The European Organisation for Civil Aviation Equipment
L'Organisation Européenne pour l'Equipement de l'Aviation Civile

Minimum Operational Performance Standards for 1090 MHz Extended Squitter Automatic Dependent Surveillance – Broadcast (ADS-B) and Traffic Information Services – Broadcast (TIS-B)

Corrigendum-1 for ED-102A
December 2011

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Minimum Operational Performance Standards for 1090 MHz Extended Squitter Automatic Dependent Surveillance – Broadcast (ADS-B) and Traffic Information Services – Broadcast (TIS-B)

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Foreword

1. This document, prepared jointly by EUROCAE Working Group 51 “Automatic Dependent Surveillance Broadcast”, and RTCA SC-186, Working Group 3, was accepted by the Council of EUROCAE in December 2011.

2. EUROCAE is an international non-profit making organisation. Membership is open to European users and manufacturers of equipment for aeronautics, trade associations, national civil aviation administrations and, under certain conditions, non-European members. Its work programme is principally directed to the preparation of performance specifications and guidance documents for civil aviation equipment, for adoption and use at European and world-wide levels.

3. The findings of EUROCAE are resolved after discussion among its members and in co-operation with RTCA Inc., Washington DC, USA and/or the Society of Automotive Engineers (SAE), Warrendale PA, USA through their appropriate committees.

4. The corrigenda related to the *Minimum Operational Performance Standards (MOPS) for the 1090 MHz Automatic Dependent Surveillance – Broadcast (ADS-B) and Traffic Information Services – Broadcast (TIS-B)* systems, published by EUROCAE in December 2009 as EUROCAE ED-102A, and, by published RTCA on December 2, 2009 as RTCA DO-260B, are contained herein as a **Corrigendum-1 for RTCA DO-260B and EUROCAE ED-102A**, and has been produced to reflect errata, corrections and clarifications to requirements and test procedures for 1090ES ADS-B and TIS-B transmitting and receiving systems, as a result of comments received from industry during their implementation of products conforming to the referenced standard since the publication of the standards in December 2009.

5. With the publication of this document as “**Corrigendum-1 for RTCA DO-260B and EUROCAE ED-102A**,” errata are being reviewed for EUROCAE ED-102A and RTCA DO-260B that have been identified since the time of the publication of ED-102A/DO-260B. These errata do not alter any requirements within the original ED-102A/DO-260B documents published in December 2009. Errata in this Corrigendum-1 include, but are not limited to:

    a. Correcting typographical and paragraph reference errors;
    b. Correcting various test procedure data input, or expected results; and
    c. Additions of clarifying text where issues have been raised, or where clarification has been found to be required.

6. Where applicable, EUROCAE and RTCA documents reflect ICAO standards and documents providing more detail and including test procedures to support equipment implementation. With the publication of this "**Corrigendum-1 for RTCA DO-260B and EUROCAE ED-102A**," ED-102A/DO-260B are in particular consistent with Annex 10 Vol. IV and ICAO Doc 9871, Edition 2 “*Technical Provisions for Mode S Services and Extended Squitter*.”

7. The Minimum Operation Performance Specifications are recommendations only. EUROCAE is not an official body of the European Governments therefore its recommendations are valid as statements of official policy only when adopted by a particular government or conference of governments.

8. Copies of this document may be obtained from:

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Corrigendum-1 for RTCA DO-260B and EUROCAE ED-102A

Extended Squitter Automatic Dependent Surveillance - Broadcast (ADS-B) and Traffic Information Service - Broadcast (TIS-B) Equipment Operating on the Radio Frequency of 1090 Megahertz (MHz)

The applicable standards for the corrigenda described in this document is RTCA DO-260B and EUROCAE ED-102A, "*Minimum Operational Performance Standards for 1090 MHz Extended Squitter Automatic Dependent Surveillance – Broadcast (ADS-B) and Traffic Information Services – Broadcast (TIS-B),"* issued December, 2009.

Corrigenda that are being specified in this **Corrigendum-1 for RTCA DO-260B and EUROCAE ED-102A** will use numbers such as (**1.1**) through (**1.xx**).

In the following list of corrigenda, for those items where existing text is proposed to be changed, the new text is presented in blue font color and underlined, and deleted text is presented in ~~strikethrough and red font color text~~. In those corrigenda where a totally new section or new text is proposed to be inserted, all the text is presented in blue font color and underlined. In some cases, a yellow highlighting of text may be used to emphasize a specific issue.

(**1.1**) In RTCA DO-260B and EUROCAE ED-102A, in section §1.1, in order to correctly describe the addition of an Appendix "W" for the purpose of inserting this entire "Corrigendum-1 for DO-260B/ED-102A," at the end of §1.1, insert the following description:

Appendix W includes the content of "Corrigendum-1 for DO-260B/ED-102A" which serves to itemize errata that was discovered in the document after the publication of RTCA DO-260B and EUROCAE ED-102A in December 2009. The Appendix also includes the addition of notes in some areas in an effort to clarify issues that have been points of discussion during the implementation of ADS-B Version 2 transmitting subsystems, as defined by RTCA DO-260B and EUROCAE ED-102A. These errata do not alter any requirements within the original DO-260B/ED-102A documents published in December 2009.

(**1.2**) In RTCA DO-260B and EUROCAE ED-102A, in order to correct a bad reference to Advisory Circular 23.1309-1D, in sections §1.2.3, §2.1.9, §2.2.3.2.7.2.4.6 and §A.1.4.10.14:

Change "AC 23.1309-1C" to "AC 23.1309-1D"

(**1.3**) In RTCA DO-260B and EUROCAE ED-102A, in section §1.2.4.3, in order to correctly point to places where the transmission rates are defined and to correct references to TIS-B, edit the second and third paragraphs as follows:

For ADS-B Messages, ICAO Doc 9871 provides the Mode S Transponder Register definitions as well as the 56-bit data formats required for the ADS-B Messages. Appendix A to this document specifies the formats contained in ICAO Doc 9871, plus those event-driven messages that are now defined. The transmission rate for each of the defined broadcast messages is defined in the subparagraphs of §2.2.3.3 and in Appendix A ~~and in the MOPS for *Air Traffic Control Radar Beacon System/Mode Select (ATCRBS/Mode-S) Airborne Equipment* (RTCA DO-181D) (EUROCAE ED-73C)~~.

~~TIS-B Messages have not yet been incorporated into the ICAO Annex 10 SARPs, nor into the Mode S Transponder MOPS (RTCA/DO-181D, EUROCAE ED-73C).~~ TIS-B Messages are defined in §2.2.17 and §A.2 of this document and in ICAO Doc 9871.

(**1.4**) In RTCA DO-260B and EUROCAE ED-102A, in section §1.4.2.1, the first paragraph is the initial occurrence of the reference to RTCA DO-181D and EUROCAE ED-73C. Both of these Transponder MOPS documents were updated to reflect changes that were made to the ADS-B MOPS with the publication of RTCA DO-260B and EUROCAE ED-102A. For all references to the Transponder MOPS in RTCA DO-260B and EUROCAE ED-102A:

Change DO-181D to DO-181E and **Change** ED-73C to ED-73E

(**1.5**) In RTCA DO-260B and EUROCAE ED-102A, in section §2.1.12.1, after Table 2-4 in the *Notes* for Table 2-3 and 2-4, the information in *Note* #4 was not updated with the revisions to the Target State and Status Message for DO-260B/ED-102A. Make the following updates to *Note* #4:

4. On-Condition reports is a category that includes multiple report types. Each specific On-Condition report type includes the following elements:

- *Target State Report (see Table 2-97)*
  - *Time of Applicability*
  - ~~*Horiztonal Short Term Intent*~~ *Selected Heading*
  - ~~*Vertical Short Term Intent*~~ *MCP/FCU or FMS Selected Altitude*
  - *Barometric Pressure Setting (Minus 800 millibars)*
- *Air Referenced Velocity Report (see Table 2-100)*
  - *Address (the ICAO 24-bit Address)*
  - *Time of Applicability*
  - *Airspeed*
  - *Heading*
- *Reserved for Trajectory Change Reports*

(**1.6**) In RTCA DO-260B and EUROCAE ED-102A, in section §2.2.3.2.1.2.b, since it is recognized that Extended Squitter-capable Transponders are defined as being required to have Level 2 or above capabilities, the value of CA=0 is not authorized for use in these Transponders. Therefore, a clarifying *Note* should be added under subparagraph "b" as follows:

Note: *Since a Transponder supporting Extended Squitter is required to be at a minimum of Level 2 or greater, the CA field can only support values equal to 4, 5, 6 or 7.*

(**1.7**) In RTCA DO-260B and EUROCAE ED-102A, in section §2.2.3.2.3.1, inside Table 2-14, the value for R_C less than 0.5 NM is expressed incorrectly. Make the following change:

The phrase "R_C < 0.5 NM (925 m)" **should be** "R_C < 0.5 NM (926 m)"

(**1.8**) In RTCA DO-260B and EUROCAE ED-102A, in section §2.2.3.2.3.1.1, in order to account for the fact that some regulators have already made clarifying statements on HPL limiting, please add the following as *Note* #2, just after the existing *Note* under the section heading:

Notes:

1. *If the position information comes from a GNSS receiver that conforms to the ARINC 743A characteristic, a suitable source of information for the radius of containment (R_C), is ARINC 429 label 130 from that GNSS receiver.*
2. *Although these requirements do not require HPL limiting, it is expected that some regulators will only accept installations that limit HPL. This may be standardized accordingly in future versions of these MOPS.*

(**1.9**) In RTCA DO-260B and EUROCAE ED-102A, in section §2.2.3.2.4.1.1, in order to account for the fact that some regulators have already made clarifying statements on HPL limiting, please add the following as *Note* #2, just after the existing *Note*:

Notes:

1. *If the position information comes from a GNSS receiver that conforms to the ARINC 743A characteristic, a suitable source of information for the radius of containment (R_C), is ARINC 429 label 130 from that GNSS receiver.*
2. *Although these requirements do not require HPL limiting, it is expected that some regulators will only accept installations that limit HPL. This may be standardized accordingly in future versions of these MOPS.*

(**1.10**) In RTCA DO-260B and EUROCAE ED-102A, in section §2.2.3.2.4.3, in order to account for the fact that some regulators have already made restrictions on the usage of the Ground Speed when it is below 7 knots, please add the following additional clarification inside the parenthetical at the end of the *Note* following Table 2-17:

Note: *If a source of A/V Heading is not available to the ADS-B Transmitting Subsystem, but a source of Ground Track angle is available, then Ground Track angle may be used instead of Heading, provided that the "Status Bit for Heading/Ground Track" subfield is set to ZERO whenever the Ground Track angle is not a reliable indication of the A/V's heading. (The Ground Track angle is not a reliable indication of the A/V's heading when the A/V's ground speed is close to ZERO. Some regulators have already established such limits. These limits may be standardized accordingly in future versions of these MOPS.)*

(**1.11**) In RTCA DO-260B and EUROCAE ED-102A, in section §2.2.3.2.6.1.14, the values in Table 2-30 need to account for the situation where the barometric and Geometric (GNSS or INS) altitude source data are exactly equal. Edit the "Meaning" in Table 2-30 for the value of ZERO (0) as follows:

Table 2-30: "Difference From Barometric Altitude Sign Bit" Encoding

Coding	Meaning
0	Geometric (GNSS or INS) Altitude Source data is greater than (above) or equal to Barometric
1	Geometric (GNSS or INS) Altitude Source data is less than (below) Barometric

(**1.12**) In RTCA DO-260B and EUROCAE ED-102A, in section §2.2.3.2.6.1.15, in order to account for the fact that some regulators have already made clarifying statements on the usage of MSL, please add the following *Note* #2:

2. Although the above requirements allows this subfield to be based on MSL in certain cases, it is expected that some regulators will only accept installations that report based on WGS-84 HAE. HAE will be required for some State mandates and the manufacturer must ensure that when converting from HAG (e.g., MSL) to HAE, the same model used by the position source is used. This may be standardized accordingly in future versions of these MOPS.

(**1.13**) In RTCA DO-260B and EUROCAE ED-102A, in section §2.2.3.2.7.1.3.7, in order to clarify the dependency of the Selected Heading on a reference direction flag, please add the following new *Note #2* just after sub-bullet "c:"

2. The Selected Heading parameter does not have a source bit in this version of these MOPS to indicate its reference orientation (True North or Magnetic North). Implementers of the Target State and Status Message are encouraged whenever possible to use input parameters to populate this field that utilize Magnetic North orientation, as that is the de facto standard utilized by most users of this data. However since many aircraft have flight decks that can operate in either True North or Magnetic North orientation, this field should be encoded with the current active value in the flight deck, regardless of orientation. Users of the Selected Heading data should be aware that there is no method defined in this version of these MOPS to indicate its reference orientation.

(**1.14**) In RTCA DO-260B and EUROCAE ED-102A, in section §2.2.3.2.7.1.3.11 references to the LNAV Mode Engaged were left out in the final edit. Add references to "ME" bit 54, and Message bit 86 into the proper places as follows for this section:

The "Status of MCP / FCU Mode Bits" subfield is a 1-bit ("ME" bit 47, Message bit 79) field that shall be used to indicate whether the mode bits ("ME" bits 48, 49, 50, ~~and~~ 52, and 54, Message bits 80, 81, 82, ~~and~~ 84 and 86) are actively being populated (e.g., set) in the Target State and Status Message in accordance with Table 2-48.

Table 2-48: "Status of MCP/FCU Mode Bits" Subfield Encoding

Coding ("ME" Bit 47)	**Meaning**
0	No Mode Information is being provided in "ME" bits 48, 49, 50, ~~or~~ 52 or 54 (Message bits 80, 81, 82, ~~or~~ 84 or 86)
1	Mode Information is deliberately being provided in "ME" bits 48, 49, 50, ~~or~~ 52 or 54 (Message bits 80, 81, 82, ~~or~~ 84 or 86)

If information is provided to the ADS-B Transmitting Subsystem to set either "ME" bit 48, 49, 50, ~~or~~ 52 or 54 (Message bit 80, 81, 82, ~~or~~ 84 or 86) to either "0" or "1," then bit 47 shall be set to ONE (1). Otherwise, bit 47 shall be set to ZERO (0).

(**1.15**) In RTCA DO-260B and EUROCAE ED-102A, in section §2.2.3.2.7.1.3.18, inside Table 2-54, the definition of the LNAV Mode Engaged subfield was not totally defined. The "or Unknown" case must be added to the encoding of ZERO (0), as follows:

Table 2-54: "LNAV" Mode Engaged" Subfield Encoding

Coding ("ME" Bit 54)	**Meaning**
0	LNAV Mode is NOT Active or Unknown
1	LNAV Mode is Active

(**1.16**) In RTCA DO-260B and EUROCAE ED-102A, in section §2.2.3.2.7.2.4.8, in order to correct a cut-and-paste error, make the following correction to this paragraph:

"Reserved" bits, ("ME" bits 33 – 40, Message bits 65 – 72) in the OM Code Subfield of ~~Surface~~ Airborne format Aircraft Operational Status Messages are reserved for future assignment. Until such future assignment, these bits shall be set to "ZERO" (0).

(**1.17**) In RTCA DO-260B and EUROCAE ED-102A, in section §2.2.3.2.7.2.8, in order to clarify the usage of the Geometric Vertical Accuracy (GVA) metric with respect to the Baro-Geo Difference data field in the Airborne Velocity Message, make a change in the existing initial paragraph, and add a new *Note* below the paragraph as follows:

The "Geometric Vertical Accuracy (GVA)" subfield of Subtype=0 Aircraft Operational Status Message is a 2-bit field ("ME" bits 49-50, Message bits 81-82) defined in Table 2-71. The GVA field shall be set by using the Vertical Figure of Merit (VFOM) (95%) from the GNSS position source used to ~~encode the geometric altitude field in the Airborne Position Message~~ report the geometric altitude.

Note: *The geometric altitude may be reported directly in the altitude field in the Airborne Position Message or indirectly using the Difference From Barometric Altitude subfield (§2.2.3.2.6.1.15) in the Airborne Velocity Message (§2.2.3.2.6) when barometric altitude is reported in the altitude field in the Airborne Position Message (§2.2.3.2.3.4).*

(**1.18**) In RTCA DO-260B and EUROCAE ED-102A, in section §2.2.3.2.7.2.8, in order to clarify the usage of the Geometric Vertical Accuracy (GVA) metric encoding values for previous and potential future ADS-B Versions, revise the Note below Table 2-71 as follows:

Note: *For the purposes of these MOPS (RTCA DO-260B/EUROCAE ED-102A) values for 0, 1 and 2 are encoded.* ~~*Decoding values for 3 should be treated as < 45 meters until future versions of these MOPS redefine the value*~~*.* *It is expected that ADS-B transmitting subsystems with ADS-B Version Numbers greater than 2 will define the GVA encoding of "3" as a value less than 45 meters at some point in the future. Therefore, ADS-B Version 2 receiving subsystems should treat the GVA encoding of "3" as less than 45 meters for data received from ADS-B Version Numbers 2 or greater.*

(**1.19**) In RTCA DO-260B and EUROCAE ED-102A, in section §2.2.3.2.7.2.13, in order to clarify what the Horizontal Reference Direction (HRD) flag applies to, please add the following new *Note* just after the paragraph and prior to Table 2-76:

Note: *The HRD flag only applies to the Heading/Ground Track subfield in the Surface Position Message, or the Heading subfield in the Airborne Velocity Message (Subtypes 3 & 4).*

(**1.20**) In RTCA DO-260B and EUROCAE ED-102A, in section §2.2.3.3.1.2, Table 2-79 summarizes the broadcast rates of the 1090ES ADS-B Messages. There was one case that was not included in the original summary of broadcast rates, wherein there would be no transmission of the Aircraft Status Message. Replace Table 2-79 with the following:

			Broadcast Rate		
Transponder Register	**Event-Driven Message Priority**	**1090ES ADS-B Message**	**On-the-Ground, not moving**	**On-the-Ground and moving**	**Airborne**
BDS 0,5	N/A	Airborne Position	N/A	N/A	2 / 1 second (0.4 – 0.6 sec)
BDS 0,6	N/A	Surface Position	LOW RATE 1 / 5 seconds (4.8 – 5.2 sec)	HIGH RATE 2 / 1 second (0.4 – 0.6 sec)	N/A
BDS 0,8	N/A	Aircraft Identification and Category	LOW RATE 1 / 10 seconds (9.8 – 10.2 sec)	HIGH RATE 1 / 5 seconds (4.8 – 5.2 sec)	HIGH RATE 1 / 5 seconds (4.8 – 5.2 sec)
BDS 0,9	N/A	Airborne Velocity	N/A	N/A	2 / 1 second (0.4 – 0.6 sec)
BDS 6,1	TCAS RA=1 Emergency=2	Aircraft Status Subtype=1: (Emergency/Priority Status) Subtype=2: (TCAS RA Broadcast)	TCAS RA or Mode A Code Change 0.7 – 0.9 seconds		
			No TCAS RA, No Mode A Change 4.8 – 5.2 seconds		
			No TCAS RA, No Mode A Change, No Emergency, Mode A Code set to 1000_8 No Transmission		
BDS 6,2	N/A	Target State and Status (TSS)	N/A	N/A	1.2 – 1.3 seconds
BDS 6,5	N/A	Aircraft Operational Status	4.8 – 5.2 seconds	No change NIC_{SUPP}/NAC/SIL 2.4 – 2.6 seconds	TSS being broadcast or not No change TCAS/NAC/SIL/NIC_{SUPP} 2.4 – 2.6 seconds
				Change in NIC_{SUPP}/NAC/SIL 0.7 – 0.9 seconds	TSS being broadcast Change in TCAS/NAC/SIL/NIC_{SUPP} 2.4 – 2.6 seconds
					TSS not broadcast [2] Change in TCAS/NAC/SIL/NIC_{SUPP} 0.7 – 0.9 seconds

(**1.21**) In RTCA DO-260B and EUROCAE ED-102A, in section §2.2.3.3.1.4.1.a, in order to clarify the target state information that is required to be "available and valid" in order to start transmission of the Target State and Status (Subtype=1) Message, insert the following *Note* after subparagraph "a:"

Note: *Target state information includes both Selected Altitude and Selected Heading data. Because only one of these may actually be available in any given installation, then in order to initiate broadcast of the Target State and Status (Subtype=1) Message, either the Selected Altitude or the Selected Heading data must be available and valid as a minimum. Future versions of these MOPS may include the Barometric Pressure Setting (BPS) as a required parameter in order to initiate the Target State and Status Message.*

(**1.22**) In RTCA DO-260B and EUROCAE ED-102A, in section §2.2.3.3.1.4.2.a, add a clarifying expression on to the end of subparagraph "a" as follows:

a. Airborne Aircraft Operational Status Messages (TYPE=31, Subtype=0) **shall** be broadcast at the rates given in the following subparagraphs when aircraft operational status information is valid and when in the airborne state (i.e., when airborne message formats are being broadcast);

(**1.23**) In RTCA DO-260B and EUROCAE ED-102A, in section §2.2.3.3.1.4.2.b, add a clarifying expression on to the end of subparagraph "b" as follows:

b. Surface Aircraft Operational Status Messages (TYPE=31, Subtype=1) **shall** be broadcast at the rates given in the following subparagraphs when aircraft operational status information is valid and when in the ON-Ground state (i.e., when surface message formats are being broadcast);

(**1.24**) In RTCA DO-260B and EUROCAE ED-102A, in section §2.2.3.3.1.4.2.b.(3) to correct a cut-and-paste error and to indicate that the high broadcast rate that occurs when an aircraft is on the surface and moving with a change in NIC_{SUPP}/NAC/SIL, replace subparagraph §2.2.3.3.1.4.2.b.(3) with:

(3). Aircraft/Vehicle Is Moving With Change in NIC_{SUPP}/NAC/SIL Data:

If the Aircraft/Vehicle IS Moving and there has been a change in the NIC_{SUPP}, NAC, or SIL data provided in the Surface Aircraft Operational Status Message (TYPE=31, Subtype=1), then the messages shall be broadcast at random intervals that are uniformly distributed over the range of 0.7 to 0.9 seconds relative to the previous Surface Aircraft Operational Status Message for a period of 24 ±1 seconds ~~as long as data is available to satisfy the requirements of subparagraph "b." above~~.

(**1.25**) In RTCA DO-260B and EUROCAE ED-102A, in section §2.2.3.3.2.11, in order to clarify the intended purpose of this subsection, revise *Note #1* and add the following *Note #3*:

1. These ~~messages~~ data subfields are cleared to prevent the reporting of outdated position and velocity information.

3. All references in this subsection relate to the treatment of data subfields in specific ADS-B Messages after the data in that subfield has not been refreshed for some specified period of time, known as a "timeout." The requirements for terminating the actual transmission of ADS-B Messages are specified separately in the subparagraphs of §2.2.3.3.2.12.

(**1.26**) In RTCA DO-260B and EUROCAE ED-102A, in section §2.2.3.3.2.12, in order to clarify the intended purpose of this subsection, add a *Note* immediately after the section heading and prior to sub-bullet "a" as follows:

Note: *The subsections below contain requirements for terminating transmission of ADS-B Messages. These requirements are in response to data timeout conditions or in response to terminating transmission of other ADS-B Messages. Requirements in the subparagraphs of §2.2.3.3.2.11 relate to the treatment of data subfields in specific ADS-B Messages after the data in that subfield has not been refreshed for some specified period of time, known as a "timeout."*

(**1.27**) In RTCA DO-260B and EUROCAE ED-102A, in section §2.2.3.3.2.12.b, in the *Note* following the text of subparagraph "b" it has been discovered that there are several places in DO-260B/ED-102A that reference the "Ground Track" or "Heading" field in the Surface Position Message without referencing both data items. In this specific *Note*, in order to correctly reference the data item, make the following edit:

Note: *For the Surface Position Message, the receipt of new Movement, or Heading/Ground Track data is not sufficient to maintain broadcast of the message once the message has been initiated.*

(**1.28**) In RTCA DO-260B and EUROCAE ED-102A, in section §2.2.3.3.2.12.e, in order to clarify the fact that there are actually two defined requirements for terminating the broadcast of Target State and Status Messages, replace the existing *Note* below sub-bullet "e" with the following:

Note: *The broadcast of Target State and Status (Subtype=1) Messages may be terminated either: (1) as a result of the requirements of §2.2.3.3.1.4.1.b if the target state information is no longer available or valid, or (2) if the broadcast of the Airborne Position Message has been terminated (see §2.2.3.3.2.12.a), since the Target State and Status Messages contain various integrity, mode, or status information that is applicable to the Airborne Position Messages, data which becomes irrelevant if the broadcast of the Airborne Position Message has been terminated.*

(**1.29**) In RTCA DO-260B and EUROCAE ED-102A, in section §2.2.3.3.2.12.f, in order to clarify the requirements for terminating the broadcast of Aircraft Operational Status Messages, replace the existing *Note* below sub-bullet "f" with the following:

Note: *The broadcast of the Aircraft Operational Status Messages (either Subtype 0 or 1) may be terminated only after the termination of the respective Airborne (see §2.2.3.3.2.12.a) or Surface (see §2.2.3.3.2.12.b) Position Messages, since the Operational Status Messages contain various integrity, mode, version number, or status information that is applicable to the respective Position Messages, data which becomes irrelevant if the broadcast of that Position Message has been terminated.*

(**1.30**) In RTCA DO-260B and EUROCAE ED-102A, in section §2.2.4.3.4.1.a, there is a typographical error in specifying the threshold were the value "**A**" should be -6 dB ±1 dB instead of "-6 dB + 1 dB." Make the following correction in the last three lines of subparagraph "a:"

……...
is received (§2.2.3.1.1), in which case the threshold shall be held at A -6 dB ±1 dB for a period of not less than 115 microseconds and shall be recovered in not more than 120 microseconds.

(**1.31**) In RTCA DO-260B and EUROCAE ED-102A, in section §2.2.5.1.10, in order to account for the fact that some regulators have already made restrictions on the usage of the Ground Speed when it is below 7 knots, please add the following additional clarification inside the parenthetical at the end of *Note #2,* just prior to §2.2.5.1.11:

2. *If a source of A/V Heading is not available to the ADS-B Transmitting Subsystem, but a source of Ground Track angle is available, then Ground Track angle may be used instead of Heading, provided that the "Status Bit for Heading/Ground Track" subfield is set to ZERO whenever the Ground Track angle is not a reliable indication of the A/V's heading. (The Ground Track angle is not a reliable indication of the A/V's heading when the A/V's ground speed is close to ZERO. Some regulators have already established such limits. These limits may be standardized accordingly in future versions of these MOPS.)*

(**1.32**) In RTCA DO-260B and EUROCAE ED-102A, in section §2.2.5.1.22, there is an incorrect reference to the UAT IN subfield. Make the following change:

The ADS-B Transmitting Subsystem **shall** be capable of accepting "UAT IN" information via an appropriate variable data input interface and use such data to establish subfields in transmitted ADS-B Aircraft Operational Status Messages as specified in §~~2.2.3.2.7.2.3.2~~ 2.2.3.2.7.2.3.9.

(**1.33**) In RTCA DO-260B and EUROCAE ED-102A, in section §2.2.5.2.2.c, in the text of subparagraph "c" it has been discovered that there are several places in DO-260B/ED-102A that reference the "Ground Track" or "Heading" field in the Surface Position Message without referencing both data items. In this specific subparagraph, in order to correctly reference the data items, make the following edits:

c. Any change in Heading/Ground Track identified in §2.2.3.2.4.3 and §2.2.3.2.4.4 **shall** be reflected in the appropriate Heading/Ground Track subfields of the next scheduled Surface Position Message transmission provided that the change occurs at least 100 milliseconds prior to the next scheduled Surface Position Message transmission.

(**1.34**) In RTCA DO-260B and EUROCAE ED-102A, in section §2.2.8.1.4.3, in the text of the second paragraph it has been discovered that there are several places in DO-260B/ED-102A that reference the "Ground Track" or "Heading" field in the Surface Position Message without referencing both data items. In this specific paragraph, in order to correctly reference the data items, make the following edit:

Each time that a Surface Position Message is received with valid Movement AND Heading/Ground Track data, the Report Assembly Function **shall** update the Velocity Time of Applicability data in the State Vector Report with either the GPS/GNSS UTC Measure Time data (see §2.2.8.5.1) or the Established Receiver Unit Time (see §2.2.8.5.2), whichever is applicable to the Receiving device Report Assembly Function installation requirements.

(**1.35**) In RTCA DO-260B and EUROCAE ED-102A, in section §2.2.8.1.16, in order to clarify the reporting of the correct Type Code by an ADS-B Receiving Subsystem when using one or more of the NIC-Supplement parameters to interpret the correct radius of Containment (R_C), make corrections to the existing *Note*, and add an additional *Note* under the section as follows:

Notes:

1. *For backward compatibility, applications designed to interface to the State Vector Report structure of RTCA DO-260A will decode R_C < 0.3 NM as NIC=6 with a NIC Supplement=0, and interpret it as R_C < 0.~~6~~5 NM. Applications designed to comply with these MOPS will properly decode the NIC as R_C < 0.3 NM.*
2. *NIC is derived by the combination of Airborne or Surface Position Message Type Codes and NIC Supplement bits broadcast in Airborne Position Messages (NIC Supplement-B), and Operational Status Messages (NIC Supplement-A and C). Because of the different rates of broadcast between either Airborne or Surface Position Messages, and the Operational Status Messages, during a NIC change or airborne/surface format reporting transitions, the receipt of a new Type Code can no longer be associated with the NIC Supplement bits previously received and processed by the ADS-B Receiving Subsystem. These transitions may yield an incorrect NIC value or a value not specified in Table 2-69 (also see Table 2-14). In order to prevent improper reporting of NIC to ADS-B applications during these NIC transitions, the reporting of NIC needs to consider the following cases:*
   a. *For reporting of NIC during Type Code changes between position messages of the same format (either airborne-to-airborne or surface-to-surface), the largest R_C for that Type Code (Type Code and NIC Supplement-B for Airborne Position Messages) should be reported in accordance with Table 2-69 (see also Table 2-14), until subsequent update of NIC Supplement bits occurs from receipt of an Operational Status Message.*
   b. *When aircraft transition from transmitting Airborne Position Messages to Surface Position Messages, a Surface Operational Status Message (Subtype=1) is required to be received to correctly determine NIC. In this case, until the reception of a Surface Operational Status Message, the reported NIC should correspond to the R_C of the last received airborne R_C if the Type Code of the received Surface Position Message can represent this, or the next larger R_C value defined for that Type Code. Otherwise, report the NIC corresponding to the largest R_C for that received Surface Position Type Code until an Operational Status Message is received.*

c. *When aircraft transition from transmitting Surface Position Messages to Airborne Position Messages, an Airborne Operational Status Message (Subtype=0) is required to be received to correctly determine NIC if Type Code=13, and the NIC Supplement-B is equal to ONE (1) (in order to distinguish between R_C < 0.3 NM and R_C < 0.6 NM). In this case, until the reception of a new Airborne Operational Status Message, if the last reported surface R_C was either R_C < 0.3 NM or R_C < 0.6 NM, then report the corresponding NIC value. Otherwise, report R_C < 0.6 NM.*

(**1.36**) In RTCA DO-260B and EUROCAE ED-102A, in section §2.2.13.6.1, the last sentence contains a reference to the paragraph previously holding the description of the Single Antenna Flag (SAF), which was moved in DO-260B/ED-102A, but the reference in the last sentence was not correctly updated. In order to clarify the usage of the SAF while an aircraft is on the surface, and to correct the bad paragraph reference, please add *Note #2* and modify the last sentence as follows:

Notes:

1. *For example, successive Airborne Position Messages would be transmitted on different antennas. Again, successive messages loaded into a transponder's event-driven register would be transmitted alternately from the top and bottom antennas.*
2. *On systems implementing transmitting diversity, the use of the top antenna only is the default condition for broadcasting the surface type messages. The selection of the antenna when transmitting surface type messages may be under the control of other systems (see EUROCAE ED-73E / RTCA DO-181E).*

~~If transmission diversity is used, the bit~~ The Single Antenna Flag is set as described in §~~2.2.3.2.3.3~~ 2.2.3.2.7.2.4.5 ~~shall be set valid~~.

(**1.37**) In RTCA DO-260B and EUROCAE ED-102A, in section §2.2.17.3.5.1, modify the initial paragraph as follows:

The format of the TIS-B Coarse Position Message is not specifically related to any other ADS-B format. The Surveillance Status and CPR Format (F) fields **shall** be decoded as specified for the ADS-B Airborne Position Message defined in §2.2.3.2.3. The formats for the other elements of the TIS-B Coarse Position Message are ~~is~~ specified in the following subparagraphs.

(**1.38**) In RTCA DO-260B and EUROCAE ED-102A, in section §2.3, in the third paragraph is the initial reference to RTCA DO-160F and EUROCAE ED-14F, *Environmental Conditions and Test Procedures for Airborne Equipment*. This document is updated approximately every two years by RTCA and EUROCAE, and all references to these Environmental documents should be considered to be the latest published version. Currently, for all references to DO-160F and ED-14F inside RTCA DO-260B and EUROCAE ED-102A, edit as follows:

Change DO-160F to DO-160G and **Change** ED-14F to ED-14G

(**1.39**) In RTCA DO-260B and EUROCAE ED-102A, in section §2.3.1, in Table 2-112 the references to specific tests that should be conducted only "when required" were not entered into this version of these MOPS as described in the second paragraph under §2.3. Therefore, edit Table 2-112 as follows:

Table 2-112: Environmental Test Groups

TEST#	ENVIRONMENTAL CONDITION	RTCA DO-160~~F~~G Paragraph	EUROCAE ED-14~~F~~G Paragraph	GROUPS	REMARKS
4a	Temperature	4.5	4.4 – 4.5	1	
4b	Altitude	4.6.1	4.6.1	3	
4c	Decompression & Overpressure	4.6.2 - 4.6.3	4.6.2 - 4.6.3	3	When required
5	Temperature Variation	5.0	5.0	3	
6	Humidity	6.0	6.0	2	
7a	Operational Shock	7.2	7.1	2	When required
7b	Crash Safety	7.3	7.2	5	NO TESTS
8	Vibration	8.0	8.0	3 & 1	3 during: 1 after
9	Explosion	9.0	9.0	5	~~NO TESTS~~ When required
10	Waterproofness	10.0	10.0	2	When required
11	Fluids Susceptibility	11.0	11.0	2	When required
12	Sand and Dust	12.0	12.0	2	When required
13	Fungus Resistance	13.0	13.0	2	When required
14	Salt Spray	14.0	14.0	2	When required
15	Magnetic Effect	15.0	15.0	5	NO TESTS
16	Power Input Momentary Interruptions All Others	16.0	16.0	4 3 & 2	3 during: 2 after
17	Voltage Spike	17.0	17.0	2	
18	Audio Frequency Conducted Susceptibility	18.0	18.0	1	
19	Induced Signal Susceptibility	19.0	19.0	1	
20	RF Susceptibility	20.0	20.0	1	
21	Emission of RF Energy	21.1	21.1	5	NO TESTS
22	Lightning Induced Transient Susceptibility	22.0	22.0	3	
23	Lightning Direct Effects	23.0	23.0	3	When required
24	Icing	24.0	24.0	2	When required
25	Electrostatic Discharge	25.0	25.0	2	~~NO TESTS~~ No Test during, 2 after
26	Fire / Flammability	26.0	26.0	2	When required, 2 after

(**1.40**) In RTCA DO-260B and EUROCAE ED-102A, section §2.3.2.3.1 contains the initial occurrence of a test condition in which DF=17 is specified along with CA=0. Since it is recognized that Extended Squitter-capable Transponders are defined as being required to have Level 2 or above capabilities, the value of CA=0 is not authorized for use in these Transponders. Therefore, it is not appropriate for CA=0 to be specified in a test case where DF=17. Since the actual value of CA used in each test is not significant, in all of the following test procedure sections, for clarification, please strike reference to the test condition for CA=0:

§2.3.2.3.1	§2.3.2.4.5	§2.4.4.2.2	§2.4.4.3.4.2
§2.3.2.3.2	§2.3.2.4.6.1	§2.4.4.3.1.1.1	§2.4.4.3.4.7.1
§2.3.2.4.1	§2.3.2.4.6.2	§2.4.4.3.1.1.2	§2.4.4.3.4.7.3
§2.3.2.4.2	§2.3.2.4.7	§2.4.4.3.1.2	§2.4.4.4.2.2
§2.3.2.4.3	§2.4.3.2.1.7	§2.4.4.3.2	§2.4.4.4.2.3
§2.3.2.4.4	§2.4.4.2.1.1	§2.4.4.3.3	§2.4.4.4.3.2

(**1.41**) In RTCA DO-260B and EUROCAE ED-102A, in section §2.3.2.4.3, in order to correct a value in Step 3 of the test procedure, make the following change:

Step 3: Re-Trigger Capability – Part 3

Repeat Step 1 with **Input** level at ~~-24~~ 32 dBm for the first ADS-B Message and -16 dBm for the second ADS-B Message.

(**1.42**) In RTCA DO-260B and EUROCAE ED-102A, in section §2.4.2.2.12, in order to correct a bad reference, make the following change:

Test procedures to validate the broadcast rate capability requirements for the ADS-B transmitted message are provided in §~~2.4.3.2.7.9~~ 2.4.3.3 through §2.4.3.3.2.12 of this document.

(**1.43**) In RTCA DO-260B and EUROCAE ED-102A, in section §2.4.3.2.1.2.1, Step 3 at the end of the 2nd paragraph, there is a reference to Table 2-19, which is hyperlinked. Unfortunately, when the hyperlink was initiated, it was pointed to Figure 2-19 instead of Table 2-19. This unfortunate error cannot be corrected until the document is re-published.

(**1.44**) In RTCA DO-260B and EUROCAE ED-102A, section §2.4.3.2.1.7 contains a test condition in which DF=17 is specified along with CA=0. Since it is recognized that Extended Squitter-capable Transponders are defined as being required to have Level 2 or above capabilities, the value of CA=0 is not authorized for use in these Transponders. Therefore, it is not appropriate for CA=0 to be specified in a test case where DF=17. In the "Measurement Procedure:" section, in order to clarify this, strike through sub-bullet "a" and change the reference for test set up in sub-bullet "h" to only reference sub-bullets "b" through "f" as follows:

~~a. For equipment that can transmit "DF" = 17 and "CA" = 0, use Set 1.~~
b. For equipment that can transmit "DF" = 17 and "CA" = 4, use Set 2.
c. For equipment that can transmit "DF" = 17 and "CA" = 5, use Set 3.
d. For equipment that can transmit "DF" = 17 and "CA" = 6, use Set 4.
e. For equipment that can transmit "DF" = 17 and "CA" = 7, use Set 5.

f. For equipment that can transmit “DF” = 18 with “CF” = 0, use Set 6. Note that this is the case where the equipment is non-Transponder device.
g. For equipment that can transmit “DF” = 19 with “AF” = 0, use Set 7. Note that this case is where the equipment is for Military Applications.
h. Where an equipment is capable of transmitting several of the cases described in paragraphs “~~a~~ b.” through “f.~~,~~” above, it should suffice that the equipment be testing to only one of the cases since the parity encoding should work the same for all.

(**1.45**) In RTCA DO-260B and EUROCAE ED-102A, in section §2.4.3.2.1.7, in order to correct several typographical errors, replace Table 2-136 with the following. The modified data are highlighted in yellow:

Column #		1	2	3	4	5	6
		Bit #	1 --- 5	6 –- 8	9 ---------- 32	33 ---------- 88	89 ------ 112
SET #	CASE #	Field Name	“DF”	“CA” (“CF”)	“AA” [HEX]	“ME” [HEX]	“PI” [HEX]
#1	1		1 0001	000	AA AA AA	ALL ZEROs	46E012
	2		1 0001	000	55 55 55	ALL ZEROs	5B7924
	3		1 0001	000	77 77 77	ALL ZEROs	7DC67B
	4		1 0001	000	BB BB BB	ALL ZEROs	AA45B9
	5		1 0001	000	DD DD DD	ALL ZEROs	C18458
	6		1 0001	000	EE EE EE	ALL ZEROs	0B9EAC
	7		1 0001	000	FE DC BA	ALL ZEROs	7790F4
	8		1 0001	000	AB CD EF	ALL ZEROs	7EE5D2
#2	1		1 0001	100	AA AA AA	ALL ZEROs	D8D1FB
	2		1 0001	100	55 55 55	ALL ZEROs	C548CD
	3		1 0001	100	77 77 77	ALL ZEROs	E3F792
	4		1 0001	100	BB BB BB	ALL ZEROs	347450
	5		1 0001	100	DD DD DD	ALL ZEROs	5FB5B1
	6		1 0001	100	EE EE EE	ALL ZEROs	95AF45
	7		1 0001	100	FE DC BA	ALL ZEROs	E9A11D
	8		1 0001	100	AB CD EF	ALL ZEROs	E0D43B
#3	1		1 0001	101	AA AA AA	ALL ZEROs	80A083
	2		1 0001	101	55 55 55	ALL ZEROs	9D39B5
	3		1 0001	101	77 77 77	ALL ZEROs	BB86EA
	4		1 0001	101	BB BB BB	ALL ZEROs	6C0528
	5		1 0001	101	DD DD DD	ALL ZEROs	07C4C9
	6		1 0001	101	EE EE EE	ALL ZEROs	CDDE3D
	7		1 0001	101	FE DC BA	ALL ZEROs	B1D065
	8		1 0001	101	AB CD EF	ALL ZEROs	B8A543
#4	1		1 0001	110	AA AA AA	ALL ZEROs	68330B
	2		1 0001	110	55 55 55	ALL ZEROs	75AA3D
	3		1 0001	110	77 77 77	ALL ZEROs	531562
	4		1 0001	110	BB BB BB	ALL ZEROs	8496A0
	5		1 0001	110	DD DD DD	ALL ZEROs	EF5741
	6		1 0001	110	EE EE EE	ALL ZEROs	254DB5
	7		1 0001	110	FE DC BA	ALL ZEROs	5943ED
	8		1 0001	110	AB CD EF	ALL ZEROs	5036CB
#5	1		1 0001	111	AA AA AA	ALL ZEROs	304273
	2		1 0001	111	55 55 55	ALL ZEROs	2DDB45
	3		1 0001	111	77 77 77	ALL ZEROs	0B641A
	4		1 0001	111	BB BB BB	ALL ZEROs	DCE7D8
	5		1 0001	111	DD DD DD	ALL ZEROs	B72639
	6		1 0001	111	EE EE EE	ALL ZEROs	7D3CCD
	7		1 0001	111	FE DC BA	ALL ZEROs	013295
	8		1 0001	111	AB CD EF	ALL ZEROs	0847B3
#6	1		1 0010	000	AA AA AA	ALL ZEROs	FDAC76
	2		1 0010	000	55 55 55	ALL ZEROs	E03540
	3		1 0010	000	77 77 77	ALL ZEROs	C68A1F
	4		1 0010	000	BB BB BB	ALL ZEROs	1109DD
	5		1 0010	000	DD DD DD	ALL ZEROs	7AC83C
	6		1 0010	000	EE EE EE	ALL ZEROs	B0D2C8
	7		1 0010	000	FE DC BA	ALL ZEROs	CCDC90
	8		1 0010	000	AB CD EF	ALL ZEROs	C5A9B6
#7	1		1 0011	000	AA AA AA	ALL ZEROs	3E3BAD
	2		1 0011	000	55 55 55	ALL ZEROs	23A29B
	3		1 0011	000	77 77 77	ALL ZEROs	051DC4
	4		1 0011	000	BB BB BB	ALL ZEROs	D29E06
	5		1 0011	000	DD DD DD	ALL ZEROs	B95FE7
	6		1 0011	000	EE EE EE	ALL ZEROs	734513
	7		1 0011	000	FE DC BA	ALL ZEROs	0F4B4B
	8		1 0011	000	AB CD EF	ALL ZEROs	063E6D

(**1.46**) In RTCA DO-260B and EUROCAE ED-102A, in section §2.4.3.2.3.4.1, inside Table 2-137, the value in "Case #3" originally stated as -12.5 feet was for the purpose of testing ½ LSB rounding. This is not generally testable with standard altitude inputs, which are normally in 1 foot resolution. Therefore the testable value should be corrected in Table 2-137 to "13 feet." Make the following correction in Table 2-137.

Table 2-137: Barometric Altitude Data Inputs

Case #	Altitude Input_A (100 foot increments)	Altitude Input_B (≤ 25 foot increments)
1	- 1000	- 1012
2	- 900	- 500
3	- 200	~~- 12.5~~ - 13
4	0	0
5	800	18025
6	2800	32050
7	6800	50175
8	14800	50200
9	30800	51600
10	62800	79800

(**1.47**) In RTCA DO-260B and EUROCAE ED-102A, in section §2.4.3.2.3.4.2, inside Table 2-138, the value in "Case #3" originally stated as -12.5 feet was for the purpose of testing ½ LSB rounding. This is not generally testable with standard altitude inputs, which are normally in 1 foot resolution. Therefore the testable value should be corrected in Table 2-138 to "13 feet." Make the following correction in Table 2-138.

Table 2-138: GNSS Height (HAE) Data Inputs

Case #	GNSS Height (HAE) (≤ 25 foot increments)
1	- 1012
2	- 500
3	~~- 12.5~~ - 13
4	0
5	18025
6	32050
7	50175
8	50200
9	51600
10	79800

(**1.48**) In RTCA DO-260B and EUROCAE ED-102A, in section §2.4.3.2.3.8.3.a, in order to correct a cut-and-paste error in the first step of the test procedure, make the following correction in Step 1, part "a" as follows:

a.	Initialize Time Reference at:	t_0		
	Set initial Computed Longitude to:	0.0625	degrees	**EAST**
	Set initial Computed ~~Longitude~~ Latitude to:	45.0	degrees	**NORTH**
	Set initial Computed E/W Velocity to:	1020	knots	**WEST**

(**1.49**) In RTCA DO-260B and EUROCAE ED-102A, in section §2.4.3.2.4.2, Step 2 there is a need to correct the test procedure parameters. Make the following minor corrections:

Step 2: "Movement" Verification – Part 2

Set up the ADS-B Transmitting Subsystem as above and set the "Movement" input to represent a "Movement" of greater than ~~or equal to~~ Zero knots, but less than or equal to 0.125 knots. Verify that the "Movement" subfield is set to TWO (binary 000 0010). Increase the "Movement" input to a value greater than ~~0.126~~ 0.125 knots and less than 0.270 knots, and verify that the "Movement" subfield is set to THREE (binary 000 0011).

(**1.50**) In RTCA DO-260B and EUROCAE ED-102A, in section §2.4.3.2.4.2, Step 3 there is a need to correct the test procedure parameters. Make the following minor corrections:

Step 3: "Movement" Verification – Part 3

Continue to increase the "Movement" input in increments equal to those identified in Table 2-16 for values greater than ~~or equal to~~ ONE knot and less than 175 knots. Verify that for each such increment, the encoding of the "Movement" subfield is equal to that specified in Table 2-16. Increase the Ground Speed input data to exactly 175 knots and verify that the "Movement" subfield is set to ~~124~~ 123. Continue increasing the Ground Speed data input for values greater than 175 knots and verify that the "Movement" subfield continues to be set at 124.

(**1.51**) In RTCA DO-260B and EUROCAE ED-102A, in section §2.4.3.2.4.2, Step 4, in the 2nd paragraph there is a need to correct the test procedure parameters. Make the following minor correction:

Input new ADS-B Surface Position data with the position data changing at a rate of 9.9 meters in any 30 second interval. At least ~~61~~ 36 seconds after the input of the new data, verify that the "Movement" subfield is set to decimal ONE (1) "Aircraft Stopped."

Note: *The 36 seconds is derived from the initial 30 second interval plus the 5 second broadcast rate, plus one second.*

(**1.52**) In RTCA DO-260B and EUROCAE ED-102A, in section §2.4.3.2.5.3, in order to be consistent with changes that were made in RTCA DO-181E and EUROCAE ED-73E and ICAO Doc 9871, Edition 2 to clarify the zeroing and termination of Registers 08_{16} and 20_{16}, revise Step 4 of this test procedure as shown below:

Step 4 No Aircraft Identification or Aircraft Registration Data

~~Discontinue the input of Aircraft Identification or Aircraft Registration Marking Data.~~ Reinitialize the ADS-B Transmitting Subsystem and ensure that Aircraft Identification or Flight Number Data, and Aircraft Registration Data is not available to the ADS-B Transmitting Subsystem. Verify that each of the characters in the ADS-B Aircraft Identification and Category Message is transmitted properly with all bits of each character set to a binary ZERO (0). The encoding for each character should be ALL ZEROs (binary 000000).

~~***Note:*** *The message will continue to be transmitted as long as Category data continues to be updated.*~~

(**1.53**) In RTCA DO-260B and EUROCAE ED-102A, in section §2.4.3.2.6.1.9, the specification of the location of the Message and "ME" bits inside the Airborne Velocity Message as specified in the "Purpose/Introduction:" section are incorrect. Please make the following corrections:

Purpose/Introduction:

The "North/South Velocity" subfield is contained in Message bits ~~55~~ 58 – ~~65~~ 67 ("ME" bits ~~23~~ 26 – ~~33~~ 35) of Airborne Velocity Messages - Subtypes "1" and "2." This test procedure verifies that the "North/South Velocity" subfield in Airborne Velocity Messages is correctly set.

(**1.54**) In RTCA DO-260B and EUROCAE ED-102A, in section §2.4.3.2.7.1.3.3, inside Table 2-151 there is an error in the specification of a Data Value for existing Item #3. There are also problems with the numbering in the "Item #" column in both Table 2-151 and 2-152. Therefore, replace: (a) Table 2-151, (b) Step 2 of the Test Procedure, and (c) Table 2-152 with the following:

Table 2-151: MCP/FCU Selected Altitude in Target State and Status Messages (ARINC Label '102')

Item #	Generic MCP / FCU Selected Altitude Input (BNR)			Target State and Status Encoding of MCP / FCU Selected Altitude		
	Type of Value	Status	Data Value (feet)	TYPE (bit 9)	Decimal Value (feet)	Binary Value (bit 10 ----- 20)
1	Basic	Valid	43648.00	0	43648.00	101 0101 0101
2	Basic	Valid	21792.00	0	21792.00	010 1010 1010
3	Basic	Valid	28352.00	0	238352.00	011 0111 0111
~~5~~ 4	Basic	Valid	65472.00	0	65472.00	111 1111 1111
~~6~~ 5	Basic	Rounded (1/4 LSB)	52392.00	0	52384.00	110 0110 0110
~~7~~ 6	Basic	Rounded (1/2 LSB)	52400.00	0	52416.00	110 0110 0111
~~8~~ 7	Invalid	Invalid	21792.00	0	0.00	000 0000 0000

Step 2: Setup of FMS Selected Altitude Data

For each line Item # in Table 2-152, via the appropriate interface, provide the ADS-B Transmitting Subsystem with FMS Selected Altitude having a value as indicated in the "Data Value" (feet) Column in Table 2-152. Provide at least one data value from Table 2-152 while provided the data for Line Item #1 through ~~7~~ 6 in Table 2-151. Do not provide any data from Table 2-152 when providing data for Line Item #~~8~~ 7 in Table 2-151.

Table 2-152: FMS Selected Altitude in Target State and Status Messages (ARINC Label '102')

Item #	Generic FMS Selected Altitude Input (BNR)			Target State and Status Encoding of FMS Selected Altitude		
	Type of Value	Status	Data Value (feet)	TYPE (bit 9)	Decimal Value (feet)	Binary Value (bit 10 ------ 20)
1	Basic	Valid	37088.00	1	37088.00	100 1000 1000
2	Basic	Valid	13600.00	1	13600.00	001 1010 1010
3	Basic	Valid	22880.00	1	22880.00	010 1100 1100
~~5~~ 4	Basic	Valid	60032.00	1	60032.00	111 0101 0101
~~6~~ 5	Basic	Rounded (1/4 LSB)	25640.00	1	25632.00	011 0010 0010
~~7~~ 6	Basic	Rounded (1/2 LSB)	25648.00	1	25664.00	011 0010 0011
~~8~~ 7	Invalid	Invalid	13600.00	1	0.00	000 0000 0000

(**1.55**) In RTCA DO-260B and EUROCAE ED-102A, in section §2.4.3.2.7.1.3.4, inside Table 2-153 there is an error with the numbering in the "Item #" column, and several errors in the Binary Value column. Replace Table 2-153 with the following:

Table 2-153: Barometric Pressure Setting in Target State and Status Messages (ARINC Label '234')

Item #	Barometric Pressure Setting Data Input			Target State and Status Encoding of Barometric Pressure Setting	
	Type of Value	Status	Data Value (millibars)	Decimal Value (millibars) (minus 800)	Binary Value (bits 21 --- 29)
1	Basic	Valid	942.7	142.4	0 1011 ~~0001~~ 0011
2	Basic	Valid	923.2	123.2	~~1 0101~~ ~~0101~~ 0 1001 1011
3	Basic	Valid	1208.0	408.0	1 1111 1111
~~5~~ 4	Basic	Valid	927.2	127.2	0 1010 ~~1010~~ 0000
~~6~~ 5	Basic	Rounded (1/4 LSB)	1099.4	299.2	1 0111 0111
~~7~~ 6	Basic	Rounded (1/2 LSB)	1099.6	300.0	1 0111 1000
~~8~~ 7	Invalid	Valid	1208.5	0.000	0 0000 0000
~~9~~ 8	Invalid	Valid	799.6	0.000	0 0000 0000
~~10~~ 9	Invalid	Invalid	927.2	0.000	0 0000 0000

(**1.56**) In RTCA DO-260B and EUROCAE ED-102A, in section §2.4.3.2.7.1.3.9, Step 2, 1st paragraph, there is an incorrect reference to a bit location for the "ALTITUDE TYPE. Make the following minor correction:

Step 2: Verification of NIC_{BARO} Transmission

Provide the ADS-B Transmitting Subsystem with valid Barometric Pressure Altitude data via the appropriate input interface. Operationally select Barometric Pressure Altitude as the Primary Altitude information and verify that the "ALTITUDE TYPE" field in "ME" bit ~~10~~ 9 is set to ZERO (0).

(**1.57**) In RTCA DO-260B and EUROCAE ED-102A, in section §2.4.3.2.7.2.4.5, for test procedure Steps 1 and 2, an unfortunate cut-and-past error has left references to the Airborne Position Message, where the Single Antenna Flag (SAF) existed in DO-260/ED-102 and in RTCA DO-260A. With the development of DO-260B/ED-102A, the SAF was moved to the Aircraft Operational Status Message. Therefore, Steps 1 and 2 should be edited as follows:

Step 1: Non-Diversity Configuration

For ADS-B Transmitting Subsystems that operate with a single antenna, configure the system to broadcast ~~Airborne Position~~ Aircraft Operational Status Messages. Verify that the Single Antenna subfield ("ME" bit 30) is set to "ONE" (1) at all times in the ~~Airborne Position~~ Aircraft Operational Status Message.

Step 2: Diversity Configuration

For ADS-B Transmitting Subsystems that operate in the diversity mode, configure the system to broadcast ~~Airborne Position~~ Aircraft Operational Status Messages. Verify that the Single Antenna subfield ("ME" bit 30) is set to "ZERO" (0) at all times in the ~~Airborne Position~~ Aircraft Operational Status Message.

Disable one antenna channel by whatever means that the ADS-B Transmitting Subsystem utilizes to detect a non-functioning antenna channel. Verify that the Single Antenna subfield ("ME" bit 30) is set to "ONE" (1) in the ~~Airborne Position~~ Aircraft Operational Status Message. Repeat, except disable the alternate channel and verify that the Single Antenna subfield is set to ONE (1) in the ~~Airborne Position~~ Aircraft Operational Status Message.

(**1.58**) In RTCA DO-260B and EUROCAE ED-102A, in section §2.4.3.2.7.2.4.8, in order to correct a cut-and-paste error, make the following correction to the text in the Purpose/Introduction paragraph:

"Reserved" bits, ("ME" bits 33 – 40, Message bits 65 – 72) in the OM Code Subfield of ~~surface~~ airborne format Aircraft Operational Status Messages are reserved for future assignment. Until such future assignment, these bits will be set to "ZERO" (0).

(**1.59**) In RTCA DO-260B and EUROCAE ED-102A, in section §2.4.3.2.7.2.8, in order to clarify the usage of the Geometric Vertical Accuracy (GVA) metric with respect to the Baro-Geo Difference data field in the Airborne Velocity Message, make a change as follows in the existing paragraph of the "Purpose/Introduction" section:

The "Geometric Vertical Accuracy (GVA)" subfield of Subtype=0 Aircraft Operational Status Message is a 2-bit field ("ME" bits 49-50, Message bits 81-82) defined in Table 2-71. The GVA field shall be set by using the Vertical Figure of Merit (VFOM) (95%) from the GNSS position source used to ~~encode the geometric altitude field in the Airborne Position Message~~ report the geometric altitude.

(**1.60**) In RTCA DO-260B and EUROCAE ED-102A, in section §2.4.3.2.7.2.10, Step 1 in the 2nd paragraph, there is an incorrect reference to a bit location for the "ALTITUDE TYPE. Make the following minor correction:

Operationally select Barometric Pressure Altitude as the Primary Altitude information and verify that the "ALTITUDE TYPE" field in "ME" bit ~~10~~ 9 of the Target State and Status Message is set to ZERO (0).

(**1.61**) In RTCA DO-260B and EUROCAE ED-102A, in section §2.4.3.3.1.4.1, in order to clarify the target state information that is required to be "available and valid" in order to start transmission of the Target State and Status (Subtype=1) Message, and to be consistent with the clarification made in §2.2.3.3.1.4.1.a, insert the following *Note* after the "Purpose/Introduction" paragraph:

Note: *Target state information includes both Selected Altitude and Selected Heading data. Because only one of these may actually be available in any given installation, then in order to initiate broadcast of the Target State and Status (Subtype=1) Message, either the Selected Altitude or the Selected Heading data must be available and valid as a minimum. Future versions of these MOPS may include the Barometric Pressure Setting (BPS) as a required parameter in order to initiate the Target State and Status Message.*

(**1.62**) In RTCA DO-260B and EUROCAE ED-102A, in section §2.4.3.3.1.4.2 to correctly test that the high broadcast rate that occurs when an aircraft is on the surface and moving with a change in NIC_{SUPP}/NAC/SIL data, replace the second paragraph of test procedure Step 6 with:

Verify that the ADS-B Transmitting Subsystem is broadcasting ADS-B Surface Aircraft Operational Status Messages at a spacing uniformly distributed over the range of 0.7 to 0.9 seconds for a period of 24 ±1 seconds.

(**1.63**) In RTCA DO-260B and EUROCAE ED-102A, in section §2.4.3.3.1.4.3.1, Step 2, subsection "a.(1)," at the end of the test procedure paragraph, there needs to be an additional test to ensure that the broadcast continues at the specified rate for at least 30 seconds. Please make the following corrections:

Step 2: Emergency/Priority Message Rate started with Mode A Code Off and Emergency (§2.2.3.3.1.4.3.1.1.a and b)

a. Via the appropriate data input interface, provide the ADS-B Transmitting Subsystem with Mode A (4096) Code of "7500".

After setting the Mode A (4096) Code to "7500":

(1). Verify that the ADS-B Transmitting Subsystem randomly transmits Emergency/Priority Status (TYPE=28, Subtype=1) messages at intervals that are uniformly distributed over the range of 0.7 to 0.9 seconds, and that it continues at that rate for at least 30 seconds.

(**1.64**) In RTCA DO-260B and EUROCAE ED-102A, in section §2.4.3.3.1.4.3.1, Step 3, subsection "b.(3)," the binary value for the Mode A Code input as "0330" is incorrect and should be replaced with the following:

(3). Verify that the broadcast messages contain a Mode A Code Subfield ("ME" bits 12 – 24, Message bits 44 – 56) that is set to "~~1010100101010~~ 1010000101000" binary.

(**1.65**) In RTCA DO-260B and EUROCAE ED-102A, in section §2.4.3.3.1.4.3.1, Step 4, subsection "a.(1)," at the end of the test procedure paragraph, there needs to be an additional test to ensure that the broadcast continues at the specified rate for at least 30 seconds. Please make the following corrections:

Step 4: Emergency/Priority Message Rate with Mode A Code ON and Emergency (§2.2.3.3.1.4.3.1.2.a .(1))

a. Via the appropriate data input interface, provide the ADS-B Transmitting Subsystem with Mode A (4096) Code of "7500".

After setting the Mode A (4096) Code to "7500":

(1). Verify that the ADS-B Transmitting Subsystem randomly transmits Emergency/Priority Status (TYPE=28, Subtype=1) messages at intervals that are uniformly distributed over the range of 0.7 to 0.9 seconds, and that it continues at that rate for at least 30 seconds.

(**1.66**) In RTCA DO-260B and EUROCAE ED-102A, in section §2.4.3.3.1.4.3.1, Step 5, subsection "b.(2)" in order to correct a cut-and-paste error, revise the setting of the Emergency/Priority Status Subfield to ZERO (0), as follows:

(2). Verify that the broadcast messages contain an Emergency/Priority Status Subfield ("ME" bits 9 – 11, Message bits 41 – 43) that is set to ~~"101" binary ("5" decimal)~~ "000" binary ("0" decimal).

(**1.67**) In RTCA DO-260B and EUROCAE ED-102A, in section §2.4.4.3.1.2, in order to correct a value in Step 3 of the test procedure, make the following change:

Step 3: Re-Trigger Capability – Part 3

Repeat Step 1 with **Input** level at -~~24~~ -32 dBm for the first ADS-B Message and -16 dBm for the second ADS-B Message.

(**1.68**) In RTCA DO-260B and EUROCAE ED-102A, in section §2.4.4.4.2.2 inside Table 2-163, in order to correct a typographical error on the input value for the delta pulse width of "-3.5" for pulse #2, make the following correction by inserting a value of "+3.5":

Table 2-163: Input C: Preamble Pulse Characteristics

Input C: Preamble Pulse Characteristics					
Pulse	**Rise time** (µsec)	**Fall time** (µsec)	**Δ Width** (µsec)	**Δ Position** (µsec)	**Δ Amplitude** (dB)
1	0.05 - 0.1	0.05 - 0.2	-0.3	—	—
2	0.05 - 0.1	0.05 - 0.2	~~-3.5~~ +3.5	0	0
3	Pulse Not Present				
4	Pulse Not Present				

(**1.69**) In RTCA DO-260B and EUROCAE ED-102A, in section §2.4.5.2.2, in the text of Step 3 of the test procedure it has been discovered that there are several places in DO-260B/ED-102A that reference the "Ground Track" or "Heading" field in the Surface Position Message without referencing both data items. In this specific test procedure Step, in order to correctly reference the data items, make the following edits:

Step 3: Surface Position Message – "Heading/Ground Track" Subfield (§2.2.3.2.4.3, §2.2.3.2.4.4 and §2.2.5.2.2.c)

Purpose/Introduction:

Any change in Heading/Ground Track identified in §2.2.3.2.4.3 and §2.2.3.2.4.4 **shall** be reflected in the appropriate Heading/Ground Track subfields of the next scheduled Surface Position Message transmission provided that the change occurs at least 100 milliseconds prior to the next scheduled Surface Position Message transmission.

Measurement Procedure:

Configure the ADS-B Transmitting Subsystem to transmit Surface Position Messages by providing position information at the nominal update rate. Provide the data externally at the interface to the ADS-B system. Set the ADS-B Transmitting Subsystem to Surface status. Continue transmitting Surface Position Messages at the nominal rate with all parameters unchanged. Verify that the Heading/Ground Track subfields in the Surface Position Message correctly matches the Heading/Ground Track subfield values from the Table 2-17 and Table 2-18 (§2.2.3.2.4.3 and §2.2.3.2.4.4).

Change input to the ADS-B System so as to affect the Heading/Ground Track subfield values so that the change occurs at least 100 milliseconds prior to the next scheduled Surface Position Message transmission. Verify that the Heading/Ground Track subfield values have changed in the next transmitted Surface Position Message and that they contain the correct values.

(**1.70**) In RTCA DO-260B and EUROCAE ED-102A, in section §2.4.8.1.4.1, in the text of Step 4, first paragraph of the test procedure it has been discovered that there are several places in DO-260B/ED-102A that reference the "Ground Track" or "Heading" field in the Surface Position Message without referencing both data items. In this specific test procedure Step, in order to correctly reference the data items, make the following edits:

Step 4: Verification of (TOA) for Estimated Velocity (resulting from received Surface Position Messages) Reporting

Repeat step 3 and verify that the Report Assembly Function outputs a State Vector Report with the Report Mode set to TWO (binary xxxx 0010). Generate a series of "even" and "odd" Surface Position Messages having a stable TYPE code, which include encoded data ("ME" bits 6 – 12) for a Ground Speed (Movement) of 2 knots (forces "High" rate of two Surface Position Messages per second), and a Heading/Ground Track Status ("ME" Bit 13) of "ONE," and encoded data ("ME" bits 14 – 20) for any convenient Heading/Ground Track ~~heading.~~

(**1.71**) In RTCA DO-260B and EUROCAE ED-102A, in section §2.4.8.1.4.3, in the text of the second paragraph of the test procedure Purpose/Introduction, it has been discovered that there are several places in DO-260B/ED-102A that reference the "Ground Track" or "Heading" field in the Surface Position Message without referencing both data items. In this specific paragraph, in order to correctly reference the data items, make the following edit:

These test procedures also verify that each time a Surface Position Message is received with valid Movement AND Heading/Ground Track data, the Report Assembly Function updates the Velocity Time of Applicability data in the State Vector Report with either the GPS/GNSS UTC Measure Time data (see §2.2.8.5.1) or the Established Receiver Unit Time (see §2.2.8.5.2), whichever is applicable to the Receiving device Report Assembly Function installation requirements.

(**1.72**) In RTCA DO-260B and EUROCAE ED-102A, in section §2.4.8.1.4.3, in the text of Step 2, first and second paragraphs of the test procedure it has been discovered that there are several places in DO-260B/ED-102A that reference the "Ground Track" or "Heading" field in the Surface Position Message without referencing both data items. In this specific test procedure Step, in order to correctly reference the data items, make the following edits:

Repeat Step 2 of §2.2.8.1.4.2 and verify that the Report Assembly Function outputs a State Vector Report with the Report Mode set to TWO (binary xxxx 0010). Generate a series of "even" and "odd" Surface Position Messages having a stable TYPE code, which include encoded data ("ME" bits 6 - 12) for a Ground Speed (Movement) of 2 knots (forces "High" rate of two Surface Position Messages per second), which include a Heading/Ground Track Status ("ME" bit 13) of "ONE," and which include encoded data ("ME" bits 14 - 20) for any convenient Heading/Ground Track ~~heading~~.

Verify that the corresponding Velocity Time of Applicability presence bit (Report Byte #2, Bit 0), Ground Speed validity flag (Report Byte #4, Bit 0), and Heading/Ground Track validity flag (Report Byte #5, Bit 7), are set to "ONEs." Verify that the Velocity Time of Applicability presence bit, bit 1 of byte 2, is set to ONE (1).

(**1.73**) In RTCA DO-260B and EUROCAE ED-102A, in section §2.4.8.1.19, in the text of Step 2, first paragraph of the test procedure it has been discovered that there are several places in DO-260B/ED-102A that reference the "Ground Track" or "Heading" field in the Surface Position Message without referencing both data items. In this specific test procedure Step, in order to correctly reference the data items, make the following edits:

Generate a series of Surface Position Messages (Subtype 1 or 2), which include encoded data ("ME" Bits 6 - 12) for valid Ground Speed (Movement) values, which include a Heading/Ground Track Status ("ME" Bit 13) of "ONE," and which include encoded data ("ME" Bits 14 - 20) for valid Heading/Ground Track ~~headings~~ having a significant North/South component, and verify that the ADS-B Receiver/Report Assembly outputs a State Vector Report of Type 0001.

(**1.74**) In RTCA DO-260B and EUROCAE ED-102A, in section §2.4.8.1.19, in the text of Step 4, first paragraph, fourth line of the test procedure it has been discovered that there are several places in DO-260B/ED-102A that reference the "Ground Track" or "Heading" field in the Surface Position Message without referencing both data items. In this specific test procedure Step, in order to correctly reference the data items, make the following edit:

Generate any valid Surface Position Message, which includes the encoded data ("ME" Bits 6 - 12) for a suitable Decimal Ground Speed (Movement) value, which includes the encoded data ("ME" Bits 14 - 20) for a suitable Decimal Heading/Ground Track value, representing a North/South movement ……

(**1.75**) In RTCA DO-260B and EUROCAE ED-102A, in section §2.4.8.1.19, in the text of Step 4, second paragraph, third line of the test procedure it has been discovered that there are several places in DO-260B/ED-102A that reference the "Ground Track" or "Heading" field in the Surface Position Message without referencing both data items. In this specific test procedure Step, in order to correctly reference the data items, make the following edit:

Three seconds after the first Surface Position Message, generate another valid Surface Position Message, which includes the same encoded data for Decimal Ground Speed (Movement), the same encoded data for Decimal Heading/Ground Track, and updated ……..

(**1.76**) In RTCA DO-260B and EUROCAE ED-102A, in section §2.4.8.1.20, in the text of Step 2, first paragraph of the test procedure it has been discovered that there are several places in DO-260B/ED-102A that reference the "Ground Track" or "Heading" field in the Surface Position Message without referencing both data items. In this specific test procedure Step, in order to correctly reference the data items, make the following edits:

Generate a series of Surface Position Messages (Subtype 1 or 2), which include encoded data ("ME" Bits 6 - 12) for valid Ground Speed (Movement) values, which include a Heading/Ground Track Status ("ME" Bit 13) of "ONE," and which include encoded data ("ME" Bits 14 - 20) for valid Heading/Ground Track ~~headings~~ having a significant East/West component, and verify that the ADS-B Receiver/Report Assembly outputs a State Vector Report of Type 0001.

(**1.77**) In RTCA DO-260B and EUROCAE ED-102A, in section §2.4.8.1.20, in the text of Step 4, first paragraph, third line of the test procedure it has been discovered that there are several places in DO-260B/ED-102A that reference the "Ground Track" or "Heading" field in the Surface Position Message without referencing both data items. In this specific test procedure Step, in order to correctly reference the data items, make the following edits:

Generate any valid Surface Position Message, which includes the encoded data ("ME" Bits 6 - 12) for a suitable Decimal Ground Speed (Movement) value, and the encoded data ("ME" Bits 14 - 20) for a suitable Decimal Heading/Ground Track value ……..

(**1.78**) In RTCA DO-260B and EUROCAE ED-102A, in section §2.4.8.1.20, in the text of Step 4, second paragraph, third line of the test procedure it has been discovered that there are several places in DO-260B/ED-102A that reference the "Ground Track" or "Heading" field in the Surface Position Message without referencing both data items. In this specific test procedure Step, in order to correctly reference the data items, make the following edits:

Three seconds after the first Surface Position Message, generate another valid Surface Position Message, which includes the same encoded data for Decimal Ground Speed (Movement), the same encoded data for Decimal Heading/Ground Track, and updated ……

(**1.79**) In RTCA DO-260B and EUROCAE ED-102A, in section §2.4.8.2.17, in the text of Step 5, first paragraph of the test procedure it has been discovered that there are several places in DO-260B/ED-102A that reference the "Ground Track" or "Heading" field in the Surface Position Message without referencing both data items. In this specific test procedure Step, in order to correctly reference the data items, make the following edit:

Provide valid Version One (1) ADS-B Aircraft Operational Status Messages (Subtype=1) with "Track Angle/Heading Bit" set to ZERO (0) and Surface Position Messages with "Heading/Ground Track Status Bit" set to ZERO (0) to the ADS-B Receiving Subsystem. Verify that bits 0 and 1 of byte 32 of the True/Magnetic Heading field in the output Mode Status Report are set to ZERO (binary 00).

(**1.80**) In RTCA DO-260B and EUROCAE ED-102A, in section §2.4.8.2.17, in the text of Step 6, first paragraph of the test procedure it has been discovered that there are several places in DO-260B/ED-102A that reference the "Ground Track" or "Heading" field in the Surface Position Message without referencing both data items. In this specific test procedure Step, in order to correctly reference the data items, make the following edit:

Provide valid Version One (1) ADS-B Aircraft Operational Status Messages (Subtype=1) with "Track Angle/Heading Bit" set to ZERO (0) and Surface Position Messages with "Heading/Ground Track Status Bit" set to ONE (1) to the ADS-B Receiving Subsystem. Verify that bits 0 and 1 of byte 32 of the True/Magnetic Heading field in the output Mode Status Report are set to ONE (binary 01).

(**1.81**) In RTCA DO-260B and EUROCAE ED-102A, in section §2.4.8.2.17, in the text of Step 9, first paragraph of the test procedure it has been discovered that there are several places in DO-260B/ED-102A that reference the "Ground Track" or "Heading" field in the Surface Position Message without referencing both data items. In this specific test procedure Step, in order to correctly reference the data items, make the following edit:

Provide valid Version Two (2) ADS-B Aircraft Operational Status Messages (Subtype=1) with "Track Angle/Heading Bit" set to ZERO (0) and Surface Position Messages with "Heading/Ground Track Status Bit" set to ZERO (0) to the ADS-B Receiving Subsystem. Verify that bits 0 and 1 of byte 32 of the True/Magnetic Heading field in the output Mode Status Report are set to ZERO (binary 00).

(**1.82**) In RTCA DO-260B and EUROCAE ED-102A, in section §2.4.8.2.17, in the text of Step 10, first paragraph of the test procedure it has been discovered that there are several places in DO-260B/ED-102A that reference the "Ground Track" or "Heading" field in the Surface Position Message without referencing both data items. In this specific test procedure Step, in order to correctly reference the data items, make the following edit:

Provide valid Version Two (2) ADS-B Aircraft Operational Status Messages (Subtype=1) with "Track Angle/Heading Bit" set to ZERO (0) and Surface Position Messages with "Heading/Ground Track Status Bit" set to ONE (1) to the ADS-B Receiving Subsystem. Verify that bits 0 and 1 of byte 32 of the True/Magnetic Heading field in the output Mode Status Report are set to ONE (binary 01).

(**1.83**) In RTCA DO-260B and EUROCAE ED-102A, in section §2.4.11.2.1, in order to clarify that requirements are not established in the test procedures, and to also correct actual typographical errors in Table 2-218, please make the following corrections in the first sentence of the second paragraph, and in Table 2-218:

~~In order to not induce unnecessary intermittent Fail/Warn declarations, the squitter monitor shall implement appropriate "debounce" and recovery techniques provided for in Table 2-218.~~ In the squitter monitor, it is necessary to implement appropriate "debounce" and recovery techniques, such as those provided for in Table 2-218, in order to not induce unnecessary intermittent Fail/Warn declarations. In these regards, "debounce" refers to the number of successive maximum transmit intervals that a particular squitter message can be missed (e.g., not transmitted) plus an additional time of 100 milliseconds to process and activate the Fail/Warn mechanism. Likewise, "recovery" refers to the number of successive maximum transmit intervals within which a particular squitter message must be transmitted plus 100 milliseconds to process and de-activate the Fail/Warn mechanism.

Table 2-218: Extended Squitter Monitor Time Allocation

1090ES Message Type	Transmit Interval (seconds)	Maximum Time to Declare Fail/Warn (seconds)	Number of Intervals to Declare Fail/Warn	Maximum Time to Clear Fail/Warn (seconds)	Number of Intervals to Clear Fail/Warn
Airborne Position	0.4 to 0.6	~~1.9~~ 1.3	2	1.9	3
Airborne Velocity	0.4 to 0.6	~~1.9~~ 1.3	2	1.9	3
Aircraft Identification and Category	4.8 to 5.2	15.7	3	5.3	1
Aircraft Identification and Category	9.8 to 10.2	30.7	3	10.3	1
Surface Position	0.4 to 0.6	~~1.9~~ 1.3	2	1.9	3
Surface Position	4.8 to 5.2	15.7	3	5.3	1
Target State and Status	1.2 to 1.3	5.3	4	4.0	3
Aircraft Operational Status	0.7 to 0.9	1.9	2	1.9	2
Aircraft Operational Status	2.4 to 2.6	5.3	2	2.7	1
Aircraft Operational Status	4.8 to 5.2	10.5	2	5.3	1
Extended Squitter Aircraft Status	0.7 to 0.9	1.9	2	1.9	2
Extended Squitter Aircraft Status	4.8 to 5.2	10.5	2	5.3	1

(**1.84**) In RTCA DO-260B and EUROCAE ED-102A, in section §A.1.4.1, inside Table A-2, the value for R_C less than 0.5 NM is expressed incorrectly. Make the following change:

The phrase "R_C < 0.5 NM (925 m)" **should be** "R_C < 0.5 NM (926 m)"

(**1.85**) In RTCA DO-260B and EUROCAE ED-102A, in Appendix A, section §A.1.4.1.1.1, in order to account for the fact that some regulators have already made clarifying statements on HPL limiting, please add the following as *Note* #2, just after the existing *Note* under the section heading:

Notes:

1. *If the position information comes from a GNSS receiver that conforms to the ARINC 743A characteristic, a suitable source of information for the radius of containment (R_C), is ARINC 429 label 130 from that GNSS receiver.*
2. *Although these requirements do not require HPL limiting, it is expected that some regulators will only accept installations that limit HPL. This may be standardized accordingly in future versions of these MOPS.*

(**1.86**) In RTCA DO-260B and EUROCAE ED-102A, in Appendix A, section §A.1.4.1.2.1, in order to account for the fact that some regulators have already made clarifying statements on HPL limiting, please add the following as *Note* #2, just after the existing *Note*:

Notes:

1. *If the position information comes from a GNSS receiver that conforms to the ARINC 743A characteristic, a suitable source of information for the radius of containment (R_C), is ARINC 429 label 130 from that GNSS receiver.*
2. *Although these requirements do not require HPL limiting, it is expected that some regulators will only accept installations that limit HPL. This may be standardized accordingly in future versions of these MOPS.*

(**1.87**) In RTCA DO-260B and EUROCAE ED-102A, in Appendix A, section §A.1.4.3.2.1, in order to account for the fact that some regulators have already made restrictions on the usage of the Ground Speed when it is below 7 knots, please add the following additional clarification inside the parenthetical at the end of the *Note*:

Note: *If a source of A/V Heading is not available to the ADS-B Transmitting Subsystem, but a source of Ground Track angle is available, then Ground Track angle may be used instead of Heading, provided that the "Status Bit for Heading/Ground Track" subfield is set to ZERO whenever the Ground Track angle is not a reliable indication of the A/V's heading. (The Ground Track angle is not a reliable indication of the A/V's heading when the A/V's ground speed is close to ZERO. Some regulators have already established such limits. These limits may be standardized accordingly in future versions of these MOPS.)*

(**1.88**) In RTCA DO-260B and EUROCAE ED-102A, in Appendix A, section §A.1.4.5.4, in the third paragraph, make the following deletion of the reference to "vertical velocity" to account for the change that was made during the creation of DO-260B/ED-102A when references to vertical velocity were removed from NAC_V, NIC and SIL definitions and the Geometric Vertical Accuracy (GVA) parameter was created.

If the external data source provides 95% accuracy figures of merit for horizontal ~~and vertical~~ velocity, then the ADS-B Transmitting Subsystem will determine the value of the NAC_V field in the Airborne Velocity Messages, Subtypes 1, 2, 3 and 4 according to Table A-5.

(**1.89**) In RTCA DO-260B and EUROCAE ED-102A, in Appendix A, section §A.1.4.5.6, in order to account for the fact that some regulators have already made clarifying statements on the usage of MSL, please replace the existing *Note* with the following:

Note: *Although the above requirements allows this subfield to be based on MSL in certain cases, it is expected that some regulators will only accept installations that report based on WGS-84 HAE. HAE will be required for some State mandates and the manufacturer must ensure that when converting from HAG (e.g., MSL) to HAE, the same model used by the position source is used. This may be standardized accordingly in future versions of these MOPS. ~~The difference between Baro Altitude and GNSS height above ellipsoid (HAE) is preferred. However, GNSS altitude (MSL) may be used when Airborne Position is being reported using Format TYPE Codes 11 through 18.~~*

(**1.90**) In RTCA DO-260B and EUROCAE ED-102A, in Appendix A, section §A.1.4.7, first paragraph:

Replace "Registers 61_{16} to $6F_{16}$" **with** "Register 61_{16}"

(**1.91**) In RTCA DO-260B and EUROCAE ED-102A, in Appendix A, section §A.1.4.7.3.1, second paragraph:

Change "§A.1.4.8.1.1" **to** "§A.1.4.7.3.1.1"
Change "§A.1.4.8.1.2" **to** "§A.1.4.7.3.1.2"

(**1.92**) In RTCA DO-260B and EUROCAE ED-102A, in Appendix A, section §A.1.4.7.3.1.1, first paragraph:

Change "§A.1.4.8.1" **to** "§A.1.4.7.3.1"

(**1.93**) In RTCA DO-260B and EUROCAE ED-102A, in Appendix A, section §A.1.4.7.3.1.2, first paragraph:

Change "§A.1.4.8.1" **to** "§A.1.4.7.3.1"

(**1.94**) In RTCA DO-260B and EUROCAE ED-102A, in Appendix A, section §A.1.4.9.8, in order to clarify the dependency of the Selected Heading on a reference direction flag, please add the following *Note* just after sub-bullet "c" and prior to Table A-12:

Note: *The Selected Heading parameter does not have a source bit in this version of these MOPS to indicate its reference orientation (True North or Magnetic North). Implementers of the Target State and Status Message are encouraged whenever possible to use input parameters to populate this field that utilize Magnetic North orientation, as that is the de facto standard utilized by most users of this data. However since many aircraft have flight decks that can operate in either True North or Magnetic North orientation, this field should be encoded with the current active value in the flight deck, regardless of orientation. Users of the Selected Heading data should be aware that there is no method defined in this version of these MOPS to indicate its reference orientation.*

(**1.95**) In RTCA DO-260B and EUROCAE ED-102A, in Appendix A, section §A.1.4.10.8, in order to clarify the usage of the Geometric Vertical Accuracy (GVA) metric with respect to the Baro-Geo Difference data field in the Airborne Velocity Message, and to clarify the usage of the GVA metric encoding values for previous and potential future ADS-B Versions, replace the entire section, including Table A-29 with the following:

This 2-bit ("ME" bits 49 – 50, Message bits 81 – 82) subfield in the Airborne Operational Status Message (Subtype=0) will be encoded as shown in Table A-29, and set by using the Vertical Figure of Merit (VFOM) (95%) from the GNSS position source used to ~~encode the geometric altitude in the Airborne Position Message~~ report the geometric altitude.

Note: *The geometric altitude may be reported directly in the altitude field in the Airborne Position Message (§A.1.4.2.4) or indirectly using the Difference From Barometric Altitude subfield (§A.1.4.5.6) in the Airborne Velocity Message (§A.1.4.5) when barometric altitude is reported in the altitude field in the Airborne Position Message (§A.1.4.2.4).*

Table A-29: Encoding of the Geometric Vertical Accuracy (GVA) Subfield in Aircraft Operational Status Messages

GVA Encoding (decimal)	**Meaning** (meters)
0	Unknown or > 150 meters
1	≤ 150 meters
2	≤ 45 meters
3	Reserved

Note: *For the purposes of these MOPS (RTCA DO-260B/EUROCAE ED-102A) values for 0, 1 and 2 are encoded. It is expected that ADS-B transmitting subsystems with ADS-B Version Numbers greater than 2 will define the GVA encoding of "3" as a value less than 45 meters at some point in the future. Therefore, ADS-B Version 2 receiving subsystems should treat the GVA encoding of "3" as less than 45 meters for data received from ADS-B Version Numbers 2 or greater.*

(**1.96**) In RTCA DO-260B and EUROCAE ED-102A, in section §A.1.4.10.13, in order to clarify what the Horizontal Reference Direction (HRD) flag applies to, please add the following new *Note* just after the paragraph and prior to Table A-31:

Note: *The HRD flag only applies to the Heading/Ground Track subfield in the Surface Position Message or the Heading subfield in the Airborne Velocity Message (Subtypes 3 & 4).*

(**1.97**) In RTCA DO-260B and EUROCAE ED-102A, in Appendix A, section §A.1.5.1, in order to clarify the requirements for the initiation of broadcasting Extended Squitter Messages, make the following addition in the middle of the paragraph:

At power up initialization, the transponder will commence operation in a mode in which it broadcasts only acquisition squitters. The transponder will initiate the broadcast of Extended Squitters for Airborne Position, Surface Position, Aircraft Identification and Category, Airborne Velocity, Target State and Status and Operational Status when data are inserted into Registers 05_{16}, 06_{16}, 08_{16}, 09_{16}, 62_{16} and 65_{16} respectively. This determination will be made individually for each squitter type, as specified in §2.2.3.3. The insertion of just altitude or surveillance status data into Register 05_{16} by the transponder will not satisfy the minimum requirement for broadcast of the airborne position squitter.

(**1.98**) In RTCA DO-260B and EUROCAE ED-102A, in Appendix A, section §A.1.5.2, in the *Note* under bullet "a:"

Replace the reference "§2.2.3.2.3.1.3.1" **with** "§2.2.3.2.3.1.3.2"

(**1.99**) In RTCA DO-260B and EUROCAE ED-102A, in Appendix A, section §A.1.5.2, in *Note #1* under bullet "b:"

Replace the reference "§2.2.3.2.4.1.3.1" **with** "§2.2.3.2.4.1.3.2"

(**1.100**) In RTCA DO-260B and EUROCAE ED-102A, in Appendix A, section §A.1.5.2.d, in order to be consistent with changes made in RTCA DO-181E, EUROCAE ED-73E and ICAO Doc 9871, Edition 2, regarding clarifications for the zeroing and termination of Registers 08_{16} and 20_{16}, replace the *Note* after subparagraph "d" with the following:

Note: *The Aircraft Identification and Category Message is not cleared since it contains data that rarely changes in flight and is not frequently updated. With Extended Squitter installed, the Aircraft Identification and Category Message is not cleared or ZEROed once either Flight Identification or Aircraft Registration data has been loaded into Register 08_{16} during the current ADS-B Transmitting Subsystem power-on cycle. The Aircraft Identification and Category Message is not cleared since it provides information that is fundamental to track file management in the ADS-B environment (see §2.2.5.1.11.c). Implementation of Register 08_{16} should also consider the following:*

a. If valid Flight Identification data is available, then the data should be used to populate the character subfields in the Aircraft Identification and Category Message.

b. After using Flight Identification data to populate the character subfields in the Aircraft Identification and Category Message in a given power-on cycle, if Flight Identification data becomes invalid or not available, then the last known valid Flight Identification data should be retained and used to continue population of the character subfields in the Aircraft Identification and Category Message for the duration of the power-on cycle.

c. If valid Flight Identification data is not available, but valid Aircraft Registration data is available in a given power-on cycle, then the valid Aircraft Registration data should be used to populate the character subfields in the Aircraft Identification and Category Message for the duration of the power-on cycle.

d. If the Aircraft Identification and Category Message has been populated using Aircraft Registration data in a given power-on cycle, and valid Flight Identification data becomes available, then the Flight Identification data should be used to populate the character subfields in the Aircraft Identification and Category Message for the remainder of the power-on cycle.

e. Once valid Flight Identification data has been used to populate the Aircraft Identification and Category Message in a given power-on cycle, Aircraft Registration data should not be used to populate the character subfields of the Aircraft Identification and Category Message, even if Flight Identification data becomes invalid or not available during the power-on cycle.

(**1.101**) In RTCA DO-260B and EUROCAE ED-102A, in Appendix A, section §A.1.6.4.2, last paragraph before §A.1.6.4.3, fourth line:

Replace the reference "§A.1.4.6.3" **with** "§A.1.6.4.3"

(**1.102**) In RTCA DO-260B and EUROCAE ED-102A, in Appendix A, section §A.1.8, in Figure A-2, in the text of the descriptions of Bits 13 and 16 it has been discovered that there are several places in DO-260B/ED-102A that reference the "Ground Track" or "Heading" field in the Surface Position Message without referencing both data items. In this specific Figure on these specific Bit definition lines, in order to correctly reference the data items, make the following edits:

13	STATUS for Heading/Ground Track (1 = valid, 0 = not valid)
14	MSB
15	
16	HEADING/GROUND TRACK (7 bits)

(**1.103**) In RTCA DO-260B and EUROCAE ED-102A, in Appendix A, section §A.1.8, in Figure A-8a in order to conform to changes that have been made in the Transponder MOPS (RTCA DO-181E and EUROCAE ED-73E) and in Edition 2 of ICAO Doc 9871, in the *Notes* inside the Register format for the Aircraft Status Message for Subtype 1, the Emergency/Priority Status and Mode A Code, make the following changes:

(a) **Revise** *Note 1* as follows:

1) Message delivery is accomplished ~~once per 0.8 seconds~~ using the Event-Driven Protocol as specified in §2.2.3.3.1.4.3.

(b) **Add** *Note 7* as follows:

7) The Mode A Code shall be coded as defined in ICAO Annex 10 Volume IV, §3.1.2.6.7.1.

(**1.104**) In RTCA DO-260B and EUROCAE ED-102A, in Appendix A, section §A.1.8, in Figure A-10, correct a bad paragraph reference for the SIL Supplement in bit position #55 by making the following change:

55	SIL Supplement (§A.1.4.10.~~14~~ 15)

(**1.105**) In RTCA DO-260B and EUROCAE ED-102A, in Appendix A, section §A.3.4.6, in the Note:

Replace the reference "§A.1.4.8" **with** "§A.1.4.9"

(**1.106**) In RTCA DO-260B and EUROCAE ED-102A, in Appendix J, section §J.3.1.2, add the following *Note* just after the section Title:

Note: *Since this Appendix was developed, the vertical rate accuracy requirement has been decoupled from the NAC_V parameter. The test for vertical rate is not necessary to establish the NAC_V =1 but remains here in the event that manufacturers want to additionally establish the vertical rate performance of their system at the 50ft/sec 95% level.*

(**1.107**) In RTCA DO-260B and EUROCAE ED-102A, in Appendix J, section §J.4 at the end of the last sentence of the second paragraph, change the incorrect Table Q-3 reference to Table J-3.

Change the reference "Table Q-3" **to** "Table J-3"

(**1.108**) In RTCA DO-260B and EUROCAE ED-102A, in Appendix N, section §N.2.2.2, inside Table N-4, the value for R_C at 0.5 NM is expressed incorrectly. Make the following change:

The phrase "26 m (0.5 NM) < HPL" **should be** "926 m (0.5 NM) < HPL"

(**1.109**) In RTCA DO-260B and EUROCAE ED-102A, in Appendix T, section §T.4, in the first sentence of the paragraph just after Equation #5, we propose the following changes to the sentence in order to clarify the intention of the sentence:

The modulus function returns the number of degrees between *lat* and the southern edge of the zone containing *lat* ~~and *lat*~~. ……

(**1.110**) In RTCA DO-260B and EUROCAE ED-102A, in Appendix T, section §T.5.1.2 the description of Equation #22 contains a cut-and-paste error, and should refer to "odd" zones instead of "even" zones.

$$ZO_{XZ1} = (NL)\left(\frac{XZ_1}{2^{Nb}}\right)$$ *for ~~even~~ odd zones* Eq 22

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