|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| ../../../Program%20Files/Default%20Company%20Name/ICAOMainMenuSetup/Icons/icaologo.jpg | International Civil Aviation Organization**WORKING PAPER** |

|  |
| --- |
|  |
|  |

 |

NSP WP CSG-20

05/19/2014

**Navigation Systems Panel (NSP)**

**Category II/III Subgroup (CSG) Meeting**

**Montreal, May 19-21, 2014**

**Agenda Item: 1.c Coordination with other panels and groups on GBAS information**

 **Proposed Amendments to Annex 10 Concerning Encoding of the**

 **GBAS FAS Data Block**

(Presented by Ken Alexander)

(Prepared by Rick Cassell, Advisor to US NSP Member)

|  |
| --- |
| At the Instrument Flight Procedures Panel’s (IFPP) Plenary 12-3 Meeting, amendments to Doc 8168 Volume II were progressed addressing the encoding of the GBAS FAS data block. These amendments are required to provide the procedure designer and others with operational information concerning the implementation of GBAS and GLS approach procedures. This WP provides rationale for associated changes to Annex 10, concerning the encoding of the GBAS FAS data block.  |

**1.0 Introduction.**

**1.1 Background.**

The original intent of the satellite navigation community was that structure and field content would be the same with only minor differences between the SBAS and GBAS FAS data blocks.

Annex 10 does not contain standards for the SBAS FAS data block, only guidance material; whereas for GBAS, Annex 10 contains the standards. The reason for this difference is because the data for SBAS is stored within the avionics whereas for GBAS it is transmitted to the avionics by the ground facility. SBAS guidance material in Volume I, Attachment D, paragraph 6 states that the SBAS FAS data block is the same as the GBAS FAS data block. The FAA avionics TSOs, European ETSOs, and ICAO SBAS validation material have all used RTCA DO-229(), Appendix D, as the authoritative source for this information. Doc 8168 Volume II, Part III, Section 2, Chapter 6 Appendix B contains information on the encoding of the GBAS FAS data block. The Appendix only describes the differences from the description and encoding of the SBAS FAS data block contained in Doc 8168.

* 1. **Operational Implementation and Maturity.** As both SBAS and GBAS operational implementations have matured, differences in the encoding of the FAS data blocks have evolved. With SBAS implementation, text in Doc 8168, Volume II has expanded on the textual description and encoding of the SBAS FAS data block. This was done to address operational implementation issues that arose when the SBAS FAS data block is encoded in accordance with DO-229. During the review of Doc 8168 by the IFPP, some issues were identified in the interpretation of the GBAS FAS data defined in Annex 10. Therefore, the IFPP has recommended changes to clarify the descriptions of some of the FAS data parameters. They have also added conventions in the descriptions as appropriate. The recommended changes are intended to maintain consistency between Annex 10 and Doc 8168. Those which may be of interest to NSP for inclusion in Annex 10 are given below.

**2.0 DISCUSSION**

The proposed changes for the GBAS Annex 10 SARPs are reviewed below. The rationale for the extended description and encoding information is also provided.

**2.1 Operation Type.**

The IFPP recommended that text be added to clarify that offset procedures are straight-in procedures and are coded as “0”. Therefore they should be treated the same as other straight-in procedures. No other encoding of this field has been identified. The proposed change is:

*Operation type:* Straight-in approach procedure or other type operations.

Coding: 0 = straight-in approach procedure

 1 to 15 = spare

*Note.- Offset procedures are straight-in procedures and coded as “0”.*

**2.4 Route Indicator Field.**

The IFPP recommended several changes to provide further guidance on coding of the route indicator field. Two changes are identified. One change is to define the order of letter identifiers starts with Z and goes in reverse alphabetical order. The second change is to include a note indicating that a different Route Indicator is required even when the FAS data points are the same for different approaches to the same runway end. A different missed approach procedure with a coincident FAS requires a different Route Indicator. Any difference in the procedure must be considered. When there is only one procedure to the runway end, the field is encoded as a “space”. The change will make the Route Indicator definition consistent with Doc 8168 Volume II, specifically the Duplicate Procedure Identifier for multiple procedures to the runway end provided by the same navigation equipment.

The proposed change to Annex 10 is:

*Route indicator:* The one-letter identifier used to differentiate between multiple GBAS approach procedures to the same runway end.

Coding: The letter is coded using bits b1 through b5 of its IA-5 representation. Bit b1 is transmitted first. Only upper case letters, excluding “I” and “O”, or IA-5 “space” are used.

Space = only one GBAS approach procedure to the runway end

 Z = 1st GBAS procedure when more than one procedure exists to the runway end.

 Y= 2nd GBAS procedure to the runway end.

 W=3rd GBAS procedure to the runway end.

 Etc.

*Note.- The entire procedure must be considered. Any difference in initial, intermediate or missed approach segments also requires a different route indicator. The order of developed procedures is represented by the sequence Z to A omitting “I” and “O”.*

**2.5 Δ Length Offset Field.**

Two points were raised by the IFPP concerning the wording with the encoding of the Δ Length Offset field. Annex 10, Appendix B 3.6.7.2.4.6 calls for the FPAP to be located on the extended runway centerline and the Δ Length Offset value is used to identify the stop end of the runway. The first issue is the Δ Length Offset cannot take on a negative value. For long runways the FPAP has to be moved forward onto the runway to provide a flyable lateral course width and the stop end of the runway cannot be identified. There are other cases where the stop end of the runway cannot be identified including the encoding of offset procedures. In these cases, Annex 10 provides the encoding of “1111 1111= Not Provided” for Δ Length Offset field.

The IFPP suggested changing the description to “Runway Stop End Not Identified”. This factually depicts the situation when the Δ Length Offset cannot be established. The proposed encoding of the field in Annex 10 is the same as recommended for Doc 8168.

The proposed change is:

Δ *length offset:* the distance from the stop end of the runway to the FPAP.

Coding: 1111 1111 = ~~not provided~~ Runway stop end not identified

*Note.- If the Δ length offset cannot be coded to identify the end of the runway it is coded as “1111 1111”. For offset procedures the Δ length offset should be coded as “Runway stop end not identified”.*

**3.0 RECOMMENDATION**

It is recommended that the CSG review the information in this paper and consider the proposed amendments to Annex 10. It is also recommended that this information be provided to the GSSG for their consideration of the SBAS material in Annex 10.

**---END---**