

# MASPS for ADS-B Rev. A

Tracking Information (committee secretary only)	
Change Issue Number	3
Submission Date	12/27/00
Status (open/closed/deferred)	CLOSED
Last Action Date	8/30/01

Short Title for Change Issue:	Effective received reporting rates should be adjusted to match operational requirements.
-------------------------------	--

MASPS Document Reference:		Originator Information:	
Entire document (y/n)		Name	Stephen Heppe/ADSI Inc
Section number(s)		Phone	+1 703-589-1522
Paragraph number(s)	3.3.3.1	E-mail	steveheppe@adsi-m4.com
Table/Figure number(s)	Table 3-4	Other	

Proposed Rationale for Consideration (originator should check all that apply):	
<input checked="" type="checkbox"/>	Item needed to support of near-term MASPS/MOPS development
<input checked="" type="checkbox"/>	DO-260/ED-102 1090 MHz Link MOPS Rev A
<input checked="" type="checkbox"/>	ASA MASPS
<input type="checkbox"/>	TIS-B MASPS
<input checked="" type="checkbox"/>	UAT MOPS
<input type="checkbox"/>	Item needed to support applications that have well defined concept of operation
<input type="checkbox"/>	Has complete application description
<input type="checkbox"/>	Has initial validation via operational test/evaluation
<input type="checkbox"/>	Has supporting analysis, if candidate stressing application
<input checked="" type="checkbox"/>	Item needed for harmonization with international requirements
<input type="checkbox"/>	Item identified during recent ADS-B development activities and operational evaluations
<input type="checkbox"/>	MASPS clarifications and correction item
<input checked="" type="checkbox"/>	Validation/modification of questioned MASPS requirement item
<input type="checkbox"/>	Military use provision item
<input type="checkbox"/>	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 type="checkbox"/> Functional
<u>Issue Description:</u>				
<p>Table 3-4 indicates a need for 95% probability of update within 3 seconds at 3 nmi, for Aid to Visual Acquisition (the 99% value is at 6 seconds). A footnote indicates it is really the 99% value that drives the requirement, but either way the update rate is very rapid. For a number of reasons this does not appear to make any operational sense.</p> <p>If the CDTI is allowed to update the display based on last reported velocity vector, the error in estimated position can only be due to an acceleration (these are not reported). We may take 0.25g as a reasonable upper bound for sustained lateral accelerations. Over a time period T the position error is</p> $d \text{ (feet)} = (0.5) * (8 \text{ ft/sec/sec}) * T^2 ; T \text{ expressed in seconds}$ <p>Table 1 indicates the worst-case error in estimated position, and angular offset at a range of 3 nmi or 10 nmi, assuming 0.25g sustained acceleration and various time intervals since the last update.</p>				

Issue Description (continued):

Table 1: Position estimation error and resulting angular error at 3 nmi

Time interval since last SV report	Position error assuming 0.25g sustained lateral acceleration		Angular error (degrees) at range R assuming acceleration is perpendicular to line of sight	
	(sec)	(feet)	(meters)	R = 3 nmi
3	36	11	0.1	< 0.1
5	100	30	0.3	< 0.1
6	144	44	0.5	0.1
10	400	122	1.3	0.4
12	576	176	1.8	0.5
20	1600	488	5.1	1.5

Based on this information, it appears that a 95% containment value of 6 seconds at 3 nmi and 10 seconds at 10 nmi would yield less than a 0.5 degree error in each case, and would be more than sufficient. Likewise, a 99% containment value of 12 seconds at 3 nmi and 20 seconds at 10 nmi would still yield less than a 2 degree apparent error. It is the opinion of the author that this level of accuracy is more than sufficient for Aid to Visual Acquisition

Originator's proposed resolution if any:

Adjust the requirement for Aid to Visual Acquisition to the following (subject to discussion):

- 95% values should be 6 seconds at 3 nmi and 10 seconds at 10nmi.
- 99% values should be 12 seconds at 3 nmi and 20 seconds at 10nmi.

Working Group 6 Deliberations:

May 24, 2001: This Issue Paper was discussed by the ad hoc group at their May 2001 meeting. Some of this work will be done by Jim Maynard's attempt to rework some of the SV and MS report elements and their required minimum transmit rates for A3 aircraft (IP33). It was agreed to address the rates for A0 equipped aircraft. However, if it is concluded that some rates are too high, analysis will be needed to determine exactly what rates will be sufficient. It was agreed that this Issue Paper needs to be presented to WG4 at their June 2001 meeting. Richard Barhydt will write an addendum to IP03 reflecting our discussions and ask them for any guidance or feedback on this topic. [AI 5-12] Steve Heppe will be asked to perform and present the necessary analysis needed to determine minimum required rates. [AI 5-13] This Issue Paper will be considered for Revision A based on the feedback from WG4 and analysis results presented by Steve Heppe.

July 19, 2001: It was agreed at the July WG6 meeting to accept the proposed change for the "Aid to Visual Acquisition" column for Table 3-4. However, WG6 also realized the potential need to change Table 3-4 to stress range of acquisition, rather than example applications. Such a change might nullify his Issue Paper and its resolution.

August 30, 2001: It was agreed by WG6 at their August meeting to accept Issue Paper 46 and its proposed resolution to rework Tables 3-3(a), 3-3(b), and 3-4 so that the requirements defined in the tables are range dependant and not application dependant. A consequence of this decision is that the previously agreed upon resolution to this Issue Paper is now moot. Therefore, with the acceptance of IP46, this Issue Paper is closed without any action taken since it is now overcome by events.