

**RTCA Special Committee 186, Working Group 3  
ADS-B 1090ES MOPS Maintenance  
Meeting #24**

**Honeywell Aerospace, Phoenix Arizona  
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**Proposed STP MOPS Requirements Restructuring  
[Revision 1](#)**

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**Summary**

It is the view of the FAA that the material in the current revision of the STP MOPS (RTCA/DO-302) is guidance material that represents a way to integrate navigation sources, but is not the only acceptable way to integrate navigation sources. Additionally, there are some specific details of the STP MOPS that may not hold true for all instances of a given sensor type (i.e., RNP FMS or WAAS GPS). During the RTCA SC-186 Plenary on 24 April 2008, a small Ad Hoc Group was tasked to review the STP MOPS for possibly including some of the requirements in Change 3 to DO-260A, and potentially Change 2 to DO-282A. This task also included the review of Latency in the ADS-B system, and the production of proposals for any changes to FAA Advisory Circulars (AC). This Working Paper is presented as a matrix which proposes to allocate specific paragraphs of the STP MOPS to (1) the Navigation AC, (2) the ADS-B OUT AC, or (3) ADS-B Link MOPS. Working Paper 1090-WP24-09 is presented as proposed resolution to the issue of Total and Uncompensated Latency in the ADS-B system.

## Proposed STP MOPS Requirements Restructuring

### Dispensations:

- (1) If the paragraph provides no obvious value, it will be discarded.
- (2) If the paragraph provides useful guidance for an acceptable means to integrate navigation sensors with ADS-B Link Equipment, it will be integrated into an FAA Advisory Circular (AC) on position sources (e.g., RNP FMS or GNSS) or ADS-B OUT installations.
- (3) If the paragraph involves a requirement that will need to be implemented into ADS-B Link Equipment, it will be captured in Change 3 to DO-260A, and if required, in a possible Change 2 to DO-282A.

STP MOPS Section #	Section Title	Dispensation				Remarks
		Link MOPS	Nav Src AC	ADS-B AC	No Value	
1.5	Assumptions		X	X		
1.5.1	GNSS Assumptions		X	X		
1.5.1.1	GNSS Position Output					Will be addressed by the latency definition
1.5.1.1.1	Position Accuracy				X	Heading with no text
1.5.1.1.1.1	HFOM (definition)		?X?	?X?		
1.5.1.1.1.2	VFOM (definition)		?X?	?X?		
1.5.1.1.2	GNSS Position Integrity				X	Heading with no text
1.5.1.1.2.1	HPL or HIL		?X?	?X?		
1.5.1.1.2.2	VPL or VIL		X	X		Clarify the accepted operational usage of this parameter
1.5.1.2	GNSS Velocity Accuracy		X	X		Strike current paragraph and replace with reference to GRAS MOPS (DO-310)
1.5.1.3	GPS Receiver Mode Annunciations			?X?		
1.5.2	Flight Management System (FMS) Assumptions		X	X		
1.5.2.1	FMS Position Output		X	X		
1.5.2.1.1	Position Accuracy – ANP, EPU, and EPE Assumptions		X	X		
1.5.2.1.2	Position Integrity		X	X		
1.5.2.2	FMS Velocity Accuracy		X	X		
1.6	Test Procedures				X	
2.2	STP Subsystem Requirements				X	Heading with no text
2.2.1	Introduction				X	No shall statements
2.2.2	General Requirements for STP				X	No shall statements
2.2.3	Reserved				X	Heading with no text
2.2.4	State Data Processing				X	No shall statements
2.2.4.1	Position Accuracy (HEPU <sub>STP</sub> and VEPU <sub>STP</sub> )				X	No shall statements

STP MOPS Section #	Section Title	Dispensation				Remarks
		Link MOPS	Nav Src AC	ADS-B AC	No Value	
2.2.4.1.1	HEPU <sub>STP</sub>				X	Heading with no text
2.2.4.1.1.1	Definition of HEPU <sub>STP</sub>				X	No shall statements
2.2.4.1.1.2	Requirements for the Determination of HEPU <sub>STP</sub>				X	
2.2.4.1.1.2.1	Case 1: Position Accuracy Metric(s) Reported by the Selected Position Source		X	X		
2.2.4.1.1.2.2	Case 2: Position Accuracy Metric(s) not Reported by the Selected Position Source		X	X		
2.2.4.1.1.3	Conditions for Limiting the Reported HEPU <sub>STP</sub>	X				limiting will be replaced by latency work in DO-260A Change 3
2.2.4.1.1.4	Requirements for the Delivery of HEPU <sub>STP</sub>				X	Heading with no text
2.2.4.1.1.4.1	STP and ADS-B Transmit Subsystem Are Not Integrated		X	X		
2.2.4.1.1.4.2	STP and ADS-B Transmit Subsystem Are Integrated		X	X		
2.2.4.1.2	VEPU <sub>STP</sub>				X	Heading with no text
2.2.4.1.2.1	Definition of VEPU <sub>STP</sub>				X	No shall statements
2.2.4.1.2.2	Requirements for the Determination of VEPU <sub>STP</sub>				X	
2.2.4.1.2.2.1	Case 1: Position Accuracy Metric(s) Reported by the Selected Position Source		X	X		
2.2.4.1.2.2.2	Case 2: Position Accuracy Metric(s) not Reported by the Selected Position Source		X	X		
2.2.4.1.2.3	Conditions for Limiting the Reported VEPU <sub>STP</sub>				X	No shall statements
2.2.4.1.2.4	Requirements for Delivery of VEPU <sub>STP</sub>				X	Heading with no text
2.2.4.1.2.4.1	STP and ADS-B Transmit Subsystem Are Not Integrated		X	X		
2.2.4.1.2.4.2	STP and ADS-B Transmit Subsystem Are Integrated		X	X		
2.2.4.2	Determination of Velocity Accuracy (HEVU <sub>STP</sub> and VEVU <sub>STP</sub> )				X	No shall statements
2.2.4.2.1	HEVU <sub>STP</sub>				X	Heading with no text
2.2.4.2.1.1	Definition of HEVU <sub>STP</sub>				X	No shall statements
2.2.4.2.1.2	Requirements for Determination of HEVU <sub>STP</sub>				X	
2.2.4.2.1.2.1	Case 1: Velocity Accuracy Metric(s) Reported by the Selected Velocity Source		X	X		
2.2.4.2.1.2.2	Case 2: Velocity Accuracy Metric(s) Not Reported by the Selected Velocity Source, but a Position Accuracy Metric is Reported		X	X		
2.2.4.2.1.2.2.1	Velocity Source is a GNSS Navigation Sensor that Provides HFOM	X	X	X		this case covered by Barbara Clark work in DO-310 Fixes needed in DO-260A Change 3
2.2.4.2.1.2.2.2	Velocity Source is an RNP Compliant FMS		X	X		
2.2.4.2.1.2.2.3	Other Conditions Relative to Case 2		X	X		
2.2.4.2.1.2.3	Case 3: No Position or Velocity Accuracy Metrics Reported		X	X		
2.2.4.2.1.3	Requirements for the Delivery of HEVU <sub>STP</sub>				X	Heading with no text
2.2.4.2.1.3.1	STP and ADS-B Transmit Subsystem are not integrated		X	X		
2.2.4.2.1.3.2	STP and ADS-B Transmit Subsystem are integrated		X	X		
2.2.4.2.2	VEVU <sub>STP</sub>				X	Heading with no text
2.2.4.2.2.1	Definition of VEVU <sub>STP</sub>				X	No shall statements
2.2.4.2.2.2	Requirements for Determination of VEVU <sub>STP</sub>				X	
2.2.4.2.2.2.1	Case 1: Velocity Accuracy Metric(s) Reported by the Selected Velocity Source		X	X		

STP MOPS Section #	Section Title	Dispensation				Remarks
		Link MOPS	Nav Src AC	ADS-B AC	No Value	
2.2.4.2.2.2.2	Case 2: Velocity Accuracy Metric(s) Not Reported by the Selected Velocity Source, but a Position Accuracy Metric is Reported		X	X		
2.2.4.2.2.2.2.1	Velocity Source is a GNSS Navigation Sensor that Provides VFOM		X	X		
2.2.4.2.2.2.2.2	Velocity Source is an RNP Compliant FMS		X	X		
2.2.4.2.2.2.2.3	Other Conditions Relative to Case 2		X	X		
2.2.4.2.2.2.3	Case 3: No Position or Velocity Accuracy Metrics Reported		X	X		
2.2.4.2.2.3	Requirements for the Delivery of VEVU <sub>STP</sub>				X	Heading with no text
2.2.4.2.2.3.1	STP and ADS-B Transmit Subsystem Are Not Integrated		X	X		
2.2.4.2.2.3.2	STP and ADS-B Transmit Subsystem are integrated		X	X		
2.2.4.3	Position Integrity Containment Region (HPL <sub>STP</sub> and VPL <sub>STP</sub> )				X	No shall statements
2.2.4.3.1	HPL <sub>STP</sub>				X	Heading with no text
2.2.4.3.1.1	Definition of HPL <sub>STP</sub>				X	No shall statements
2.2.4.3.1.2	Requirements for Determination of HPL <sub>STP</sub>				X	
2.2.4.3.1.2.1	Case 1: Integrity Metric(s) Reported by the Selected Position Source		X	X		
2.2.4.3.1.2.2	Case 2: Integrity Metric(s) not Reported by the Selected Position Source		X	X		
2.2.4.3.1.3	Conditions for Limiting the Reported HPL <sub>STP</sub>				X	All limiting will be deleted
2.2.4.3.1.4	Requirements for the Delivery of HPL <sub>STP</sub>				X	Heading with no text
2.2.4.3.1.4.1	STP and ADS-B Transmit Subsystem Are Not Integrated		X	X		
2.2.4.3.1.4.2	STP and ADS-B Transmit Subsystem Are Integrated		X	X		
2.2.4.3.2	VPL <sub>STP</sub>				X	Heading with no text
2.2.4.3.2.1	Definition of VPL <sub>STP</sub>				X	No shall statements
2.2.4.3.2.2	Requirements for Determination of VPL <sub>STP</sub>				X	
2.2.4.3.2.2.1	Case 1: Integrity Metric(s) Reported by the Selected Position Source		X	X		
2.2.4.3.2.2.2	Case 2: Integrity Metric(s) not Reported by the Selected Position Source		X	X		
2.2.4.3.2.3	Conditions for Limiting the Reported VPL <sub>STP</sub>				X	All limiting will be deleted
2.2.4.3.2.4	Requirements for the Delivery of VPL <sub>STP</sub>				X	Heading with no text
2.2.4.3.2.4.1	STP and ADS-B Transmit Subsystem Are Not Integrated		X	X		
2.2.4.3.2.4.2	STP and ADS-B Transmit Subsystem Are Integrated		X	X		
2.2.4.4	Surveillance Integrity Level (SIL)				X	No shall statements
2.2.4.4.1	SIL Encoding	X				Already in MOPS
2.2.4.4.2	Requirements for the Determination of SIL	X				Already in MOPS
2.2.4.4.2.1	Example Means of Compliance for Determining SIL				X	No shall statements
2.2.4.4.3	Providing SIL to the ADS-B Transmit Subsystem	X				Already in MOPS
2.2.4.5	Barometric Altitude Quality (BAQ) Level	X				Already in MOPS
2.2.4.6	Barometric Altitude Surveillance Integrity Level (SIL <sub>BARO</sub> )				X	Not yet in DO-242A MASPS
2.2.4.7	Management of State Data Sources				X	No shall statements
2.2.4.7.1	Horizontal Position and Navigation Data Sources	<u>X</u>		<u>X</u>		
2.2.4.7.2	Altitude Data Sources	X				
2.2.4.7.3	Vertical Rate Sources	<u>X</u>		<u>X</u>		
2.2.5	STP Input / Output Data Requirements				X	Heading with no text
2.2.5.1	STP Input Data Requirements				X	Heading with no text

STP MOPS Section #	Section Title	Dispensation				Remarks
		Link MOPS	Nav Src AC	ADS-B AC	No Value	
2.2.5.1.1	Horizontal Figure of Merit, HFOM				X	
2.2.5.1.2	Estimated Position Uncertainty, EPU				X	
2.2.5.1.3	Actual Navigation Performance, ANP				X	
2.2.5.1.4	GNSS/FMS Navigation Type Information				X	
2.2.5.1.5	Vertical Figure of Merit, VFOM				X	
2.2.5.1.6	Horizontal Figure of Merit_Rate, HFOM <sub>R</sub>				X	
2.2.5.1.7	Vertical Figure of Merit_Rate, VFOM <sub>R</sub>				X	
2.2.5.1.8	Horizontal Protection Limit, HPL				X	
2.2.5.1.9	Vertical Protection Limit, VPL				X	
2.2.5.1.10	Surveillance Integrity Level, SIL				X	
2.2.5.1.11	Barometric Altitude Quality (BAQ) Level				X	
2.2.5.1.12	Barometric Altitude Surveillance Integrity Level (SIL <sub>BARO</sub> )				X	
2.2.5.1.13	Ground Speed				X	
2.2.5.1.14	Altitude Select Data				X	
2.2.5.1.15	Position Accuracy and Integrity Data				X	
2.2.5.1.16	Velocity Accuracy Data				X	
2.2.5.1.17	Time Mark Synchronization Data				X	
2.2.5.2	STP Output Data Requirements				X	Heading with no text
2.2.5.2.1	Horizontal Figure of Merit_STP (HFOM <sub>STP</sub> )				X	
2.2.5.2.2	Vertical Figure of Merit_STP (VFOM <sub>STP</sub> )				X	
2.2.5.2.3	Horizontal Figure of Merit_Rate_STP, HFOM <sub>RSTP</sub>				X	
2.2.5.2.4	Vertical Figure of Merit_Rate_STP, VFOM <sub>RSTP</sub>				X	
2.2.5.2.5	Horizontal Protection Limit_STP, HPL <sub>STP</sub>				X	
2.2.5.2.6	Vertical Protection Limit_STP, VPL <sub>STP</sub>				X	
2.2.5.2.7	Surveillance Integrity Level_STP, SIL <sub>STP</sub>				X	
2.2.5.2.8	Barometric Altitude Quality (BAQ) Level_STP (BAQ <sub>STP</sub> )				X	
2.2.5.2.9	Barometric Altitude Surveillance Integrity Level__STP (SIL <sub>BAROSTP</sub> )				X	
2.2.5.2.10	Selected Data Source Annunciation				X	No shall statements
2.2.5.2.10.1	Selected ADS-B Position Source Annunciation				X	
2.2.5.2.10.2	Selected ADS-B Vertical Rate Source Annunciation				X	
2.2.5.2.10.3	Selected ADS-B Altitude Source Annunciation				X	