



International  
Civil Aviation  
Organization

Organisation  
de l'aviation civile  
internationale

Organización  
de Aviación Civil  
Internacional

Международная  
организация  
гражданской  
авиации

منظمة الطيران  
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国际民用  
航空组织

Tel.: +1 514-315-1872

Ref.: AN 7/66.2.2-25/21

14 April 2025

**Subject:** Adoption of Amendment 91 to Annex 10,  
Volume V

**Action required:** a) Notify any disapproval before  
4 August 2025; b) Notify any differences and  
compliance before 27 October 2025; c) Consider the use  
of the Electronic Filing of Differences (EFOD) System  
for notification of differences and compliance

Sir/Madam,

1. I have the honour to inform you that Amendment 91 to the *International Standards and Recommended Practices, Annex 10 — Aeronautical Telecommunications, Volume V — Aeronautical Radio Frequency Spectrum Utilization* was adopted by the Council at the twelfth meeting of its 234th Session on 28 March 2025. Copies of the Amendment and the Resolution of Adoption are available as attachments to the electronic version of this State letter on the ICAO-NET (<http://portal.icao.int>) where you can access all other relevant documentation.

2. When adopting the amendment, the Council prescribed 4 August 2025 as the date on which it will become effective, except for any part concerning which a majority of Contracting States have registered their disapproval before that date. In addition, the Council resolved that Amendment 91, to the extent it becomes effective, will become applicable on 27 November 2025.

3. Amendment 91 arises from:

- a) proposals developed by the third meeting of the Frequency Spectrum Management Panel (FSMP/3) introducing provisions related to the implementation of wireless avionic intra-communications (WAIC); and
- b) proposals developed by the seventh meeting of the Navigation Systems Panel (NSP/7) concerning amendments related to frequency utilization for instrument landing system (ILS), VHF omnidirectional radio range (VOR), distance measuring equipment (DME) and ground-based augmentation system (GBAS).

4. The subjects are given in the amendment to the Foreword of Annex 10, a copy of which is in Attachment A.

5. In conformity with the Resolution of Adoption, may I request:

- a) that before 4 August 2025 you inform me if there is any part of the adopted Standards and Recommended Practices (SARPs) amendments in Amendment 91 concerning which your Government wishes to register disapproval, using the form in Attachment B for this purpose. Please note that only statements of disapproval need be registered and if you do not reply it will be assumed that you do not disapprove of the amendment;
- b) that before 27 October 2025 you inform me of the following, using the Electronic Filing of Differences (EFOD) System or the form in Attachment C for this purpose:
  - 1) any differences that will exist on 27 November 2025 between the national regulations or practices of your Government and the provisions of the whole of Annex 10, Volume V, as amended by all amendments up to and including Amendment 91, and thereafter of any further differences that may arise; and
  - 2) the date or dates by which your Government will have complied with the provisions of the whole of Annex 10, Volume V as amended by all amendments up to and including Amendment 91.

6. With reference to the request in paragraph 5 a) above, it should be noted that a registration of disapproval of Amendment 91 or any part of it in accordance with Article 90 of the Convention does not constitute a notification of differences under Article 38 of the Convention. To comply with the latter provision, a separate statement is necessary if any differences do exist, as requested in paragraph 5 b) 1). It is recalled in this respect that international Standards in Annexes have a conditional binding force, to the extent that the State or States concerned have not notified any difference thereto under Article 38 of the Convention.

7. With reference to the request in paragraph 5 b) above, it should be also noted that the ICAO Assembly, at its 39th Session (27 September to 6 October 2016), resolved that Member States should be encouraged to use the EFOD System when notifying differences (Resolution A39-22 refers). The EFOD System is currently available on the Universal Safety Oversight Audit Programme (USOAP) restricted website (<http://www.icao.int/usoap>) which is accessible by all Member States. You are invited to consider using this for notification of compliance and differences.

8. Guidance on the determination and reporting of differences is given in the Note on the Notification of Differences in Attachment D. Please note that a detailed repetition of previously notified differences, if they continue to apply, may be avoided by stating the current validity of such differences.

9. I would appreciate it if you would also send a copy of your notifications, referred to in paragraph 5 b) above, to the ICAO Regional Office accredited to your Government.

10. At the fifth meeting of its 204th Session, the Council requested that States, when being advised of the adoption of an Annex amendment, be provided with information on implementation and

available guidance material, as well as an impact assessment. This is presented for your information in Attachments E and F, respectively. An overview of the approval process for Amendment 91 to Annex 10, Volume V is also included for your information in Attachment G.

11. As soon as practicable after the amendment becomes effective, on 4 August 2025, replacement pages incorporating Amendment 91 will be forwarded to you.

Accept, Sir/Madam, the assurances of my highest consideration.

for Juan Carlos Salazar  
Secretary General

**Enclosures:**

- A — Amendment to the Foreword of Annex 10, Volume V
- B — Form on notification of disapproval of all or part of Amendment 91 to Annex 10, Volume V
- C — Form on notification of compliance with or differences from Annex 10, Volume V
- D — Note on the Notification of Differences
- E — Implementation task list and outline of guidance material in relation to Amendment 91 to Annex 10, Volume V
- F — Impact assessment in relation to Amendment 91 to Annex 10, Volume V
- G — Overview of approval process for Amendment 91 to Annex 10, Volume V



**ATTACHMENT A** to State letter AN 7/66.2.2-25/21

**AMENDMENT TO THE FOREWORD OF ANNEX 10, VOLUME V**

*Add* the following elements at the end of Table A:

<i><b>Amendment</b></i>	<i><b>Source(s)</b></i>	<i><b>Subject</b></i>	<i><b>Adopted/Approved Effective Applicable</b></i>
91	Third meeting of the Frequency Spectrum Management Panel (FSMP/3)  Seventh meeting of the Navigation Systems Panel (NSP/7)	a) introduce new definitions and Standards and Recommended Practices (SARPs) related to WAIC; and  b) update references to guidance material and to partly obsolete provisions in relation to frequency utilization for instrument landing system (ILS), VHF omnidirectional radio range (VOR), distance measuring equipment (DME) and ground-based augmentation system (GBAS).	28 March 2025 4 August 2025 27 November 2025

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**NOTIFICATION OF DISAPPROVAL OF ALL OR PART OF  
AMENDMENT 91 TO ANNEX 10, VOLUME V**

To: The Secretary General  
International Civil Aviation Organization  
999 Robert-Bourassa Boulevard  
Montréal, Quebec  
Canada H3C 5H7

(State) \_\_\_\_\_ hereby wishes to disapprove the following parts of  
Amendment 91 to Annex 10, Volume V:

Signature \_\_\_\_\_

Date \_\_\_\_\_

*NOTES*

- 1) If you wish to disapprove all or part of Amendment 91 to Annex 10, Volume V please dispatch this notification of disapproval to reach ICAO Headquarters by 4 August 2025. If it has not been received by that date it will be assumed that you do not disapprove of the amendment. **If you approve of all parts of Amendment 91, it is not necessary to return this notification of disapproval.**
- 2) This notification should not be considered a notification of compliance with or differences from Annex 10, Volume V. Separate notifications on this are necessary. (See Attachment C.)
- 3) Please use extra sheets as required.

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ATTACHMENT C to State letter AN 7/66.2.2-25/21

**NOTIFICATION OF COMPLIANCE WITH OR DIFFERENCES  
FROM ANNEX 10, VOLUME V  
(Including all amendments up to and including Amendment 91)**

To: The Secretary General  
International Civil Aviation Organization  
999 Robert-Bourassa Boulevard  
Montréal, Quebec  
Canada H3C 5H7

1. No differences will exist on \_\_\_\_\_ between the national regulations and/or practices of **(State)** \_\_\_\_\_ and the provisions of Annex 10, Volume V, including all amendments up to and including Amendment 91.

2. The following differences will exist on \_\_\_\_\_ between the regulations and/or practices of **(State)** \_\_\_\_\_ and the provisions of Annex 10, Volume V, including Amendment 91 (Please see Note 2) below.)

<b>a) Annex Provision</b> (Please give exact paragraph reference)	<b>b) Details of Difference</b> (Please describe the difference clearly and concisely)	<b>c) Remarks</b> (Please indicate reasons for the difference)
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(Please use extra sheets as required)

3. By the dates indicated below, **(State)** \_\_\_\_\_ will have complied with the provisions of Annex 10, Volume V, including all amendments up to and including Amendment 91 for which differences have been notified in 2 above.

a) <b>Annex Provision</b> (Please give exact paragraph reference)	b) <b>Date</b>	c) <b>Comments</b>
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(Please use extra sheets as required)

Signature \_\_\_\_\_ Date \_\_\_\_\_

*NOTES*

- 1) If paragraph 1 above is applicable to your State, please complete paragraph 1 and return this form to ICAO Headquarters. If paragraph 2 is applicable to you, please complete paragraphs 2 and 3 and return the form to ICAO Headquarters.
- 2) A detailed repetition of previously notified differences, if they continue to apply, may be avoided by stating the current validity of such differences.
- 3) Guidance on the notification of differences is provided in the Note on the Notification of Differences and in the *Manual on Notification and Publication of Differences* (Doc 10055).
- 4) Please send a copy of this notification to the ICAO Regional Office accredited to your Government.

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ATTACHMENT D to State letter AN 7/66.2.2-25/21

**NOTE ON THE NOTIFICATION OF DIFFERENCES**

*(Prepared and issued in accordance with instructions of the Council)*

1. *Introduction*

1.1 Article 38 of the *Convention on International Civil Aviation* (“Convention”) requires that a Contracting State notify ICAO any time it does not comply with a Standard in all respects, it does not bring its regulations or practices into full accord with any Standard, or it adopts regulations or practices differing in any particular respect from the Standard.

1.2 The Assembly and the Council, when reviewing the notification of differences by Contracting States in compliance with Article 38 of the Convention, have repeatedly noted that the timeliness and currency of such notifications is not entirely satisfactory. Therefore, this note is issued to reiterate the primary purpose of Article 38 of the Convention and to facilitate the determination and notification of differences.

1.3 The primary purpose of the notification of differences is to promote safety, regularity and efficiency in air navigation by ensuring that governmental and other agencies, including operators and service providers, concerned with international civil aviation are made aware of all national regulations and practices in so far as they differ from those prescribed in the Standards contained in Annexes to the Convention.

1.4 Contracting States are, therefore, requested to give particular attention to the notification of differences with respect to Standards in all Annexes, as described in paragraph 4 b) 1) of the Resolution of Adoption.

1.5 Although differences from Recommended Practices are not notifiable under Article 38 of the Convention, the Assembly has urged Contracting States to extend the above considerations to Recommended Practices contained in Annexes to the Convention, as well.

2. *Notification of differences from Standards and Recommended Practices (SARPs)*

2.1 Guidance to Contracting States in the notification of differences to Standards and Recommended Practices (SARPs) can only be given in very general terms. Contracting States are further reminded that compliance with SARPs generally extends beyond the issuance of national regulations and requires establishment of practical arrangements for implementation, such as the provision of facilities, personnel and equipment and effective enforcement mechanisms. Contracting States should take those elements into account when determining their compliance and differences. The following categories of differences are provided as a guide in determining whether a notifiable difference exists:

- a) *A Contracting State’s requirement is more exacting or exceeds a SARP (Category A).* This category applies when the national regulation and practices are more demanding than the corresponding SARP, or impose an obligation within the scope of the Annex which is not covered by the SARP. This is of particular importance where a Contracting State requires a higher standard which affects the operation of aircraft of other Contracting States in and above its territory;

- b) *A Contracting State's requirement is different in character or the Contracting State has established other means of compliance (Category B)\**. This category applies, in particular, when the national regulation and practices are different in character from the corresponding SARP, or when the national regulation and practices differ in principle, type or system from the corresponding SARP, without necessarily imposing an additional obligation; and
- c) *A Contracting State's requirement is less protective, partially implemented or not implemented (Category C)*. This category applies when the national regulation and practices are less protective than the corresponding SARP; when no national regulation has been promulgated to address the corresponding SARP, in whole or in part; or when the Contracting State has not brought its practices into full accord with the corresponding SARP.

These categories do not apply to Not Applicable SARP. Please see the paragraph below.

2.2 **Not Applicable SARP.** When a Contracting State deems a SARP concerning aircraft, operations, equipment, personnel, or air navigation facilities or services to be not applicable to the existing aviation activities of the State, notification of a difference is not required. For example, a Contracting State that is not a State of Design or Manufacture and that does not have any national regulations on the subject, would not be required to notify differences from Annex 8 provisions related to the design and construction of an aircraft.

2.3 **Differences from appendices, tables and figures.** The material comprising a SARP includes not only the SARP itself, but also the appendices, tables and figures associated with the SARP. Therefore, differences from appendices, tables and figures are notifiable under Article 38. In order to file a difference against an appendix, table or figure, States should file a difference against the SARP that makes reference to the appendix, table or figure.

2.4 **Differences from definitions.** Contracting States should notify differences from definitions. The definition of a term used in a SARP does not have independent status but is an essential part of each SARP in which the term is used. Therefore, a difference from the definition of the term may result in there being a difference from any SARP in which the term is used. To this end, Contracting States should take into consideration differences from definitions when determining compliance or differences to SARPs in which the terms are used.

2.5 The notification of differences should be not only to the latest amendment but to the whole Annex, including the amendment. In other words, Contracting States that have already notified differences are requested to provide regular updates of the differences previously notified until the difference no longer exists.

2.6 Further guidance on the identification and notification of differences, examples of well-defined differences and examples of model processes and procedures for management of the notification of differences can be found in the *Manual on Notification and Publication of Differences* (Doc 10055).

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\* The expression "different in character or other means of compliance" in b) would be applied to a national regulation and practice which achieve, by other means, the same objective as that of the corresponding SARPs or for other substantive reasons so cannot be classified under a) or c).

3. *Form of notification of differences*

3.1 Differences can be notified:

- a) by sending to ICAO Headquarters a form on notification of compliance or differences;  
or
- b) through the Electronic Filing of Differences (EFOD) System at [www.icao.int/usoap](http://www.icao.int/usoap).

3.2 When notifying differences, the following information should be provided:

- a) the number of the paragraph or subparagraph which contains the SARP to which the difference relates\*;
- b) the reasons why the State does not comply with the SARP, or considers it necessary to adopt different regulations or practices;
- c) a clear and concise description of the difference; and
- d) intentions for future compliance and any date by which your Government plans to confirm compliance with and remove its difference from the SARP for which the difference has been notified.

3.3 The differences notified will be made available to other Contracting States, normally in the terms used by the Contracting State when making the notification. In the interest of making the information as useful as possible, Contracting States are requested to ensure that:

- a) statements be as clear and concise as possible and be confined to essential points;
- b) the provision of extracts from national regulations not be considered as sufficient to satisfy the obligation to notify differences; and
- c) general comments, unclear acronyms and references be avoided.

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\* This applies only when the notification is made under 3.1 a).



**IMPLEMENTATION TASK LIST AND OUTLINE OF GUIDANCE MATERIAL  
IN RELATION TO AMENDMENT 91 TO ANNEX 10, VOLUME V**

**1. IMPLEMENTATION TASK LIST**

1.1 Essential steps to be followed by a State in order to implement Amendment 91 to Annex 10, Volume V:

- a) identification of the rule-making process necessary to transpose the new and modified ICAO provisions into national regulations taking into consideration the applicability date;
- b) establishment of a national implementation plan that takes into consideration the new and modified provisions;
- c) drafting of the necessary modifications to the national regulations and means of compliance;
- d) official adoption of the national regulations and means of compliance;
- e) filing of State differences with ICAO, if necessary; and
- f) publication of significant differences in the Aeronautical Information Publication (AIP), if necessary;

**2. STANDARDIZATION PROCESS**

2.1 Effective date: 4 August 2025

2.2 Applicability date: 27 November 2025

2.3 Embedded date(s): N/A

**3. SUPPORTING DOCUMENTATION**

**3.1 ICAO documentation:**

<b>Title/Doc no.</b>	<b>Type (PANS/TI/Manual/Circ.)</b>	<b>Planned publication date</b>
<i>Handbook on Radio Frequency Spectrum Requirements for Civil Aviation</i> (Doc. 9718)	Manual	Published

3.2 **External documentation:**

<b>Title</b>	<b>External Organization</b>	<b>Publication date</b>
<i>Airworthiness Security Methods and Considerations</i> (ED-203A and DO-356A)	RTCA and EUROCAE	Published
<i>The Minimum Aviation System Performance Standards (MASPS) for Coexistence of Wireless Avionics Intra Communication (WAIC) Systems within 4 200-4 400 MHz</i> (ED-260A and DO-378A)	RTCA and EUROCAE	Published
<i>The Minimum Operating Performance Specification (MOPS) for Wireless Avionics Intra-Communication Equipment within 4200-4400 MHz</i> (ED-319 and DO-402)	RTCA and EUROCAE	Q2 2025

4. **IMPLEMENTATION ASSISTANCE TASKS**

<b>Type</b>	<b>Global</b>	<b>Regional</b>
Nil	—	—

5. **UNIVERSAL SAFETY OVERSIGHT AUDIT PROGRAMME (USOAP)**

5.1 This amendment does not require the review of the USOAP CMA protocol questions to assess effective implementation by States.

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**IMPACT ASSESSMENT IN RELATION TO  
AMENDMENT 91 TO ANNEX 10, VOLUME V**

**1. INTRODUCTION**

1.1 Amendment 91 to Annex 10, Volume V is intended to:

- a) introduce new definitions related to WAIC in Chapter 1 and new Standards and Recommended Practices (SARPs) in Chapter 4, Section 4.5.2, including a description of radio frequency (RF) characteristics of the WAIC transmitter and the WAIC receiver; and
- b) update references to guidance material and to partly obsolete provisions in relation to frequency utilization for ILS, VHF VOR, DME and GBAS, as required.

**2. IMPACT ASSESSMENT**

**2.1 Amendment concerning the wireless avionic  
intra-communications (WAIC)**

2.1.1 *Safety impact:* Positive. Depending on the actual function WAIC is used for, safety may be improved for particular circumstances, such as, allowing dissimilar redundancy or adding new safety functionalities through WAIC.

2.1.2 *Financial impact:* Negligible. A slight increase in costs for States as indicated in 3.1.3. As for industry, the cost impact will occur when the need for WAIC is determined but it should be decided based on the cost benefit analysis.

2.1.3 *Security impact:* Negligible. The frequency band used by WAIC is dedicated for aeronautical safety services and there are no applications other than radio altimeters and WAIC that operate in the band. Frequency bands, which are exclusive to aeronautical safety services, are afforded a much higher protection by Radio Regulators than bands supporting non-safety applications. This results in a stringent radio regulatory oversight, thus providing integrity against potential interference sources. However, any residual risk of potential harmful interference to or hacking of WAIC will need to be addressed through the individual system implementation, which will need to be assured through aircraft design and certification. Specific equipment security capabilities and system implementations are defined in the WAIC MOPS (ED-260A/DO-378A) to protect systems against specific threats. Furthermore, WAIC is envisioned as a dissimilar redundant system for connectivity but not necessary a complete replacement of wires. Therefore, it is expected to be used for applications with safety critical systems without causing security impact.

2.1.4 *Environmental impact:* Positive. Enhanced sensing, without additional weight penalty of new wiring, will enable more energy-efficient operation of aircraft systems, thus reducing the overall fuel consumption and carbon emissions.

2.1.5 *Efficiency and capacity impact:* Positive. New sensing and monitoring functions made possible by WAIC may facilitate predictive and condition-based maintenance, expecting to reduce gate delays and to improve air transport efficiency.

2.1.6 *Expected implementation time:* There is no significant change to State regulations foreseen with the implementation of this amendment.

2.2 **Amendment concerning the frequency utilization for ILS, VOR, DME and GBAS**

2.2.1 *Safety impact:* There is no impact on aviation safety with the implementation of this amendment.

2.2.2 *Financial impact:* There is no financial impact with the implementation of this amendment.

2.2.3 *Security impact:* No security impact is envisaged with the implementation of this proposal.

2.2.4 *Environmental impact:* There is no environmental impact with the implementation of this amendment.

2.2.5 *Efficiency and capacity impact:* Positive. This amendment as a consequential amendment to Annex 10, Volume I is expected to facilitate future improvements to the efficiency of the frequency assignment planning process.

2.2.6 *Expected implementation time:* There is no significant change to State regulations foreseen with the implementation of this amendment.

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**ATTACHMENT G** to State letter AN 7/66.2.2-25/21

**OVERVIEW OF APPROVAL PROCESS FOR  
AMENDMENT 91 TO ANNEX 10, VOLUME V**

<b>Amendment concerning</b>	<b>Source(s)</b>	<b>Preliminary review by the ANC</b>	<b>State letter and date</b>	<b>Final review by the ANC</b>	<b>No. of replies at final review</b>	<b>Adopted Effective Applicable</b>
The implementation of wireless avionic intra-communications (WAIC)	Third meeting of the Frequency Spectrum Management Panel (FSMP/3)	16 May 2023 (ANC 223-3)	AN 7/66.1.1-23/47 1 June 2023	2 May 2024 (ANC 226-2 and Corr. No. 1)	69 Contracting States (17) 5 international organization. Total: 74 replies	28 March 2025 4 August 2025 27 November 2025
Updating of references to guidance material and to partly obsolete provisions related to frequency utilization for ILS, VOR, DME and GBAS	Seventh meeting of the Navigation Systems Panel (NSP/7)	10 October 2023 (ANC 224-3)	AN 7/62.1.5, AN 7/66.1.2-23/67 31 October 2023 and Corr. No. 1 (Spanish only)	1 October 2024 (ANC 227-3)	65 Contracting States (18) 5 international organization. Total: 70 replies	28 March 2025 4 August 2025 27 November 2025

— END —



**AMENDMENT 91**  
**TO THE**  
**INTERNATIONAL STANDARDS**  
**AND RECOMMENDED PRACTICES**  
**AND PROCEDURES FOR AIR NAVIGATION SERVICES**

**AERONAUTICAL**  
**TELECOMMUNICATIONS**

**ANNEX 10**  
**TO THE CONVENTION ON INTERNATIONAL CIVIL AVIATION**

**VOLUME V**  
**(AERONAUTICAL RADIO FREQUENCY SPECTRUM UTILIZATION)**

The amendment to Annex 10, Volume V, contained in this document was adopted by the Council of ICAO on **28 March 2025**. Such parts of this amendment as have not been disapproved by more than half of the total number of Contracting States on or before **4 August 2025** will become effective on that date and will become applicable on **27 November 2025** as specified in the Resolution of Adoption. (State letter AN 7/66.2.2-25/21 refers.)

**MARCH 2025**

**INTERNATIONAL CIVIL AVIATION ORGANIZATION**

**AMENDMENT 91 TO THE INTERNATIONAL STANDARDS  
AND RECOMMENDED PRACTICES**

**ANNEX 10 — AERONAUTICAL TELECOMMUNICATIONS,  
VOLUME V — AERONAUTICAL RADIO FREQUENCY SPECTRUM  
UTILIZATION**

**RESOLUTION OF ADOPTION**

*The Council*

Acting in accordance with the Convention on International Civil Aviation, and particularly with the provisions of Articles 37, 54 and 90 thereof,

1. *Hereby adopts* on 28 March 2025 Amendment 91 to the International Standards and Recommended Practices contained in the document entitled *International Standards and Recommended Practices, Aeronautical Telecommunications, Volume V — Aeronautical Radio Frequency Spectrum Utilization* which for convenience is designated Annex 10, Volume V, to the Convention;
2. *Prescribes* 4 August 2025 as the date upon which the said amendment shall become effective, except for any part thereof in respect of which a majority of the Contracting States have registered their disapproval with the council before that date;
3. *Resolves* that the said amendment or such parts thereof as have become effective shall become applicable on 27 November 2025;
4. *Requests the Secretary General:*
  - a) to notify each Contracting State immediately of the above action and immediately after 4 August 2025 of those parts of the amendment which have become effective;
  - b) to request each Contracting State:
    - 1) to notify the Organization (in accordance with the obligation imposed by Article 38 of the Convention) of the differences that will exist on 27 November 2025 between its national regulations or practices and the provisions of the Standards in the Annex as hereby amended, such notification to be made before 27 October 2025, and thereafter to notify the Organization of any further differences that arise;
    - 2) to notify the Organization before 27 October 2025 of the date or dates by which it will have complied with the provisions of the Standards in the Annex as hereby amended;
  - c) to invite each Contracting State to notify additionally any differences between its own practices and those established by the Recommended Practices, following the procedure specified in subparagraph b) above with respect to differences from Standards.

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**NOTES ON THE PRESENTATION OF THE AMENDMENT  
TO ANNEX 10, VOLUME V**

The text of the amendment is arranged to show deleted text with a line through it and new text highlighted with grey shading, as shown below:

- |   |                                   |
|---|-----------------------------------|
| 1. <del>Text to be deleted is shown with a line through it.</del>   | text to be deleted                |
| 2. <b>New text to be inserted is highlighted with grey shading.</b>   | new text to be inserted           |
| 3. <del>Text to be deleted is shown with a line through it</del> followed by the replacement text which is highlighted with grey shading. | new text to replace existing text |

**TEXT OF AMENDMENT 91 TO  
INTERNATIONAL STANDARDS  
AND RECOMMENDED PRACTICES**

**AERONAUTICAL TELECOMMUNICATIONS  
ANNEX 10**

**VOLUME V — AERONAUTICAL RADIO FREQUENCY SPECTRUM UTILIZATION**

**TO THE CONVENTION ON INTERNATIONAL CIVIL AVIATION**

**CHAPTER 1. DEFINITIONS**

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*Insert new definitions as follows:*

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**WAIC component.** Any tangible entity of a WAIC network on board an aircraft.

**WAIC network.** A network comprised of interrelated WAIC components, such as components used for wireless communications, security or network management.

**WAIC system.** A system which provides wireless communications between points on board a single aircraft. A WAIC system may be comprised of one or more WAIC networks necessary for establishing, maintaining and securing wireless communications. A WAIC system consists of interrelated sets of WAIC components on board the same aircraft, so that a single aircraft contains only a single WAIC system.

**Wireless avionic intra-communications (WAIC).** Radiocommunication between two or more aircraft stations located on board a single aircraft for aircraft applications supporting the safe operation of the aircraft.

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End of new definitions.

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**CHAPTER 4. UTILIZATION OF FREQUENCIES ABOVE 30 MHz**

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**4.2 Utilization in the band 108 – 117.975 MHz**

4.2.1 The block allotment of the frequency band 108 – 117.975 MHz shall be as follows:

— *Band 108 – 111.975 MHz:*

- a) ILS in accordance with 4.2.2 and Annex 10, Volume I, 3.1.3, provided that only frequencies ending in *odd tenths* of a megahertz or *odd tenths plus a twentieth* of a megahertz are used;
- b) VOR provided that:

- ~~1) no harmful adjacent channel interference is caused to ILS;~~
- ~~2) only frequencies ending in either even tenths or even tenths plus a twentieth of a megahertz are used; and~~
- c) GNSS ground-based augmentation system (GBAS) in accordance with Annex 10, Volume I, 3.7.3.5, ~~provided that no harmful interference is caused to ILS and VOR.~~

*Note.*—~~ILS/GBAS geographical separation criteria and geographical separation criteria for GBAS and VHF communication services operating in the 118 – 137 MHz band are under development. Until these criteria are defined and included in the SARPs, it is intended that frequencies in the band 112.050 – 117.900 MHz will be used for GBAS assignments.~~

— Band 111.975 – 117.975 MHz:

- a) VOR;
- b) GNSS ground-based augmentation system (GBAS) in accordance with Annex 10, Volume I, 3.7.3.5, ~~provided that no harmful interference is caused to VOR.~~

*Note 1.*— *Guidance material relating to the distance separation required to prevent harmful interference between ILS, and VOR and GBAS/VDB when using the band 108 – 111.975 MHz is found in the Handbook on Radio Frequency Spectrum Requirements for Civil Aviation (Doc. 9718, Volume II), is found in Section 3 of Attachment C to Annex 10, Volume I.*

*Note 2.*— *Guidance material relating to the distance separation required to prevent harmful interference between VOR and GBAS when using the band 112.050 – 117.900 MHz is found in the Handbook on Radio Frequency Spectrum Requirements for Civil Aviation (Doc. 9718, Volume II), is found in Section 7.2.1 of Attachment D to Annex 10, Volume I.*

4.2.2 For regional assignment planning, the frequencies for ILS facilities shall be selected in the following order:

- a) localizer channels ending in *odd tenths* of a megahertz and their associated glide path channels;
- b) localizer channels ending in *odd tenths plus a twentieth* of a megahertz and their associated glide path channels.

4.2.2.1 ILS channels identified by localizer frequencies ending in an *odd tenth plus one twentieth* of a megahertz in the band 108 – 111.975 MHz shall be permitted to be utilized on the basis of regional agreement for general use on or after 1 January 1976. ~~when they become applicable in accordance with the following:~~

- ~~a) for restricted use commencing 1 January 1973;~~
- ~~b) for general use on or after 1 January 1976.~~

*Note.*—~~See Note to 4.2.3.1.~~

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4.2.3.1 Frequencies for VOR facilities ending in *even tenths plus a twentieth* of a megahertz in the

band 108 – 111.975 MHz and all frequencies ending in 50 kHz in the band 111.975 – 117.975 MHz shall be permitted to be utilized **for general use** on the basis of a regional agreement when they have become applicable in accordance with the following:

- ~~a) in the band 111.975 – 117.975 MHz for restricted use;~~
- ~~b) for general use in the band 111.975 – 117.975 MHz at a date fixed by the Council but at least one year after the approval of the regional agreement concerned;~~
- ~~c) for general use in the band 108 – 111.975 MHz at a date fixed by the Council but giving a period of two years or more after the approval of the regional agreement concerned.~~

*Note.*—“Restricted use”, where mentioned in 4.2.2.1 a) and 4.2.3.1 a), is intended to refer to the limited use of the frequencies by only suitably equipped aircraft and in such a manner that:

- ~~a) the performance of ILS or VOR equipment not capable of operating on these frequencies will be protected from harmful interference;~~
- ~~b) a general requirement for the carriage of ILS or VOR airborne equipment capable of operation on these frequencies will not be imposed; and~~
- ~~c) operational service provided to international operators using 100 kHz airborne equipment is not derogated.~~

4.2.4 To protect the operation of airborne equipment during the initial stages of deploying VORs utilizing 50 kHz channel spacing in an area where the existing facilities may not fully conform with the Standards in Annex 10, Volume I, Chapter 3, all existing VORs within interference range of a facility utilizing 50 kHz channel spacing shall be modified to comply with the provisions of Annex 10, Volume I, 3.3.5.7.

4.2.5 *Frequency deployment.* The geographical separation between facilities operating on the same and adjacent frequencies shall be determined regionally and shall be based on the following criteria:

- a) the required functional service radii of the facilities;
- b) the maximum flight altitude of the aircraft using the facilities;
- c) the desirability of keeping the minimum IFR altitude as low as the terrain will permit.

*Note.*— Guidance material on this subject is contained in the **Handbook on Radio Frequency Spectrum Requirements for Civil Aviation (Doc 9718, Volume II)**, ~~Attachments to this Annex.~~

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### 4.3 Utilization in the band 960 – 1 215 MHz for DME

*Note.*— Guidance on the frequency planning of channels for DME systems is given in the **Handbook on Radio Frequency Spectrum Requirements for Civil Aviation (Doc 9718, Volume II)**, ~~Annex 10, Volume I, Attachment C, Section 7.~~

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*Insert new text as follows:*

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## **4.5 Utilization in the frequency band 4 200–4 400 MHz**

### **4.5.1 Utilization for radio altimeters**

*(To be developed)*

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*Editorial Note.*— Section 4.5.1 refers to the radio altimeters SARPs currently under development.

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### **4.5.2 Utilization for wireless avionic intra-communication (WAIC) systems**

*Note.*— *The following provisions for WAIC define the requirements that ensure that WAIC systems and radio altimeters can provide their intended functions while multiple aircraft are in mutual radio range. Coexistence between WAIC systems and radio altimeters installed on board the same aircraft is addressed by the specific implementation and established airworthiness certification processes. Further guidance on those implementation issues is addressed in ED-319 and DO-402 Minimum Operating Performance Specification (MOPS) for Wireless Avionics Intra-Communication Equipment within 4200-4400 MHz. In addition, considerations on protecting aircraft systems from unauthorized interactions are addressed in ED-203A and DO-356A Airworthiness Security Methods and Considerations.*

**4.5.2.1** WAIC systems shall only be used for communications related to the safety and regularity of flight between two or more points on a single aircraft.

**4.5.2.2** WAIC systems shall not cause harmful interference to radio altimeter systems and WAIC systems on other aircraft.

*Note.*— *Compliance with 4.5.2.2 is achieved by limiting the power of WAIC emissions below the level at which altimeter performance may be affected, consistent with 4.5.2.4 below. Furthermore, careful consideration is necessary when accommodating components of the WAIC system located outside of the aircraft fuselage. The European Organisation for Civil Aviation Equipment (EUROCAE)/RTCA Inc. documents ED-260A/DO-378A provide one acceptable method of demonstrating compliance with that power limit.*

**4.5.2.3** A WAIC system located on board one aircraft shall perform its intended function while subject to emissions from WAIC and radio altimeter systems located on board other aircraft.

*Note.*— *EUROCAE/RTCA documents ED-260A/DO-378A provide one acceptable method of demonstrating compliance with 4.5.2.3 via test. Alternatively, the critical coexistence scenario described in those documents may also be used to develop appropriate analyses to demonstrate compliance with 4.5.2.3.*

**4.5.2.4** Radio frequency (RF) characteristics of WAIC systems.

**4.5.2.4.1** WAIC systems shall operate in the frequency band 4 200–4 400 MHz.

**4.5.2.4.2** The power of the total aggregate emissions of all WAIC transmitters on board an aircraft shall not exceed an equivalent isotropic radiated power of -20 dBm, referenced to a point source, which is assumed to be located at the geometrical centre of the aircraft.

*Note.*— *Refer to ED-260A and DO-378A “the Minimum Aviation System Performance Standards (MASPS) for Coexistence of Wireless Avionics Intra Communication (WAIC) Systems within 4 200-4 400*

MHz”, which adopt the total aggregate EIRP limit for WAIC systems and provide a practical verification procedure how to ascertain whether the limit is satisfied.

4.5.2.4.3 The overall occupied bandwidth shall be maintained completely within the allocated frequency band 4 200–4 400 MHz including any offsets such as Doppler shift or frequency tolerances, where the occupied bandwidth is defined as the bandwidth for which 99 per cent of the signal energy falls within the lower and upper frequency limits.

*Note.— The ITU Radio Regulations define the occupied bandwidth as “The width of a frequency band such that, below the lower and above the upper frequency limits, the mean powers emitted are each equal to a specified percentage  $\beta/2$  of the total mean power of a given emission”, the value of  $\beta/2$  being 0.5 per cent.*

4.5.2.4.4 The necessary bandwidth (NB) of the WAIC transmitter shall be calculated according to Appendix 1 of the ITU Radio Regulations.

4.5.2.4.5 The boundary between the out-of-band and spurious domains shall be determined according to Annex 1, Appendix 3 of the ITU Radio Regulations. The required attenuation of the mean power of any unwanted emission relative to the total mean power  $P$  shall meet or exceed the following conditions:

50 per cent of NB  $< f < 150$  per cent of NB: Linear increase (in dB) from 24dB to 35dB within a reference bandwidth of 4kHz (Note 1);

150 per cent of NB  $< f < \text{start of the spurious domain}$ : 35 dB within a reference bandwidth of 4 kHz (Note 1); and

Spurious domain:  $56+10\log(P)$  or 40 dB, whichever is less stringent, measured in a reference bandwidth of 1 MHz (Note 2).

*Note 1.— Reference bandwidth of 4 kHz within the out-of-band domain in accordance with Annex 11, Recommendation ITU-R SM.1541-6 of the ITU Radio Regulations. The parameter  $f$  is the frequency separation from the centre frequency of the transmit signal.*

*Note 2.— Reference bandwidth of 1 MHz within the spurious domain in accordance with Appendix 3, paragraph 7 of the ITU Radio Regulations and determination of attenuation for low power device radio equipment in accordance Appendix 3, paragraph 13 of the ITU Radio Regulations.*

4.5.2.5 Out-of-band interference tolerance of a WAIC receiver

*Note.— These requirements describe the out-of-band tolerance in which the WAIC receiver must meet its performance requirements without taking into account any mitigation afforded by its installation.*

4.5.2.5.1 Receivers shall tolerate interference from sources operating outside of the frequency band 4 200–4 400 MHz whose total combined emitted power falling within the frequency band 4 200–4 400 MHz as measured at the receiver does not exceed a power spectral density of -120 dBm/MHz.

4.5.2.5.2 Receivers shall tolerate interference from sources operating outside of the frequency band 4 200–4 400 MHz whose total combined power as measured at the receiver does not exceed -20 dBm.

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End of new text.

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