOTE: Alignment information may not be immediately available.

6.2.1. ASDs

During loss of DC power, antennas with ASDs continue in normal RF operation but will lose alignment monitoring functionality.

The following data shall be retained:

- Target azimuth, tilt, and roll
- Upper azimuth, tilt, and roll thresholds
- Lower azimuth, tilt, and roll thresholds



7. LAYER 2

All definitions and specifications for RET devices in reference [4] regarding layer 2 shall be valid for all antenna line devices included in this Extension Standard regardless of whether the device implements RET functionality.

Extended specifications for layer 2 are defined in the following chapter.

7.1. Device Type

For the purposes of reverse compliance with [4], devices implementing this Extension Standard shall report the device type in compliance with provisions in [6]

The following table shows the additional device type for this Extension Standard:

Table 7.1.1: Device type

Device Type	1-octet unsigned integer
Alignment Sensor Device	0x23



8. LAYER 7

This chapter defines which procedures defined in [1] shall be re-used by ASD devices. This chapter also includes additional procedures which are specific to ASD devices.

8.1. General Aspects

8.1.1. Geometry and Numbering

All ASD devices shall be defined as multiple subunit devices.

NOTE: Devices with single ASD units shall be implemented as multiple subunit devices with the number of subunits equal to 1.

8.1.2. Parallel Procedure Handling for Time Consuming Procedures (TCPs)

The ASD device does not define any TCPs. Parallel procedure handling is not supported by the ASD.

8.2. Return and alarm codes

A table of return and alarm codes is given in [6] and extended in Annex A of this document.



8.3. Elementary Procedures for the Alignment Sensor Device

To avoid prematurely exhausting the available space in the command table through the proliferation of extensions, certain codes defined for other devices are reused by this extension. This process is called “overloading”.

For devices compliant with this extension, the overloaded code shall refer to a member of the ASD procedure set defined herein, and not to the procedure assigned by the original specification.

This section defines those procedures that are defined by overloading existing procedure codes without any significant changes in the procedure initiation message, response message, and/or return code values. For clarity, only differences from the language of the referenced specification are elaborated for these procedures.

Table 8.3.1 Common elementary procedures

ASD Command	Overloads	Code Value	Requirement
ASDAlarmIndication	TMAAlarmIndication [1]	0x76	Mandatory
ASDClearActiveAlarms	TMAClearActiveAlarms [1]	0x77	Mandatory
ASDGetAlarmStatus	TMAGetAlarmStatus [1]	0x78	Mandatory

These commands shall be implemented as specified in the corresponding paragraphs of [1].



8.4. Device-Specific Elementary Procedures for ASD Subunits

This section defines procedures that are defined by overloading existing procedures in [1] that include significant changes in the procedure message initiation, response, and/or return code values or formats. No requirements from the corresponding procedure clauses in [1] shall be inferred unless re-stated in this Extension Standard.

Table 8.4.1 Alignment Sensor Device elementary procedures for all supported functions

The following elementary procedures shall be included by all ASD implementations, regardless of supported functions.

ASD Command	Overloaded command	Code Value	Requirement
ASDGetSupportedFunctions	TMAGetSupportedFunctions[1]	0x7A	Mandatory

Table 8.4.2 ASD Mechanical Tilt function specific elementary procedures

If the Tilt Sensing function is supported as indicated by the function flags in Table 8.4.16.5, then the following elementary procedure is required.

ASD Command	Overloaded command	Code Value	Requirement
ASDGetMechTilt		0x91	Mandatory

Alternatively, if the Tilt Sensing function and Tilt Compare to Threshold functions are supported as indicated by the function flags in Table 8.4.16.5, then all of the following elementary procedures are required.

ASD Command	Overloaded command	Code Value	Requirement
ASDSetTargetMechTilt	AntennaSetTilt [1]	0x81	Mandatory
ASDGetTargetMechTilt	AntennaGetTilt [1]	0x82	Mandatory
ASDGetMechTilt		0x91	Mandatory
ASDSetMechTiltThresholds		0x92	Mandatory
ASDGetMechTiltThresholds		0x93	Mandatory

Table 8.4.3 ASD Mechanical Roll function specific elementary procedures

If the Roll Sensing function is supported as indicated by the function flags in Table 8.4.16.5, then the following elementary procedure is required.

ASD Command	Overloaded command	Code Value	Requirement
ASDGetMechRoll		0x96	Mandatory



Alternatively, if the Roll Sensing function and Roll Compare to Threshold functions are supported as indicated by the function flags in Table 8.4.16.5, then all of the following elementary procedures are required.

ASD Command	Overloaded command	Code Value	Requirement
ASDSetTargetMechRoll		0x94	Mandatory
ASDGetTargetMechRoll		0x95	Mandatory
ASDGetMechRoll		0x96	Mandatory
ASDSetMechRollThresholds		0x97	Mandatory
ASDGetMechRollThresholds		0x98	Mandatory

Table 8.4.4 ASD Mechanical Azimuth function specific elementary procedures

If the Azimuth Sensing function is supported as indicated by the function flags in Table 8.4.16.5, then the following elementary procedure is required.

ASD Command	Overloaded command	Code Value	Requirement
ASDGetMechAzimuth		0x9B	Mandatory

Alternatively, if the Azimuth Sensing function and Azimuth Compare to Threshold functions are supported as indicated by the function flags in Table 8.4.16.5, then all of the following elementary procedures are required.

ASD Command	Overloaded command	Code Value	Requirement
ASDSetTargetMechAzimuth		0x99	Mandatory
ASDGetTargetMechAzimuth		0x9A	Mandatory
ASDGetMechAzimuth		0x9B	Mandatory
ASDSetMechAzimuthThresholds		0x9C	Mandatory
ASDGetMechAzimuthThresholds		0x9D	Mandatory



8.4.1. ASD Set Target Mechanical Tilt

Table 8.4.1.1: Elementary procedure ASDSetTargetMechTilt

Name: ASDSetTargetMechTilt				
Code:	Issued by:	Procedure class:	DownloadMode state:	Power mode:
0x81	Primary device	1	No	Low

Table 8.4.1.2: Initiating message parameters and format for ASDSetTargetMechTilt

Field	Length	Type	Description
1	1 octet	Unsigned integer	Subunit number
2	2 octets	Signed integer	Target mechanical tilt

Table 8.4.1.3: Response message parameters and format for ASDSetTargetMechTilt

Field	Length	Type	Description
1	1 octet	Unsigned integer	Subunit number
2	1 octet	Return code	Return code: OK

Table 8.4.1.4: Return codes for ASDSetTargetMechTilt

OK	FAIL	Comment
	FormatError HardwareError WorkingSoftwareMissing UnsupportedProcedure	See [1]



8.4.2. ASD Get Target Mechanical Tilt

Table 8.4.2.1: Elementary procedure ASDGetTargetMechTilt

Name: ASDGetTargetMechTilt				
Code:	Issued by:	Procedure class:	DownloadMode state:	Power mode:
0x82	Primary device	1	No	Low

Table 8.4.2.2: Initiating message parameters and format for ASDGetTargetMechTilt

Field	Length	Type	Description
1	1 octet	Unsigned integer	Subunit number

Table 8.4.2.3: Response message parameters and format for ASDGetTargetMechTilt

Field	Length	Type	Description
1	1 octet	Unsigned integer	Subunit number
2	1 octet	Return code	Return code: OK
3	2 octets	Signed integer	Target mechanical tilt

Table 8.4.2.4: Return codes for ASDGetTargetMechTilt

OK	FAIL	Comment
	FormatError HardwareError WorkingSoftwareMissing UnsupportedProcedure NotConfigured	See [1] Prerequisite data has not been set. Unable to fulfill request.



8.4.3. ASD Get Mechanical Tilt

Table 8.4.3.1: Elementary procedure ASDGetMechTilt

Name: ASDGetMechTilt				
Code:	Issued by:	Procedure class:	DownloadMode state:	Power mode:
0x91	Primary device	1	No	Low

Table 8.4.3.2: Initiating message parameters and format for ASDGetMechTilt

Field	Length	Type	Description
1	1 octet	Unsigned integer	Subunit number

Table 8.4.3.3: Response message parameters and format for ASDGetMechTilt

Field	Length	Type	Description
1	1 octet	Unsigned integer	Subunit number
2	1 octet	Return code	Return code: OK
3	2 octets	Signed integer	Calculated tilt
4	2 octets	Unsigned integer	Tilt precision
5	2 octets	Signed integer	Lowest calculated tilt
6	2 octets	Signed integer	Highest calculated tilt

Table 8.4.3.4: Return codes for ASDGetMechTilt

OK	FAIL	Comment
	FormatError HardwareError WorkingSoftwareMissing UnsupportedProcedure NotConfigured NotReady	See [1] Prerequisite data has not been set. Unable to calculate result and fulfill request. The ASD has been correctly configured, but the requested measurement is currently unavailable. The ASD is busy collecting the required data or performing calculations on collected data.



8.4.4. ASD Set Mechanical Tilt Thresholds

Table 8.4.4.1: Elementary procedure ASDSetMechTiltThresholds

Name: ASDSetMechTiltThresholds				
Code:	Issued by:	Procedure class:	DownloadMode state:	Power mode:
0x92	Primary device	1	No	Low

Table 8.4.4.2: Initiating message parameters and format for ASDSetMechTiltThresholds

Field	Length	Type	Description
1	1 octet	Unsigned integer	Subunit number
2	2 octets	Unsigned integer	Upper tilt threshold
3	2 octets	Unsigned integer	Lower tilt threshold

Table 8.4.4.3: Response message parameters and format for ASDSetMechTiltThresholds

Field	Length	Type	Description
1	1 octet	Unsigned integer	Subunit number
2	1 octet	Return code	Return code: OK

Table 8.4.4.4: Return codes for ASDSetMechTiltThresholds

OK	FAIL	Comment
	FormatError HardwareError WorkingSoftwareMissing UnsupportedProcedure	See [1]



8.4.5. ASD Get Mechanical Tilt Thresholds

Table 8.4.5.1: Elementary procedure ASDGetMechTiltThresholds

Name: ASDGetMechTiltThresholds				
Code:	Issued by:	Procedure class:	DownloadMode state:	Power mode:
0x93	Primary device	1	No	Low

Table 8.4.5.2: Initiating message parameters and format for ASDGetMechTiltThresholds

Field	Length	Type	Description
1	1 octet	Unsigned integer	Subunit number

Table 8.4.5.3: Response message parameters and format for ASDGetMechTiltThresholds

Field	Length	Type	Description
1	1 octet	Unsigned integer	Subunit number
2	1 octet	Return code	Return code: OK
3	2 octets	Unsigned integer	Upper tilt threshold
4	2 octets	Unsigned integer	Lower tilt threshold

Table 8.4.5.4: Return codes for ASDGetMechTiltThresholds

OK	FAIL	Comment
	FormatError HardwareError WorkingSoftwareMissing UnsupportedProcedure NotConfigured	See [1] Prerequisite data has not been set. Unable to fulfill request.



8.4.6. ASD Set Target Mechanical Roll

Table 8.4.6.1: Elementary procedure ASDSetTargetMechRoll

Name: ASDSetTargetMechRoll				
Code:	Issued by:	Procedure class:	DownloadMode state:	Power mode:
0x94	Primary device	1	No	Low

Table 8.4.6.2: Initiating message parameters and format for ASDSetTargetMechRoll

Field	Length	Type	Description
1	1 octet	Unsigned integer	Subunit number
2	2 octets	Signed integer	Target roll

Table 8.4.6.3: Response message parameters and format for ASDSetTargetMechRoll

Field	Length	Type	Description
1	1 octet	Unsigned integer	Subunit number
2	1 octet	Return code	Return code: OK

Table 8.4.6.4: Return codes for ASDSetTargetMechRoll

OK	FAIL	Comment
	FormatError HardwareError WorkingSoftwareMissing UnsupportedProcedure	See [1]



8.4.7. ASD Get Target Mechanical Roll

Table 8.4.7.1: Elementary procedure ASDGetTargetMechRoll

Name: ASDGetTargetMechRoll				
Code:	Issued by:	Procedure class:	DownloadMode state:	Power mode:
0x95	Primary device	1	No	Low

Table 8.4.7.2: Initiating message parameters and format for ASDGetTargetMechRoll

Field	Length	Type	Description
1	1 octet	Unsigned integer	Subunit number

Table 8.4.7.3: Response message parameters and format for ASDGetTargetMechRoll

Field	Length	Type	Description
1	1 octet	Unsigned integer	Subunit number
2	1 octet	Return code	Return code: OK
3	2 octets	Signed integer	Target mechanical roll

Table 8.4.7.4: Return codes for ASDGetTargetMechRoll

OK	FAIL	Comment
	FormatError HardwareError WorkingSoftwareMissing UnsupportedProcedure NotConfigured	See [1] Prerequisite data has not been set. Unable to fulfill request.



8.4.8. ASD Get Mechanical Roll

Table 8.4.8.1: Elementary procedure ASDGetMechRoll

Name: ASDGetMechRoll				
Code:	Issued by:	Procedure class:	DownloadMode state:	Power mode:
0x96	Primary device	1	No	Low

Table 8.4.8.2: Initiating message parameters and format for ASDGetMechRoll

Field	Length	Type	Description
1	1 octet	Unsigned integer	Subunit number

Table 8.4.8.3: Response message parameters and format for ASDGetMechRoll

Field	Length	Type	Description
1	1 octet	Unsigned integer	Subunit number
2	1 octet	Return code	Return code: OK
3	2 octets	Signed integer	Calculated roll
4	2 octets	Unsigned integer	Roll precision
5	2 octets	Signed integer	Lowest calculated roll
6	2 octets	Signed integer	Highest calculated roll

Table 8.4.8.4: Return codes for ASDGetMechRoll

OK	FAIL	Comment
	FormatError HardwareError WorkingSoftwareMissing UnsupportedProcedure NotConfigured NotReady	See [1] Prerequisite data has not been set. Unable to calculate result and fulfill request. The ASD has been correctly configured, but the requested measurement is currently unavailable. The ASD is busy collecting the required data or performing calculations on collected data.



8.4.9. ASD Set Mechanical Roll Thresholds

Table 8.4.9.1: Elementary procedure ASDSetMechRollThresholds

Name: ASDSetMechRollThresholds				
Code:	Issued by:	Procedure class:	DownloadMode state:	Power mode:
0x97	Primary device	1	No	Low

Table 8.4.9.2: Initiating message parameters and format for ASDSetMechRollThresholds

Field	Length	Type	Description
1	1 octet	Unsigned integer	Subunit number
2	2 octets	Unsigned integer	Upper roll threshold
3	2 octets	Unsigned integer	Lower roll threshold

Table 8.4.9.3: Response message parameters and format for ASDSetMechRollThresholds

Field	Length	Type	Description
1	1 octet	Unsigned integer	Subunit number
2	1 octet	Return code	Return code: OK

Table 8.4.9.4: Return codes for ASDSetMechRollThresholds

OK	FAIL	Comment
	FormatError HardwareError WorkingSoftwareMissing UnsupportedProcedure	See [1]



8.4.10. ASD Get Mechanical Roll Thresholds

Table 8.4.10.1: Elementary procedure ASDGetMechRollThresholds

Name: ASDGetMechRollThresholds				
Code:	Issued by:	Procedure class:	DownloadMode state:	Power mode:
0x98	Primary device	1	No	Low

Table 8.4.10.2: Initiating message parameters and format for ASDGetMechRollThresholds

Field	Length	Type	Description
1	1 octet	Unsigned integer	Subunit number

Table 8.4.10.3: Response message parameters and format for ASDGetMechRollThresholds

Field	Length	Type	Description
1	1 octet	Unsigned integer	Subunit number
2	1 octet	Return code	Return code: OK
3	2 octets	Unsigned integer	Upper roll threshold
4	2 octets	Unsigned integer	Lower roll threshold

Table 8.4.10.4: Return codes for ASDGetMechRollThresholds

OK	FAIL	Comment
	FormatError HardwareError WorkingSoftwareMissing UnsupportedProcedure NotConfigured	See [1] Prerequisite data has not been set. Unable to fulfill request.



8.4.11. ASD Set Target Mechanical Azimuth

Table 8.4.11.1: Elementary procedure ASDSetTargetMechAzimuth

Name: ASDSetTargetMechAzimuth				
Code:	Issued by:	Procedure class:	DownloadMode state:	Power mode:
0x99	Primary device	1	No	Low

Table 8.4.11.2: Initiating message parameters and format for ASDSetTargetMechAzimuth

Field	Length	Type	Description
1	1 octet	Unsigned integer	Subunit number
2	2 octets	Signed integer	Target azimuth

Table 8.4.11.3: Response message parameters and format for ASDSetTargetMechAzimuth

Field	Length	Type	Description
1	1 octet	Unsigned integer	Subunit number
2	1 octet	Return code	Return code: OK

Table 8.4.11.4: Return codes for ASDSetTargetMechAzimuth

OK	FAIL	Comment
	FormatError HardwareError WorkingSoftwareMissing UnsupportedProcedure	See [1]



8.4.12. ASD Get Target Mechanical Azimuth

Table 8.4.12.1: Elementary procedure ASDGetTargetMechAzimuth

Name: ASDGetTargetMechAzimuth				
Code:	Issued by:	Procedure class:	DownloadMode state:	Power mode:
0x9A	Primary device	1	No	Low

Table 8.4.12.2: Initiating message parameters and format for ASDGetTargetMechAzimuth

Field	Length	Type	Description
1	1 octet	Unsigned integer	Subunit number

Table 8.4.12.3: Response message parameters and format for ASDGetTargetMechAzimuth

Field	Length	Type	Description
1	1 octet	Unsigned integer	Subunit number
2	1 octet	Return code	Return code: OK
3	2 octets	Signed integer	Target mechanical azimuth

Table 8.4.12.4: Return codes for ASDGetTargetMechAzimuth

OK	FAIL	Comment
	FormatError HardwareError WorkingSoftwareMissing UnsupportedProcedure NotConfigured	See [1] Prerequisite data has not been set. Unable to fulfill request.



8.4.13. ASD Get Mechanical Azimuth

Table 8.4.13.1: Elementary procedure ASDGetMechAzimuth

Name: ASDGetMechAzimuth				
Code:	Issued by:	Procedure class:	DownloadMode state:	Power mode:
0x9B	Primary device	1	No	Low

Table 8.4.13.2: Initiating message parameters and format for ASDGetMechAzimuth

Field	Length	Type	Description
1	1 octet	Unsigned integer	Subunit number

Table 8.4.13.3: Response message parameters and format for ASDGetMechAzimuth

Field	Length	Type	Description
1	1 octet	Unsigned integer	Subunit number
2	1 octet	Return code	Return code: OK
3	2 octets	Unsigned integer	Calculated azimuth
4	2 octets	Unsigned integer	Azimuth precision
5	2 octets	Signed integer	Lowest calculated azimuth
6	2 octets	Signed integer	Highest calculated azimuth



Table 8.4.13.4: Return codes for ASDGetMechAzimuth

OK	FAIL	Comment
	FormatError HardwareError WorkingSoftwareMissing UnsupportedProcedure NotConfigured NotReady	See [1] Prerequisite data has not been set. Unable to calculate result and fulfill request. The ASD has been correctly configured, but the requested measurement is currently unavailable. The ASD is busy collecting the required data or performing calculations on collected data.



8.4.14. ASD Set Mechanical Azimuth Thresholds

Table 8.4.14.1: Elementary procedure ASDSetMechAzimuthThresholds

Name: ASDSetMechAzimuthThresholds				
Code:	Issued by:	Procedure class:	DownloadMode state:	Power mode:
0x9C	Primary device	1	No	Low

Table 8.4.14.2: Initiating message parameters and format for ASDSetMechAzimuthThresholds

Field	Length	Type	Description
1	1 octet	Unsigned integer	Subunit number
2	2 octets	Unsigned integer	Upper azimuth threshold
3	2 octets	Unsigned integer	Lower azimuth threshold

Table 8.4.14.3: Response message parameters and format for ASDSetMechAzimuthThresholds

Field	Length	Type	Description
1	1 octet	Unsigned integer	Subunit number
2	1 octet	Return code	Return code: OK

Table 8.4.14.4: Return codes for ASDSetMechAzimuthThresholds

OK	FAIL	Comment
	FormatError HardwareError WorkingSoftwareMissing UnsupportedProcedure	See [1]



8.4.15. ASD Get Mechanical Azimuth Thresholds

Table 8.4.15.1: Elementary procedure ASDGetMechAzimuthThresholds

Name: ASDGetMechAzimuthThresholds				
Code:	Issued by:	Procedure class:	DownloadMode state:	Power mode:
0x9D	Primary device	1	No	Low

Table 8.4.15.2: Initiating message parameters and format for ASDGetMechAzimuthThresholds

Field	Length	Type	Description
1	1 octet	Unsigned integer	Subunit number

Table 8.4.15.3: Response message parameters and format for ASDGetMechAzimuthThresholds

Field	Length	Type	Description
1	1 octet	Unsigned integer	Subunit number
2	1 octet	Return code	Return code: OK
3	2 octets	Unsigned integer	Upper azimuth threshold
4	2 octets	Unsigned integer	Lower azimuth threshold

Table 8.4.15.4: Return codes for ASDGetMechAzimuthThresholds

OK	FAIL	Comment
	FormatError HardwareError WorkingSoftwareMissing UnsupportedProcedure NotConfigured	See [1] Prerequisite data has not been set. Unable to fulfill request.



8.4.16. ASD Get Supported Functions

On receipt of the initiating message, the secondary device shall respond with the function flags and parameters indicating the supported functionality of the addressed Alignment Sensor Device.

Table 8.4.16.1: Elementary procedure ASDGetSupportedFunctions

Name: ASDGetSupportedFunctions				
Code:	Issued by:	Procedure class:	DownloadMode state:	Power mode:
0x7A	Primary device	1	No	Low

Table 8.4.16.2: Initiating message parameters and format for ASDGetSupportedFunctions

Field	Length	Type	Description
1	1 octet	Unsigned integer	Subunit number

Table 8.4.16.3: Response message parameters and format for ASDGetSupported Functions

Field	Length	Type	Description
1	1 octet	Unsigned integer	Subunit number
2	1 octet	Return code	Return code: OK
3	1 octet	Unsigned integer	Function Flags

Table 8.4.16.4: Return codes for ASDGetSupportedFunctions

OK	FAIL	Comment
	FormatError HardwareError WorkingSoftwareMissing	See [1]



Table 8.4.16.5: Function Flags for ASDGetSupportedFunctions

On receipt of the initiating message, the ASD shall respond with the function flags and parameters indicating the supported functionality of the addressed ASD unit.

Bit	7 to 6	5	4	3	2	1	0
Function	Spare	Azimuth Compare to Threshold	Azimuth Sensing Function	Roll Compare to Threshold	Roll Sensing Function	Tilt Compare to Threshold	Tilt Sensing Function

Bits are numbered from 0...7, bit number 0 set to 1 represents the value 0x01.

Bit value 0 represents function is not supported.

Bit value 1 represents function is supported.

Spare bits shall be set to zero.

One or more of Tilt, Roll, and/or Azimuth function(s) must be supported.

If a Compare to Threshold function is supported, its corresponding sensing function must also be supported.



9. PRODUCT IDENTIFICATION

9.1. Marking of conforming products with extensions

In order to allow users to identify products which conform with the requirements of this extension standard, member companies are encouraged to use the AISG logo on conforming products and on any brochures, advertisements or product literature associated with them. In addition, the legends 'AISG 2.0 (Antenna Line Device Alignment Sensor Device Extension)' or 'Conforms with interface standard AISG 2.0 with Antenna Line Device Alignment Sensor Device Extension ' may be used on such products and associated literature.



Annex A: Return Codes for secondary AISG devices (Normative)

Table A.1: Assigned return codes and alarms of the ASD

Code	Meaning	Domain	Alarm
0x30	AzimuthThresholdExceeded	ASD	X
0x31	TiltThresholdExceeded	ASD	X
0x32	RollThresholdExceeded	ASD	X