



第十二次空中航行会议

2012年11月19日至30日，蒙特利尔

议程项目6：未来的方向

6.2：标准化——为支持一个天空而制定标准和建议措施的做法

制定国际民航组织技术规定及各国的参与情况

(由日本提交)

摘要

不断发展的空中航行系统（ANS）和按照《全球空中航行计划》（GANP, 9750 号文件）第四修正案对未来空中航行系统的部署表明，在及时有效地实施未来空中航行系统和全球空中交通管理的协调统一方面，国际民航组织的标准和建议措施（SARPs）及空中航行服务程序（PANS）等规定继续拥有重要的作用。

本工作文件与AN-Conf/12-WP/23号文件相关，强调了关于国际民航组织标准化做法的各种问题，并就部署国际民航组织未来空中航行系统的规定、维护航空系统组块升级和改善各国的知情决定环境，提出了各项行动。

行动：请会议审议本工作文件并同意第3段中的建议。

1. 引言

1.1 空中航行系统的发展和按照新的《全球空中航行计划》（GANP）部署未来的空中航行系统表明，国际民航组织在民航的航空安全、效率和规律性的标准制定中将继续发挥重要作用。这意味着，标准和建议措施（SARPs）、空中航行服务程序（PANS）和国际民航组织其他的技术文件将继续是实施和运行空中航行系统的监管依据。

1.2 由于《全球空中航行计划》的修正案及其补编是通过空中交通管理利害攸关方广泛的密切协作编制的，国际民航组织预期将会在与各国和业界的密切协作下制定这些规定¹，以适当应对未来空中航行系统的全球需求或要求。

¹ 本工作文件中的术语“技术规定”和“规定”指标准和建议措施、空中航行服务程序、各种文件和其他补编文件，如由国际民航组织制定的、辅助实施标准和建议措施及空中航行服务程序的通告。

1.3 本工作文件参照 AN-Conf/12-WP/23 号文件，根据日本自己的空中交通系统创新联合行动方案（CARATS）和通信、导航、监视（CNS）系统研发（R&D）活动的最新经验，解决有关制定国际民航组织技术规定的各种问题。

2. 讨论

2.1 实现标准化有待考虑的未来空中航行系统的特征

2.1.1 空中航行系统在第十一次空中航行会议之后发生了许多变化，已逐步满足空中交通复杂而多样化的运行和技术要求。鉴于新的《全球空中航行计划》和《全球空中交通管理运行概念文件》（9854号文件）所设想的空中交通管理运行的技术进步和模式转变，可观察到这一趋势将会以前所未有的步伐得到发展。

2.1.2 复杂而快速的技术进步需要高效的标准化进程，从而恰当应对未来空中交通管理要求，并兼顾附录A所列未来通信、导航、监视系统的各种特征。在第十一次空中航行会议之后或二十一世纪之交前后，部分特征已变得引人注目。

2.2 制定标准和建议措施及空中航行服务程序的原则

2.2.1 各国已在实施空中航行系统，并根据A37-15号大会决议（附录B的ref. B-1至B-2）致力于国际民航组织的标准制定工作。该决议针对制定技术规定、国际民航组织空中航行委员会各专门小组的作用及实施标准和建议措施陈述了各项原则。这些原则是并将继续是协助各国和空中交通管理利害攸关方以全球协调一致的方式实施空中航行系统的一个工具。

2.3 国际民航组织大会第 37 届会议关于未来空中航行系统技术标准的讨论

2.3.1 国际民航组织大会第37届会议核准了A37-12号大会决议（附录B的ref. B-3）下的一项以六个支柱为基础的决议，其中主要涉及本工作文件的要素为：

- a) 国际民航组织修正《全球空中航行计划》（包括供国际民航组织分析各国空中交通管理现代化计划对全球系统所产生影响的框架），以确保全球协调一致；以及
- b) 各国及时与国际民航组织共享各自的空中交通管理现代化方案，供国际民航组织审查和评估，以确保全球兼容性和一致性。

2.3.2 这些要素是以当时若干空中交通管理现代化方案的发展或产生为背景拟定的，并考虑到单个通信、导航、监视系统之间关系的不确定性和空中交通管理运行改进及要求。此外，由于对全球空中交通管理界未来前进的方向信心不足，空中交通管理的执行人和空中航行服务提供者（ANSPs）遭遇到未来投资的难题。各国和国际民航组织缺乏确保空中交通管理全球一致性可共享的工具，因而使上述决议成为必然。

2.4 关于促进航空系统组块升级（ASBUs）部署发展国际民航组织规定的思考

2.4.1 为回应A37-12号决议，《全球空中航行计划》已获修正，纳入技术路线图、地区空中航行表（RANF）和其他的各国指导工具。WP/23号文件表明了以“利用技术专家组”为重点的国际民航组织标准化进程的前行道路。为使空中交通管理界有效利用《全球空中航行计划》的组成部分和见解以获得最大的益处，建议采取额外的行动，在以下几个方面扩展WP/23号文件中所述的前进道路。

维护航空系统组块升级和路线图

2.4.2 WP/23号文件第6段说明了本次会议之后使新的《全球空中航行计划》生效和保持的方法。空中交通管理利害攸关方在单独的系统实施中运用航空系统组块升级和路线图时，这些文件必须具有一致性和最新性。表面上看，标准和建议措施与空中航行服务程序一般是由国际民航组织单个的专家组分别制定的，必要时小组之间的协调，首要事宜尤其如此。

2.4.3 鉴于业界和各国通过广泛磋商拟定了航空系统组块升级，其中的每个模型得到或将会得到一系列相关的国际民航组织规定的支持，且空中交通管理运行改进包括以上第2.1段所述的复杂的组块构建工作，建议应在可进行多学科考虑和分析的情况下，通过专家组的评议或其他方案（而不是以附件为基础的方法）维护航空系统组块升级和路线图。在设计新的国际民航组织方案时，应详细阐述工作效率、利害攸关方适当均衡的代表性、指挥多学科工作的能力和WP/23号文件中所提出的其他要素。

“知情规划和决定”：更好地了解、更多地参与和更恰当地规划和实施

2.4.4 目前，直到国际民航组织进行初步审查之后，才以国家函件的方式向全体成员国和有资格的行业组织征询有关标准和建议措施与空中航行服务程序修正草案（附带合理的背景资料）的意见。然而，各国尤其是很少参与专家组的国家，总是难以清楚地了解通信、导航、监视系统各项规定和运行规定之间的关系、修正案在空中交通管理系统或各国空中交通服务方面带来的影响、相关规定的系统化观点和修正过程的整个时间表及情况。

2.4.5 日本在通信、导航、监视系统的研发、系统设计和发展、空中航行服务提供方面的经验表明，面对2013-2028年航空系统组块升级的时间框架，空中航行服务提供者、研究机构和行业必须从早期阶段就对（不仅仅是国际民航组织而且还有其它主要标准机构的）标准化有一种预期。因此，各国在进行各自的规划时可制订远期的规范框架。而研究机构和制造部门可在兼顾标准化影响的同时分阶段地开展工作。

利用技术专家组和各国的参与

2.4.6 WP/23号文件主要涉及在对未来系统开展标准化工作时如何利用国际民航组织的技术机构。除WP/23号文件中提到的各种建议，根据上述第2.1段所述的未来系统的复杂性和多学科性，建议在处理航空系统组块升级大多数模块所需要的多学科和分级任务时，在专家组或国际民航组织秘书处内维持较强大的领导力。此外，有关空中航行系统实施的地区情况需要得以系统地分析，并通过有效利用地区规划和实施组（PIRGs）的讨论结果或其他有待载入《全球空中航行计划》的新方案，在专家组的标准化工作中得到体现。

2.4.7 在国家方面，不断地鼓励各国通过WP/23号文件中所审议的纠正方案致力于国际民航组织的规定部署工作，并宣传其空中交通管理现代化方案，包括国际民航组织、各国和行业可高效和有效分享的、用作地区或全球协调空中交通管理催化剂的补编材料。这仍符合A37-12号大会决议的精神。同时预期业界继续做出迄今为止在《全球空中航行计划》制定中所展现出的贡献。

3. 结论

3.1 根据对上述第 2.4 段中三个主题的审议，考虑到扩大 WP/23 号文件中的建议 6/x，请会议同意以下建议：

建议 6/x——制定国际民航组织技术规定

会议请国际民航组织：

- a) 考虑在一致性、最新性、透明度和交叉领域监管方面阐明维护航空系统组块升级和技术路线图的方案，并酌情在《全球空中航行计划》第四版中反映该方案；
- b) 改进国际民航组织当前的做法，以酌情向各国和其他的空中交通管理利害关系方通告标准化状态和进程，以及相关规定的系统化看法、修订规定的影响；
- c) 除使用地区空中航行表以外，考虑采用国际民航组织可据以获取地区实施情况和各项挑战的系统性高效方法，并在有效支持航空系统组块升级部署的标准化进程中得以体现。

会议请各国和行业：

- a) 在认识到 A37-15 号大会决议的同时，继续支持国际民航组织的标准化活动；并
- b) 通过遵循 A37-12 号大会决议的国际民航组织既定方案，共享各自的空中交通管理（ATM）现代化方案，包括用于协调地区或全球空中交通管理的补编材料。

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APPENDIX A

FEATURES OF FUTURE AERONAUTICAL SYSTEMS AND THE IMPLICATION OF STANDARDIZATION

Note.— The summary below is prepared with an intention of drawing attention of those involved in standardization, system design, and system R&D work to the features of future aeronautical systems, which need to be taken into account when effectively advancing standardization work.

- **From the viewpoint of system design and engineering**

- A system will be highly integrated with subsystems of communication, surveillance and/or navigation systems, while many of legacy CNS systems work independently and a single system functions in a closed or simple radio signaling loop.
- Systems will be interconnected capitalizing on advanced networking, computer, and radio communication technology, with a heavier weight on software function and performance.
- There would be less distinguished physical boundary between communication, surveillance and navigation systems.
- The more integrated, complex and sophisticated the future systems design becomes to suit the future ATM requirements, the more essential, challenging and complicated it will be to achieve compatibility and interoperability between systems.
- Systems based on satellite-based communication and navigation technologies can provide service beyond an FIR to cover some FIRs, up to regions and ultimately to the globe.
- Security, contingency, human machine interface (HMI) requirements need to be adequately reflected in the design of a system and the architect of a whole aviation system.

- **From the viewpoint of standardization**

- SARPs will transform into more descriptive and more performance-based stipulation, which resultantly entails the placement of supplementary technical details onto the outside SARPs and PANS.
- Performance requirements such as integrity, continuity, availability and security will be more significant in designing a system and evaluating the compliance of the systems with international standards.
- Consideration of a variety of ATM requirements originating from aircraft operators, environment challenge, HMI and social-economic demand are needed.
- To define an ASBU Module or a system in that Module, a set of provisions of individual subsystems need to be clearly defined and systematically represented under the framework of ICAO standards and provisions, taking into account of coherence, interdependency, hierarchical status of provisions ranging from high-level SARPs to low-level or detailed documents including industry standards.

- Up-to-dated and consistent ASBUs documents and Technology Roadmaps as well as out-of-SARPs technical documents will have graver influence to States' regulators, ANSPs, aircraft operators, and R&D institutes in terms of practical implementation of aeronautical systems and virtual interoperability.
- Standardization of aeronautical systems and that of ATM operations need to be synchronized and adequately coordinated to ensure systems implementation in a harmonious and synchronized manner.
- Expansion or augmentation of ICAO technical provisions for aeronautical systems or ATM improvements which are regarded cross-regionally or globally "essential" or "imminent" need to be undertaken by ICAO with high priority.

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APPENDIX B
RELEVANT ICAO ASSEMBLY RESOLUTIONS

A37-15: Consolidated statement of continuing ICAO policies and associated practices related specifically to air navigation

Note.– Only Appendix A and C to Resolution A37-15 are excerpted hereunder since these relates to the subject matter of Section 2.2 of this working paper.

APPENDIX A
**Formulation of Standards and Recommended Practices (SARPs) and
Procedures for Air Navigation Services (PANS)**

1. SARPs and PANS shall be amended as necessary to reflect changing requirements and techniques and thus, inter alia, to provide a second basis for regional planning and provision of facilities and services;
2. subject to the foregoing clause, a high degree of stability in SARPs shall be maintained to enable the Contracting States to maintain stability in their national regulations. To this end amendments shall be limited to those significant to safety, regularity and efficiency, and editorial amendments shall be made only if essential;
3. SARPs and PANS shall be drafted in clear, simple and concise language. SARPs shall consist of broad, mature and stable provisions specifying functional and performance requirements that provide for the requisite levels of safety, efficiency and interoperability. Supporting technical specifications, when developed by ICAO, shall be placed in separate documents to the extent possible;
4. in the development of SARPs, procedures and guidance material, ICAO should utilize, to the maximum extent appropriate and subject to the adequacy of a verification and validation process, the work of other recognized standards-making organizations. Material developed by these other standards-making organizations may be deemed appropriate by the Council as meeting ICAO requirements; in this case such material should be referenced in ICAO documentation;
5. to the extent consistent with the requirements of safety and regularity, Standards specifying the provision of facilities and services shall reflect a proper balance between the operational requirements for such facilities and services and the economic implications of providing them;
6. Contracting States shall be consulted on proposals for the amendment of SARPs and PANS before the Council acts on them, except when the Council may deem urgent action to be necessary. Furthermore, subject to the adequacy of the verification and validation process, technical specifications may be acted upon by the Council without consultation with States. Such material shall however be made available to States upon request;
7. The applicability dates of amendments to SARPs and PANS shall be so established as to allow the Contracting States sufficient time for their implementation;
8. No Annex or PANS document shall be amended more frequently than once per calendar year.

APPENDIX C
Panels of the Air Navigation Commission (ANC)

1. panels of the Air Navigation Commission shall be established when it is necessary to advance the solution of specialized technical problems which cannot be solved adequately or expeditiously by the Air Navigation Commission through other established facilities;
2. the terms of reference and the work programmes of panels shall support the ICAO Business Plan, be clear and concise with timelines and shall be adhered to;
3. the progress of panels of the Air Navigation Commission shall be reviewed periodically and panels shall be terminated as soon as the task assigned to them has been accomplished. A panel shall be allowed to continue in existence for more than four years only if its continuation is considered justified by the Air Navigation Commission; and

4. panel activity shall support a performance-based approach to SARPs development to the extent possible.

A37-12: ICAO global planning for sustainability

Note.— This Resolution is excerpted as a reference to Section 2.3 of this working paper.

1. *Instructs* the Council to amend the GANP to include a framework that will allow ICAO to easily analyze the impact of States' air navigation modernization plans on the global system and then take appropriate action as needed to ensure global harmonization;
2. *Calls upon* States, planning and implementation regional groups(PIRGs) and the aviation industry to utilize the guidance provided in the GANP for planning and implementation activities;
3. *Urges* Contracting States, industry and financing institutions to provide the necessary support for coordinated implementation of the GANP, avoiding duplication of effort;
4. *Urges* States that are developing new generation plans for their own air navigation modernization to share their plans in a timely manner with ICAO to ensure global compatibility and harmonization;
5. *Instructs* the Council to ensure that the GANP is continuously maintained up to date in light of further operational and technical developments, in close collaboration with States and other stakeholders; and
6. *Instructs* the Council to organize a Twelfth Air Navigation Conference in 2012, to develop longer-term planning for ICAO based on an update of the GANP.