



To FMS Subcommittee **Date** January 26, 2016
From P. J. Prisaznuk **Reference** 16-999/SMA-931 lth
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tel: 1-410-212-0913

Subject **Meeting Announcement**
ARINC 702A – Flight Management System (FMS)
Grand Rapids, Michigan

Chairman Mike Bakker, GE Aviation

Host **GE Aviation**

When **March 29-31, 2016**
Tuesday and Wednesday from 0900 to 1700
Thursday from 0900 to 1300

Where **GE Aviation**
3290 Patterson Avenue SE
Grand Rapids, Michigan 49512

Point of Contact:
Mike Bakker
michael.bakker@ge.com
tel: +1-616-241-8146
website: www.geaviation.com

Plan to meet at the GE Aviation main lobby at 0830, Tuesday, March 29.

Security GE Aviation is a secure facility. All visitors must submit the following information to Mike Bakker before **March 18, 2016:**

- Full Legal Name (Full First/Middle/Last)
- Work Location
- Nationality
- Company Full Name (including Sub-Division) & Address

Upon arrival, a government-issued picture ID will be required for US visitors to enter the building; a passport will be required for non-US visitors.

Attention non-US visitors – you will be required to leave any camera phones with security. The conference rooms are adjacent to the lobby in case you need to step out to make/take a call which may be done in the lobby.

Hotels There is a good selection of hotels available near GE Aviation. Restaurants near the facility are mostly chain restaurants. Downtown is typically a 15-20 minute drive (good weather) and will offer more restaurant selections. For more information, see attached information provided by GE Aviation.

Instructions Please notify ARINC Industry Activities of your intention to attend by registering online at: <http://www.aviation-ia.com/events/>

The meeting is open to all interested parties. Those wishing to have time on the agenda should contact Paul Prisaznuk. The agenda will be finalized one week before the meeting.

Activity Scope The AEEC Executive Committee formed the FMS Subcommittee to update **ARINC Characteristic 702A: Advanced Flight Management Computer System**, to support NextGen and SESAR airspace initiatives. These include enhanced datalink, satellite-based approach procedures, airport moving map and guidance, and electronic flight bags. Other evolutions include graphical user interfaces (ARINC 661) and software partitioning (ARINC 653). This project is expected to provide a number of benefits to airlines. These include user-preferred trajectories, fuel savings, environmental benefits, and capacity improvements. Supplement 5 will be aligned to the applicable RTCA/EUROCAE standards in support of initiatives such as Performance-Based Navigation (PBN) and Trajectory Based Operations (TBO). See APIM 15-005 attached.

Meeting Objectives The FMS Subcommittee will review working papers leading to the development of Supplement 5 to ARINC Characteristic 702A. New material will include:

- Magnetic variation model recommendations
- Lateral offset recommendations
- Lateral path transition containment refinement
- Fixed Radius Turn refinements
- Temperature compensation
- AT and AT OR ABOVE speed constraints
- Vertical path construction rules
- ETA min/max computation and RTA performance
- Crew selection of pre-planned RNP values for precision approach

The goal of the meeting is prepare material for Draft 1 of Supplement 5 to **ARINC Characteristic 702A: Advanced Flight Management Computer System**.

Travel Information **Gerald R. Ford International Airport (GRR) to GE Aviation (2.6mi/4.2km)**

- Exit Gerald R. Ford International Airport
- Follow Terminal Drive SE and continue onto Gateway Drive SE (0.7 mi)
- Turn right onto John J. Oostema Blvd SE (44th St, 0.6 mi)
- Turn right onto Patterson Ave SE
- Drive 1.3 mi to **GE Aviation**: 3290 Patterson Ave SE (on the right)
- Park in the Visitor Parking by the main entrance.

cc DLK, SAI

Attachment 1

ARINC 702A-5

FMS Subcommittee Meeting
March 29th – 31st 2016

Hosted by
GE Aviation Systems

<http://www.geaviation.com/systems/>



imagination at work

A702A-5 FMS Subcommittee Meeting

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• Hotels (Airport/GE Area with GE Rates)

– Crowne Plaza**

5700 28th Street SE

Grand Rapids, MI 49546

+1 (616) 957-1770

<http://www.cpgrandrapids.com>

– Hilton Airport* & Shuttle to/from GE *

4747 28th Street SE

Grand Rapids, MI 49512

+1 (616) 957-0100

http://www1.hilton.com/en_US/hi/hotel/GRRHIHF-Hilton-Grand-Rapids-Airport-Michigan/index.do

– Hampton Inn & Suites*

5200 28th Street SE

Grand Rapids, MI 49512

+1 (616) 575-9144

<http://hamptoninn.hilton.com/en/hp/hotels/index.ihtml?ctyhocn=GRRHSHX>

– Holiday Inn Express & Suites**

5401 28th Street SE

Grand Rapids, MI 49546

+1 (616) 940-8100

<http://www.ihg.com/holidayinnexpress/hotels/us/en/grand-rapids/grres/hoteldetail>

*Free Shuttle to/from Airport

*Government/Military Rates Available



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- Hotels (Airport/GE Area with GE Rates Cont'd)

- Holiday Inn**

3063 Lake Eastbrook

Kentwood, MI 49512

+1 (616) 285-7600

<http://www.holidayinn.com/hotels/us/en/kentwood/grrpd/hoteldetail>

- Spring Hill Suites*

5250 28th Street SE

Grand Rapids, MI 49512

+ 1 (888) 236-2427

<http://www.marriott.com/hotels/travel/qrrse-springhill-suites-grand-rapids-airport-southeast/>

Government/Military Rates Available

*Free Shuttle to/from Airport



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- **Hotels (Downtown)**

- Amway Grand Plaza Hotel
187 Monroe Avenue NW
Grand Rapids, MI 49503
+ 1 (616) 774-2000

<http://www.amwaygrand.com/>

- Courtyard Grand Rapids
11 Monroe Avenue NW
Grand Rapids, MI 49503
+ 1 (616) 242-6000

<http://www.marriott.com/hotels/travel/GRRDT-Courtyard-Grand-Rapids-Downtown>

- CityFlats Hotel
83 Monroe Center Street NW
Grand Rapids, MI 49503
+1 (866) 609-2489

<http://www.cityflatshotel.com/grandrapids/>

- Holiday Inn Grand Rapids*
310 Pearl Street NW
Grand Rapids, MI 49504
+ 1 (616) 235-7611

<http://www.holidayinn.com/hotels/us/en/grand-rapids/grrpe/hoteldetail>

*Government/Military Rates Available

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- **Hotels (Downtown Cont'd)**

- JW Marriott Grand Rapids

- 235 Louis Street NW

- Grand Rapids, MI 49503

- + 1 (616) 242-1500

- <http://www.marriott.com/hotels/travel/GRRJW-JW-Marriott-Grand-Rapids>

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- Area & Hotel Overview

<https://www.google.com/maps/d/edit?mid=zp3llqxUGFRU.kzJ54atdShTs>

- Lonely Planet

<http://www.lonelyplanet.com/north-america/travel-tips-and-articles/top-10-us-travel-destinations-for-2014>

- Pure Michigan

<http://www.michigan.org/>



Attachment 2

ARINC Project Initiation/Modification (APIM)

1. Name of Proposed Project

APIM 15-005

ARINC 702A-5: Advanced Flight Management Functional Definition

Software specification only

yes no

1.1 Name of Originator & Organization

Mike Bakker, GE Aviation Systems LLC

2. Suggested Subcommittee Assignment and Project Support

2.1 Suggested AEEC group

FMS Subcommittee

2.2 Support for the Activity (as verified)

Airlines:

American Airlines

Delta Air Lines

FedEx

Lufthansa

Southwest

TAP Portugal

United Airlines

US Air Force

UPS

Airframers:

Airbus

Suppliers:

Esterline CMC Electronics

GE Aviation

Rockwell Collins

Thales

Others:

The MITRE Corp

SABRE

2.3 Commitment for Drafting and Meeting Participation (as verified)

Organizations: GE Aviation, MITRE

2.4 Recommended Coordination with other Industry Groups

The following AEEC Subcommittee activities are relevant to this topic:

- SAI Subcommittee (ARINC Report 660B)

The following RTCA/EUROCAE activities are relevant to this topic:

- RTCA SC-227/EUROCAE WG-85 (DO-236C - Change 1 / ED-75D)
- RTCA SC-214/EUROCAE WG-78 (DO-350 / ED-228)

3. Project Scope

3.1 Description

A number of key technologies have emerged and evolved in a manner different than that envisioned at the time ARINC 702A was written. Many of these evolutions are discussed in ARINC 660B and part of the larger CNS/ATM initiatives of NextGen and SESAR to increase the capacity and efficiency of the airspace. These evolutions include enhanced datalink, satellite-based approach procedures, airport moving map and guidance, and electronic flight bags. Other evolutions include graphical user interfaces (ARINC 661) and software partitioning (ARINC 653).

The project proposed will prepare Supplement 5 to ARINC 702A to take the aforementioned evolutions into account and thus align the standard with the current and future avionics architectures as detailed in ARINC 660B. The standard will also be updated to align with and point to applicable RTCA/EUROCAE standards in support of NextGEN and SESAR initiatives such as Performance-Based Navigation (PBN), Trajectory Based Operations (TBO), and enhanced datalink.

The resultant ARINC 702A-5 will be used for new airplane development programs as well as retrofit programs to better equip aircraft for operation in the NextGen and SESAR airspaces. It is recognized that some existing sections of ARINC 702A may not directly apply to some newer avionics architectures. It is hoped that a future project will address this issue and the other evolutions identified earlier (i.e. graphical user interfaces, software partitioning) as part of a future ARINC Project Paper 702B. In any case, it should be recognized that: (a) the proposed changes are applicable to both older and newer avionics architectures and (b) many older aircraft will operate in the NextGEN and SESAR airspaces and will benefit from an updated ARINC Standard.

3.2 Planned usage of the envisioned specification

New aircraft developments planned to use this specification

yes no

TBD

New avionics equipment for major retrofit programs yes no

TBD

Mandate/regulatory requirement yes no
Please specify program and date: N/A

Modification/retrofit requirement yes no
Please specify:
TBD

Airframer and/or airline projects to use this specification yes no

TBD

Is the infrastructure standard for the aircraft defined? yes no

When is the ARINC standard required?
GE envisions a few programs with target certifications in the 2020 time frame which could benefit from an update to the standard. An update to the standard in the 2018 time frame would allow the standard to influence those programs.

Are 18 months (min) available for standardization work? yes no
If 'No' please specify solution:

Patent(s) involved? yes no
If 'Yes' please describe:
Airbus has a patent related to the SESAR I4D (RTA) functionality. This patent has been discussed as part of the RTCA DO-236C – Change 1 ratification. A similar discussion may be necessary as part of ARINC 702A-5.

3.3 Issues to be worked

Start with ARINC 702A-4 and update the document as follows:

Update Flight Management Function description to reflect DO-236C - Change 1 requirements and recommendations. The FMS subcommittee could be used as a forum to debate a few of these recommendations (if necessary).

- Magnetic variation model recommendations
- Lateral offset recommendations (30 degree intercept, FRT and RF offsets)
- Lateral path transition containment refinement (bank angle limits)
- Fixed Radius Turn refinements
- Temperature compensation
- AT and AT OR ABOVE speed constraints
- Vertical path construction rules
- ETA min/max computation and RTA performance (Supplement 1)
- Crew selection of preplanned RNP values for RNP AR approach
- Others, per the consensus of the Subcommittee

Update Flight Management Function description to reflect industry guidance and lessons learned on design of FLS/IAN for use flying non-precision approaches. Update attachment 4 for this interface.

Update Flight Management Function description for FAS Data Block interface to the GNSS/MMR receiver in support of LPV approaches. Add/update attachment for this interface.

Update Flight Management Function description to reflect the role of the FMS in supporting and supplying the data necessary to support Airport Surface Guidance. Add/update attachment for this interface.

Update Flight Management Function datalink description(s) to reflect evolutions in the industry for SESAR and NextGEN. Align the EPP frame definition and ARINC 702A intent bus definition.

Other editorial changes as needed for clarification and/or alignment with RTCA DO-236C – Change 1 and RTCA DO-350.

Address MCDU, EFIS, and Cursor Control Device references to, at a minimum, recognize emergence of graphical user interfaces (ARINC 661) and the various other control/display devices.

Provide recommendation for Backup Navigation function and the corresponding interface. Backup Navigation has traditionally been implemented in the MCDU but may be hosted on other hardware devices.

Discuss and possibly extend the ACARS interface to support EFB applications, airline applications, and airframer applications.

4. Benefits envisioned

4.1 Basic benefits

- | | |
|---------------------------------------------------------------------------|---------------------------------------------------------------------|
| Operational enhancements (reduction in DOC?) | yes <input checked="" type="checkbox"/> no <input type="checkbox"/> |
| Form, Fit, Function, (FFF) standard (HW and/or SW): | |
| a. ARINC 600 form (only HW) | yes <input type="checkbox"/> no <input checked="" type="checkbox"/> |
| b. Software specification only | yes <input type="checkbox"/> no <input checked="" type="checkbox"/> |
| c. Interchangeable fit (plug, mount, SW loading interface, etc) | yes <input checked="" type="checkbox"/> no <input type="checkbox"/> |
| d. Interchangeable function | yes <input checked="" type="checkbox"/> no <input type="checkbox"/> |
| If not fully interchangeable, please explain: | |
| Interface and protocol standard (for aircraft defined in section 3 scope) | yes <input checked="" type="checkbox"/> no <input type="checkbox"/> |
| <u>Please specify:</u> FMC/Data Link Interface | |

Product offerable from more than one supplier (competitive environment) yes no

Please identify: Aircraft manufacturers, avionics manufacturers

4.2 Specific Project Benefits

This project will bring ARINC 702A into alignment with industry initiatives and activities that have transpired since the last major update. It provides a forum to advance and shape those initiatives from an airline and manufacturer perspective. In many ways, it is an extension of the concepts and requirements outlined in ARINC 660B. It will advance the NextGen and SESAR operational concepts which, in turn, provide a number of benefits to airlines, airframe manufacturers, and avionics suppliers.

4.2.1 Project Benefit for Airlines

Airlines will benefit from increased standardization and clarification of the Flight Management Computer functionality and its role in bringing about the future airspace. Airlines could also benefit from more clarity relative to the datalink interface and an enhanced ACARS interface.

4.2.2 Project Benefit for Airframe Manufacturers

Airframe Manufacturers will also benefit from increased standardization and clarification of the Flight Management Computer functionality and its role in bringing about the future airspace. Manufacturers could also benefit from more clarity relative to the datalink interface and may derive benefits from an enhanced ACARS interface.

4.2.2.3 Project Benefit for Avionics Equipment Suppliers

Avionics Suppliers will benefit from increased standardization and clarification of the Flight Management Computer functionality and its role in the evolving airspace. Suppliers will also benefit from more clarity relative to the datalink interface. A clear picture of both airline and airframe manufacturer needs and preferences relative to the evolving airspace will help guide research, investment, and implementation.

5. Documents to be Produced and Date of Expected Result

ARINC 702A-5: Advanced Flight Management Computer System Standard

6. Meetings/Expected Document Completion

The following table identifies the number of meetings and proposed meeting days needed to produce the documents described above.

This activity to be completed within the approved work program and meeting schedule for the FMS Subcommittee:

Activity	Mtgs	Mtg-Days 2016	Mtg-Days 2017
ARINC 702A-5	6 meetings (3 per year)	9	9

In-person meetings will be augmented with monthly web conferences as needed.

6.1 Expiration Date for this APIM

December 2017

7. Comments

Send this document to the AEEC Executive Secretary and please include any other information deemed useful for managing this work.