

(10.X.2011)

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**JOINT MEETING:  
CBS EXPERT TEAM ON AIRCRAFT BASED  
OBSERVATIONS  
(Third Session)  
AND  
AMDAR PANEL  
(Fourteenth Session)**

ITEM: 4.3

Original: ENGLISH ONLY

(QUEBEC CITY, CANADA, 2-4 NOVEMBER 2011)

**PROJECT PLANNING AND WORK PROGRAMME**

***AMDAR Software Development***

ARINC620 Software Specification Update

*(Submitted by the Secretariat)*

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**SUMMARY AND PURPOSE OF DOCUMENT**

Summarises progress made in updating the AMDAR Panel specification for AMDAR reporting contained within the Aeronautical Radio Incorporated, ARINC 620 specification.

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**ACTION PROPOSED**

1. The Panel is invited to note the information contained in the document.

**References:**

1. WMO Wiki reference:
  2. <http://www.wmo.int/pages/prog/www/WIS/wiswiki/tiki-index.php?page=AMDAR+Panel+Task+-+Update+ARINC+620+Met+Report+to+Version+5&structure=WIGOS>
  3. AMDAR Panel Preparatory Meeting, De Bilt, 21 to 22 July, Minutes:  
<http://www.wmo.int/amdar/Reports/other/AMDAR%20Panel%20Planning%20Meeting%20De%20Bilt%2021%20July%20Minutes.pdf>
  4. ARINC, AEEC: <http://www.aviation-ia.com/aec/index.html>
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## **BACKGROUND INFORMATION**

1. The AMDAR Panel is working with the Airlines Electronic Engineering Committee (AEEC) under the organization of ARINC within the Data Link Systems Sub-Committee to facilitate an update to the ARINC 620 specification with ARINC 620 Supplement 7. Supplement 6 of this specification currently contains Versions 1 to 4 of the uplink (Meteorological Report Command Uplink) and downlink (Meteorological Report) message formats that provide the basis of the ARINC 620 AMDAR Specification.
2. The ARINC 620 specification also contains appendices G, Uplink Control Programming Notes for Version 4 Onboard Software and H, Meteorological Report Compression, for which the AMDAR community has responsibility for maintaining.
3. The result of the update will be the specification of ARINC 620 Version 5 of the Meteorological Report Command Uplink and Meteorological Report within ARINC 620 Supplement 7.

## **UPDATE TO ARINC 620**

### **Approach Taken to the Update**

4. The following principles have been adopted in the approach to update of the specification by the Panel:
  - The update will be incorporated into the ARINC 620 specification as an update of the Meteorological Reports from Version 4 to Version 5.
  - Where appropriate, version 5 will be specified through cross reference to Version 4.
  - An update to Appendix H will be necessary to specify the requirements for compression of the new downlink message formats for Version 5.

### **Requirements**

5. The requirements associated with the upgrade are the following:
  - 1) For the Ascent Data, the Series 1 duration (seconds), the allowable maximum range has been extended from 200 to 600 seconds and the Top of Climb allowable maximum range from 250 to 350 (ftx100);
  - 2) For the Descent Data, the Descent Interval allowable minimum range has been extended from 20 to 10 seconds and the Top of Descent allowable maximum range has been extended from 250 to 350 (ftx100);
  - 3) The Turbulence parameter has been added to both series of the Ascent Report;
  - 4) The Time Message Assembled parameter in all reports has been extended to a resolution of 1 seconds;

- 5) The resolution of the Time of Observation parameter has been increased from 1 minute to 1 second;
  - 6) The resolution of reporting of Latitude and Longitude has been increased from ten minutes to 1 minute for all reports in all flight phases;
  - 7) Global Navigation Satellite System (GNSS) Altitude has been added as a parameter to be reported in all flight phases;
  - 8) The resolution of the Water Vapour (WV) /Humidity parameter has been increased;
  - 9) The parameters True Airspeed, True Heading, De-icing and Aircraft Configuration have been added to be optionally reported in two parameter groupings to facilitate enhanced quality control of other meteorological parameters.
- 10) Extend capabilities and add algorithms for Turbulence/EDR reporting:
- Extend characters for turbulence from 4 to 8
  - Add section on EDR algorithms
  - Add section on EDR compression

#### **Exclusion of IAGOS and Volcanic Ash Parameters from AMDAR ARINC 620**

6. At the AMDAR Panel Preparatory Meeting, De Bilt, 21 to 22 July, the meeting minutes reported the following:

*1) Following feedback from Fernand Karcher from the IAGOS project, there was still no clear requirement evident for the inclusion of IAGOS parameters within the AMDAR specification and considerable doubt regarding the specification ever being utilized for real time transmission of IAGOS data directly from an AMDAR/ACARS system. To include the parameters, the AMDAR Panel would have to have much more certainty regarding the requirements for the composition of the data, both in terms of the parameters observed, and the vertical sampling system. There also was currently a lack of information available to adequately describe the IAGOS parameters within the specification. Another issue raised was that the combination of the IAGOS and AMDAR parameters into a single specification creates a significant complication in terms of being able to determine the costs associated with data communications and specification maintenance and attribute them to each programme.*

*It was decided that the complications created by the addition of this set of parameters, combined with the increase in the message data volumes poses a significant risk to the successful update of the AMDAR specification within the document and that it should be removed.*

*Whilst the AMDAR Panel is willing to assist the IAGOS community in implementing a specification within the ARINC620 document, it is considered that the IAGOS requirements should first be specified in more detail by the IAGOS project and the cooperation should focus on assisting IAGOS to implement a separate specification within the document.*

*2) The issue of the inclusion of the volcanic ash parameters within the AMDAR specification was discussed and rejected for the same reasons as for the IAGOS parameters.*

*Once again, the Panel would be willing to assist the relevant international meteorological and aviation bodies in developing a separate specification for volcanic ash reporting within the ARINC specifications.*

*3) Clarification was sought from Axel Hoff regarding the reporting of new parameters: True Air Speed, True Heading, De-icing and Aircraft Configuration and the specification of these parameters as optional (through uplink configuration) within the message output. It was confirmed that these parameters are sought to be included so as to determine their correlation with data2 quality. It was questioned as to whether the introduction of an optional component of each report within the message would create a significant and costly overhead for message decoders due to exception handling. It was also questioned whether it was appropriate to include the specification of non-operational parameters for research within the operational specification. It was decided that these parameters should remain within the specification but the Panel should seek advice from AEEC and data processing experts as to whether there might be a better way to handle this data.*

*4) As with chapter 5 which specifies the downlink component, chapter 4 needs to be restructured so as to provide a version history for the uplink component.*

*5) Several other smaller issues were raised with the current draft including update of the version parameter to version 05, revision of appendices G and H and inclusion of changes made to the explanation of the calculation of pressure altitude.*

## **Upgrade Process and Timeline**

7. From the AEEC perspective, the steps that will be necessary to complete the update for AMDAR ARINC 620 will be the following:

- 1) Provide the proposed initial draft changes to the ARINC coordinator, Mr Jose Godoy by end of September 2011 [Completed];
- 2) ARINC Coordinator to make the proposed changes to the specification and provide to AEEC DLK SC members to review before next AEEC DLK SC Meeting (October 25, 2011);
- 3) AMDAR Panel to review the draft and be prepared to answer questions and address issues at the next AEEC DLK Systems Subcommittee Meeting scheduled for October 25-27, 2011, at the FAA Technical Facility in Atlantic City, New Jersey;
- 4) The draft is reviewed by members of the AEEC DLK Systems Subcommittee (conference attendees) and changes are accepted or rejected based on subcommittee consensus;
- 5) If further updates or changes are necessary, they can be made and submitted to the next AEEC DLK SC meeting, to be held in 1<sup>st</sup> quarter 2012.

## **Progress Made**

8. Over 2011, requirements 1 to 9 have been drafted within ARINC 620, Supplementary 7 and reviewed by several Panel Members. Requirement 10 (turbulence/EDR algorithms and equations) is still to be addressed and awaiting input from UCAR/Research Applications Laboratory. The draft amendments have been provided to ARINC for incorporation into the working draft of ARINC 620-7.

### **Completion of the Update Process**

9. To complete the update process, the following tasks and activities will be necessary:
    - 1) Finalise the inclusions of all requirements into the working draft of ARINC 620-7;
    - 2) AMDAR Panel to conduct a final thorough review and update/correction iteration to be completed by end of December 2011;
    - 3) Final version of AMDAR ARINC 620 Version 5 to be provided to ARINC by end of December 2012;
    - 4) Final approval for ARINC 620 update to be sought at AEEC DLK SC meeting in 1<sup>st</sup> quarter 2012.
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