

**RTCA Special Committee 186, Working Group 3**

**ADS-B 1090 MOPS**

**Meeting # 13**

**20-22 August 2002**

**Potential Change to ADS-B:  
Flight Plan ID**

**Presented by J. Stuart Searight**

**SUMMARY**

During the final review and comment on the UAT ADS-B MOPS at the June 2002 plenary, a concern was raised by the Alaska ARTCC that they needed a means within ADS-B to correlate ADS-B targets to their filed flight plans. WG-5 has worked with Alaska ARTCC and the Capstone office on a fix which will be a deviation from the UAT MOPS (UAT-WP-14-02). ATC in the lower 48 states have provided feedback on this issue and have stated that the capability to correlate targets with their foiled flight plans would be a key to making ADS-B useful to ATC in the present, and be a great help in assisting in the transition to future ATC automation systems. Therefore, this topic needs to be addressed by RTCA SC-186 now, and not wait until work begins on revision B of the ADS-B MASPS.

## **1.0 Background**

During the final review and comment on the UAT ADS-B MOPS at the June 2002 plenary, a concern was raised by the Alaska ARTCC that they needed a means within ADS-B to correlate ADS-B targets to their filed flight plans. This is currently done in radar environments using 4096 transponder codes. However, since Capstone is a non-radar environment using UAT equipment, a way to provide such information within ADS-B was requested.

WG-5 has worked with Alaska ARTCC and the Capstone office on a fix which will be a deviation from the UAT MOPS (UAT-WP-14-02). A one-bit field was added to the UAT MOPS called Call Sign Identification (CSID). The UAT MOPS states that this bit will be used to distinguish whether the Call Sign or the Flight Plan ID is being sent within the Call Sign field. While the UAT MOPS has hardwired this bit to ONE to designate that the Call Sign is always broadcast, Capstone II equipment will deviate from the UAT MOPS, using this bit and alternating the sending of Call Sign and Flight Mode ID. This means that Call Sign will be broadcast at only half the required rate as other Mode Status elements.

ATC in the lower 48 states have provided feedback on this issue and have stated that the capability to correlate targets with filed flight plans would be a key to making ADS-B useful to ATC in the present, and be a great help in assisting in the transition to future ATC automation systems. Therefore, this topic needs to be addressed by RTCA SC-186 now, and not wait until work begins on revision B of the ADS-B MASPS.

## **2.0 Effect on 1090 MHz ES**

Since the 4096 code already resides within the transponder, this issue is potentially of little impact to a 1090 MHz ES ADS-B system in a radar environment. However, this could be more problematic in non-radar environments such as Alaska, the Gulf of Mexico, or flying across Australia.

## **3.0 Possible MASPS changes for Flight Plan ID**

It is unlikely that the ADS-B MASPS would allow Call Sign and Flight Plan ID to be sent at only half the Mode Status update rate. Safety studies will need to be done on the probabilities of either of those two fields not being received in a timely manner by ADS-B participants acquiring that target. Therefore, the ADS-B MASPS might conclude that the new Flight Plan ID field needs to be added to the Mode Status report and updated at the same rate as all other MS fields.

Another potential solution would be to use some of the bits within the Call Sign field to distinguish which flight plan the ADS-B participant is flying when multiple flight plans are filed. This would mean that ATC has the ability to match up the flight plan with the 24 bit address without using the 4096 code.

### **3.0 Future Plans for Flight Mode ID**

A few possible courses of action have been informally discussed. One would be to finalize the implementation recommended by WG-5 in their white paper for Capstone II equipment (UAT-WP-14-02), and put out a “Change 1” to both the ADS-B MASPS and the UAT MOPS. Another is to step back and examine all options from a non-link specific viewpoint, identify what analysis is needed, perform that analysis and then ask SC-186 to agreed to a white paper or position paper which would state the plans for how this topic will be handled in a future MASPS, revision B.

It is very likely that an ad hoc meeting will be called and held the evening after the first day of the Brussels plenary (September 23). It is hoped that this meeting will include key members of WGs 3, 5, and 6 and that a plan of action can be agreed to and work towards a paper on this topic can be scoped and assigned. Prior to that meeting, WG-3 needs to understand the issue, and to provide their opinions on how to provide this capability within ADS-B.

CHANGE ISSUE – RTCA/DO-242

# MASPS for ADS-B Rev. A

Tracking Information (committee secretary only)	
Change Issue Number	66
Submission Date	07/01/02
Status (open/closed/deferred)	TBD
Last Action Date	None

Short Title for Change Issue:	Correlation of Flight-Plan and ID
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MASPS Document Reference:		Originator Information:		
Entire document (y/n)		Name	Steve Creamer	Richard Jehlen
Section number(s)	2.1.2.1 Identification	Phone	907-271-5464	202-493-4527
Paragraph number(s)		E-mail	Steve.Creamer@faa.gov	Richard.Jehlen@faa.gov
Table/Figure Number(s)		Other	Capstone	ATP-400, Manager

Proposed Rationale for Consideration (originator should check all that apply):	
<input type="checkbox"/>	Item needed to support of near-term MASPS/MOPS development
	DO-260/ED-102 1090 MHz Link MOPS Rev A
	ASA MASPS
	TIS-B MASPS
<input checked="" type="checkbox"/>	UAT MOPS
<input type="checkbox"/>	Item needed to support applications that have well defined concept of operation
	Has complete application description
	Has initial validation via operational test/evaluation
	Has supporting analysis, if candidate stressing application
<input type="checkbox"/>	Item needed for harmonization with international requirements
<input checked="" type="checkbox"/>	Item identified during recent ADS-B development activities and operational evaluations
	MASPS clarifications and correction item
	Validation/modification of questioned MASPS requirement item
	Military use provision item
	New requirement item (must be associated with traffic surveillance to support ASAS)

Nature of Issue:	<input type="checkbox"/>	Editorial	<input type="checkbox"/>	Clarity	<input checked="" type="checkbox"/>	Performance	<input checked="" type="checkbox"/>	Functional
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Issue Description:

The intended function of the ADS-B system for air traffic control is that the aircraft broadcasts its position for use by air traffic control to provide surveillance services. In order to ensure the accurate tracking of aircraft transmitted ADS-B position information for surveillance purposes, a unique identification (Flight Plan ID) transmitted in the ADS-B message is required to effectively correlate the position information with the specific filed flight plan. In today's air traffic system, this is accomplished through use of the ATC assigned 4096 transponder codes.

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Issue Description (continued):

The following are issues that are impacting the operational ADS-B system at Bethel, Alaska that have been addressed but are not resolved:

- Aircraft departing VFR from one airfield, then departing IFR from the next airfield and the auto-acquiring system tagging with the previous/wrong portion of the flight plan;
- The pilot filing IFR flight plans for one aircraft, then being assigned another by company dispatcher at departure time and there is no update of the flight plan – the filed flight plan has the wrong hexadecimal ICAO code filed and the ground automation system can't auto-acquire;
- Aircraft continually filing IFR flight plans without filing the associated hexadecimal ICAO code.

In order to resolve the above deficiencies, air traffic controllers have developed work arounds to facilitate ADS-B usage. These are not normal air traffic controller functions: controller frustrations and workload are increasing, and resolution is required.

Additional efficiencies may be realized using a Flight-Plan ID such as allowing surveillance of VFR flights for search and rescue purposes and allowing surveillance of any flight to determine intent for possible security or airspace restriction purposes.

Originator's proposed resolution:

Accurate prediction of aircraft intent is a critical component of separation assurance. Information predicting intent is drawn from the flight plan in ground automation and by controllers viewing the situation. Establishing and maintaining a correlated, discrete link between the aircraft's target information and the flight plan during transitions between radar and ADS surveillance modes and between procedural and surveillance-based separation is essential to safe, efficient use of the airspace. Today, the air traffic control system issues discrete, changeable codes to IFR aircraft, similar to the existing Mode 3/A 4096 transponder process, to link aircraft flight plans with transmitted position information in the air traffic system. To resolve the problems described above, we propose to extend this process into the ADS-B environment in the following manner:

**Add field to Mode Status report:**

Add a Flight-Plan ID field to MASPS Identification requirements (Section 2.1.2.1). This should accommodate current Mode 3/A 4096 code, but be expandable for future US/international flight plan ID schemes in ground system automation.

A solution that is currently being reviewed for implementation in UAT Capstone II equipment by SC-186, WG-5, adds a Flight-Plan ID field with means provided that allows the pilot to input a unique Flight Plan Identification, (ATC Mode 3/A code) as assigned by air traffic control. (See Attachment B of this Issue Paper for WG5 white paper "Capstone Specific Addition to the UAT MOPS Requirements".) This code shall be broadcast in the same field as the aircraft Call Sign on an alternating basis. An optional bit has been provided in the MOPS in the Call Sign field to identify the information as Call Sign or the unique Flight Plan Identification code. (The UAT MOPS has hardwired this bit to indicate "Call Sign", but Capstone II equipment will deviate from the MOPS and use the bit to designate if "Call Sign" or "Flight Plan ID" is being sent.)

At the MASPS level, it will need to be determined if this approach raises any safety concerns. Simulations will be needed in all ADS-B links to examine the impact of broadcasting Call Sign and the new Flight Plan ID fields at half the Mode Status rate. Impact studies will also be needed on adding the Flight Plan ID field and requiring it be broadcast at the same rate as all other Mode Status Fields.

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**Originator's proposed resolution (*Continued*):**

This new "Flight Plan ID" filed should accommodate current Mode 3/A 4096 codes; but should also be expandable for future US/international flight plan ID schemes in ground system automation as noted in the long-term portion below.

**Facilitate transition towards future automation and auto-loading of Flight Plan ID:**

Enhancements on the above requires that the issuance of these Flight Plan IDs be automated so that when aircraft start, the system automatically correlates and uplinks the discrete code with the correct flight plan and aircraft requesting air traffic service. In the event there is a problem with the Flight Plan ID entered by the pilot, or the aircraft 'tags' the incorrect leg/portion of a flight plan, the system should allow the controller to electronically uplink the correct information to the aircraft or permit the controller to tag the aircraft with the correct flight plan.

Eventually, the movement of aircraft within the NAS should automatically trigger most events that will support the pilot by updating pertinent weather tables, airport information or other data they'll need on the aircraft. To do this, the ground system automation needs to have the aircraft's intent and the way for that to happen is through a flight plan.

**Administrative Note:**

This Issue Paper is a combination of two Issue Papers submitted on the same topic by different ATC organizations within the FAA. The topic of correlating flight plans to an ID field broadcast by ADS-B was first requested in review of the UAT ADS-B MOPS by Alaska ARTCC. While specific implementations for UAT Capstone II equipment was discussed, the topic was captured at a higher level with the initial submission of this Issue Paper. Feedback was solicited from other organizations, and ATP-400 (ATC org in FAA HQ) responded. Technical contact for ATP 400 is Keith Dutch, ATP-430.1 ([kieth.dutch@faa.gov](mailto:kieth.dutch@faa.gov) or 202-267-9332). Alternate contact for the Capstone office is Jim Cieplak ([jcieplak@mitre.org](mailto:jcieplak@mitre.org)).

**Working Group 6 Deliberations:**

WG6 has not formally reviewed this Issue Paper yet. This Issue Paper was created in response to the final review and comment process on the UAT ADS-B link MOPS. The UAT MOPS was submitted to the SC-186 plenary for review in June, 2002 which was after the completion of DO-242A. WG6 will consider this Issue Paper when it reconvenes to begin considering revision B of the ADS-B MASPS.

**Dispatcher/Operator**

(1) File Flight Plan(s)

**Pilot**

(3) Start Avionics, Loads ACID  
(4) Request Clearance

(6) Reads Back Clearance (i.e.  
Routes, Altitude, BCN)

(7) Loads BCN

(8) ADS-B Running

(10) Aircraft Taxis

(11) Aircraft Ready For T/O

(13) Turns BCN Transponder  
ON

(17) Pilot Uses CDTI To  
Observe Other Traffic,  
Complies with Air-to-Air  
Separation Instructions

**Controller**

(5) Finds Flight Plan, Issues  
Clearance To include  
BCN

(12) Clears Aircraft For T/O

(16) Controller Observes  
Target, Applies Radar  
Rules

**ATC Computer**

(2) Generate CID, ACID<sup>1</sup>,  
BCN<sup>2</sup> On Strip in Radar

(9) GBT Network Sees Aircraft,  
Radar Display @  
Appropriate Positions  
(i.e. Ground Control)

(14) Radar Sees 24-bit ID And  
If In Radar Coverage  
BCN

(15) S/W Correlates ID To  
Flight Plan - Tags Target

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<sup>1</sup> ACID = Aircraft ID

<sup>2</sup> BCN = Mode 3A 4096 Transponder Beacon Code