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ELEVENTH AIR NAVIGATION CONFERENCE

Montreal, 22 September to 3 October 2003

REPORT OF COMMITTEE A TO THE CONFERENCE ON AGENDA ITEM 4

The attached report has been approved by Committee A for submission to the Plenary.

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Chairman
Committee A

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(12 pages)

Agenda Item 4 : Capacity-enhancement measures

4.1 INTRODUCTION

4.1.1 Under this agenda item, the meeting recalled the problems being experienced by a number of regions as a result of increasing air traffic demand and limited capacity, and considered some of the efforts being made at both the global and regional levels to enhance capacity and to establish a more efficient operating environment. Additionally, noting the necessary function ICAO provisions played in enabling a more efficient and effective use of available airspace, the role of such provisions was examined.

4.1.2 The meeting reviewed global and regional principles and guidelines for States and PIRGs to consider when developing capacity-enhancement measures and the relationship between capacity-enhancement and safety, with a particular emphasis on runway safety. In view of the extent the field of capacity enhancements could cover, the meeting also took the opportunity to review and assess particular strategies, some of which had already been considered by individual States and/or regions to support enhanced capacity in the near term.

4.2 GLOBAL MEASURES

4.2.1 The meeting recognized that in many areas, demand often exceeded the available capacity of the air navigation system, resulting in significant negative consequences not only to the aviation industry, but also to general economic health. Over the long term, this required the implementation of an ATM system that allowed maximum use to be made of enhanced capabilities provided by technical advances, based on the principle of collaborative decision making (CDM). Over the last ten years in particular, most States and all ICAO regions had embarked on implementation programmes intended to improve aviation operations by making use of new technologies. The meeting noted, however, that the conclusions reached under Agenda Item 1 underscored the need for a comprehensive concept of an integrated and global ATM system, based on clearly-established requirements. This concept, in turn, would form the basis for the development of ATM requirements and the coordinated implementation of CNS/ATM technologies.

ATM operational concept

4.2.2 The meeting noted that the ATM operational concept and all enablers to enhance capacity and improve aircraft operations, such as 4-dimensional trajectory and ADS-B, would need to be adaptable to the unique operational environment and needs of the different States and regions. Additionally, there was a range of economic, legal, political, financial, environmental and institutional issues that varied from region to region. The meeting further noted that the planning processes at the global, regional and national levels should provide a well-understood, manageable and cost-effective sequence of improvements that kept pace with user needs, culminating in a system meeting safety, security, capacity, efficiency and environmental demands. The ATM operational concept provided the basis from which the ATM requirements, objectives and benefits would be derived, thereby providing the foundation for the development of regional and national ATM implementation plans.

4.2.3 It was recognized that States and regions were different from each other with different requirements needing different solutions, which was a fundamental aspect of the ATM operational concept. At the same time, plans of all States needed to be aligned to the greatest extent possible, to ensure that solutions were internationally standardized and integrated, and did not unnecessarily impose multiple equipment carriage requirements in the air components of the ATM system, or multiple systems on the ground.

4.2.4 In many areas, simple solutions based on regional harmonization or cooperation across homogeneous areas could provide satisfactory short- or medium-term responses while in other areas more complex ATM systems and sophisticated political and legal arrangements might be required. The meeting also noted that the PIRGs had made considerable progress on implementing CNS/ATM systems and, in some cases, had worked inter-regionally to progress global initiatives. In this respect, a number of initiatives were recalled including the introduction of reduced vertical separation minimum (RVSM) over the South China Sea (to be extended over the Middle East and the Bay of Bengal), combined with the Europe, Middle East, Asia ATS Route Structure South of the Himalayas (EMARSSH). These inter-regional coordinated initiatives had brought about substantial benefits to both ATS providers and users. The meeting also noted a proposal for the Asia and Pacific Regions to commence planning for further airspace capacity enhancements and, in particular, the implementation of required navigation performance (RNP) 4 operations, to cater for future air traffic growth. In this respect, it was acknowledged that during the regional planning process, States and aircraft operators would have an important role to play in following through with the necessary operational approval process. The need was also stressed that States should adhere to the ICAO provisions as contained in ICAO Annex 11 — *Air Traffic Services* and the *Procedures for Air Navigation Services — Air Traffic Management* (PANS-ATM, Doc 4444) when implementing RNP and not develop abnormal values or track spacings.

4.2.5 The discussion highlighted the importance placed on coordination between the regions. The meeting noted that existing mechanisms already provided the opportunity for States and PIRGs to advance inter-regionally those capacity-enhancing procedures that were likely to have a follow-on effect on their neighbours. The already existing inter-regional coordination mechanisms were recalled, however, the meeting acknowledged that other coordination mechanisms should be utilized, including informal interface coordination meetings. The meeting concluded its discussion with the following recommendation:

Recommendation 4/1 — Harmonization of air navigation systems between regions

That ICAO:

a) maintain, and develop further, a coordination mechanism between regions for planning and implementation of capacity-enhancing measures and ATM performance improvement between regions for a harmonized evolution aimed at enhancing aviation efficiency and safety;

b) be systematically involved in any regional initiatives aiming at enhancing ATM capacity and performance; and

c) urge States, who have not already done so, to establish national CNS/ATM coordination and implementation committees, with a point of contact to be made known to the respective ICAO Regional Office, so as to facilitate harmonized transition to CNS/ATM systems.

ICAO provisions

4.2.6 It was recalled that the globally accepted framework for the harmonization of civil aviation were the ICAO Standards and Recommended Practices (SARPs), which covered procedures of worldwide applicability. These SARPs, contained in ICAO Annexes were complemented by Procedures for Air Navigation Services (PANS) which specified, in greater detail than the SARPs, the actual procedures to be applied by ATS units. To accommodate specific needs on a regional basis, the development of international civil aviation was further governed by regional air navigation plans (ANPs), which set forth in detail the facilities and services to be provided by States pursuant to Article 28 of the Convention. Complementing the ANPs were the ICAO *Regional Supplementary Procedures* (SUPPs, Doc 7030), which formed the procedural part of the ANPs to meet those needs in specific areas, which were not covered in worldwide provisions.

4.2.7 As safety, regularity and efficiency of air traffic, to a large extent, depended on the uniform application of procedures on a global basis, the meeting recognized that it was of paramount importance that Regional Supplementary Procedures were not in conflict with the provisions contained in the Annexes and PANS. Further, they must either specify detailed regional options for those provisions or promulgate a regional procedure of justifiable operational significance, additional to existing provisions in Annexes or PANS, and should furthermore avoid variations in text of procedures with similar intent applicable to more than one area. More specifically, it was important that Regional Supplementary Procedures should indicate a mode of implementing procedural provisions in Annexes and PANS, as distinct from a statement or description of required facilities and services as published in the ANPs. The meeting noted that Regional Supplementary Procedures may also indicate permissible additions to provisions in Annexes and PANS.

4.2.8 The meeting further noted, however, that some States, in their efforts to develop and implement capacity-enhancing procedures, sought to utilize the Regional Supplementary Procedures as a means of harmonizing such procedures among neighbouring States. In several cases, the proposals had contravened provisions already contained in the Annexes and/or PANS, and such proposals could not be considered.

4.2.9 The meeting agreed that as a long term goal, the implementation of an ATM system that allowed maximum use to be made of enhanced capabilities provided by technical advances held the key to a safe and efficient global ATM system. The ATM operational concept addressed what was needed to increase user flexibility and maximize operating efficiencies in order to increase system capacity and improve safety levels in the future system. This long term goal was therefore preferable to using intermediate measures implemented in an *ad hoc* fashion on a regional basis.

4.2.10 Although it was appreciated that accommodating regional needs for capacity enhancement within the framework of existing SARPs and PANS was not always expeditious, the meeting agreed that it

was vital that States and PIRGs continued to propose procedures for capacity-enhancement to ICAO with a view to possibly amending global provisions rather than implementing on a regional basis. Ultimately, this would avoid the danger of disparity with existing ICAO provisions.

Performance-driven planning process

4.2.11 The meeting was informed of current efforts to improve ATM service provision in Europe, within the framework of a performance-driven top-down planning process (as documented in the European Convergence and Implementation Plan (ECIP)). The ECIP was part of a process, where planning decisions were based on benefits rather than technology, and took as its foundation the need to set and attain quantifiable and measurable ATM performance targets for the ATM key performance areas. In its initial phase the process had been applied to capacity enhancement.

4.2.12 The meeting noted that the process was consistent with the ICAO Air Navigation Plan/Facilities and Services Implementation Document (ANP/FASID) process, as well as the ICAO *Global Air Navigation Plan for CNS/ATM Systems* (Doc 9750), as far as operationally applicable.

4.2.13 It was further noted that the IATA member airlines supported a performance-driven planning approach that incorporated the widespread, consistent, and timely implementation of currently available ATM capacity improvements.

4.2.14 The meeting noted that some PIRGs were already applying some of the elements of the European approach, particularly with regard to collaborative links within the ATM community. Nevertheless, the meeting also agreed that the approach might serve as a model that each PIRG could study for possible application in its respective region. The meeting therefore agreed on the following recommendation:

Recommendation 4/2 — Investigation of performance-driven planning and implementation methods

That States study the approach to planning and implementation commonly adopted by European States, with a view to the possible application of its elements in their respective regions.

4.2.15 The importance of collaborative decision-making and global air traffic flow management in improving capacity and ATM provisions over large areas was stressed. The efforts of several States that had been working closely together in this respect were presented. The meeting recognized that the overall goals and benefits of these efforts were already being realized by these States, which included the provision of a seamless system traversing international boundaries, based on shared information to enhance security and ATM effectiveness. The meeting noted that the section of the operational concept dealing with

demand/capacity balancing was very much aligned with the work being accomplished and that the work on global demand/capacity balancing should be prioritized as an important facilitator of the sought-after seamless ATM system. The meeting therefore endorsed the following recommendation:

Recommendation 4/3 — Collaborative decision-making and global demand/capacity balancing

That ICAO:

a) develop SARPs and procedures for global air traffic flow and capacity management based on the concept of demand/capacity balancing as described in the operational concept; and

b) develop guidance material for States to implement global demand/capacity balancing techniques based on collaborative decision-making processes, and sharing of aviation information in accordance with the operational concept.

4.2.16 The view was expressed that the prevalent practices of night curfew at some airports had led to restrictive air traffic handling capacity situations. Such restrictions, with increasing traffic volumes, resulted in air traffic congestion and imbalances in the utilization of the aviation infrastructure. In noting the sentiment conveyed, the meeting recalled that ICAO policies and practices related to environmental protection were contained in Assembly Resolution A33-7, with particular reference being made to a "balanced approach" to aircraft noise management in Appendix C to the Resolution.

4.3 REGIONAL MEASURES

Single European Sky

4.3.1 The meeting was informed of efforts in some parts of the European Region to address the unique problems that the region faced with respect to increasing air traffic and the problems associated with this increase. The initiative came to be known as "Single European Sky" and was first used by the transport ministers of the European Union (EU) following a proposal by the European Commission. Additionally, the intense increase in traffic was beginning to stretch the system. The subsequent agreement led to the development of harmonized rules on service provider certification, charging, cross-border airspace organization and management, increased cooperation between civil and military, and standardization of equipment. Standardized licensing was called for, allowing air traffic controllers to be employed in other Member States where shortages were occurring, as was a more uniform airspace to streamline safety procedures and save fuel by allowing aircraft to fly more direct routes.

4.3.2 Whilst the Single European Sky initiative was developed to deal with the unique problems of a particular region, the meeting recognized that the project, or parts of it, might be adaptable to other regions or for global use as part of the ongoing effort to achieve an interoperable and more seamless global ATM

system. Nevertheless, the meeting also recognized that it was appropriate that a more thorough investigation, analysis and review of the progress achieved as well as difficulties encountered would need to be undertaken to determine if, where and how, the project could be adapted for global use, or perhaps, for use by other regions. The meeting therefore agreed on the following recommendation:

Recommendation 4/4 — Investigation and analysis of the "Single European Sky" approach to global harmonization

That ICAO follow the progress of the "Single European Sky" project for possible use in other homogeneous regions or at the global level.

Runway safety programme

4.3.3 Information was presented to the meeting on work currently underway, or planned, relating to runway safety. The meeting noted that several States and international organizations, including ICAO, had embarked on extensive programmes to improve the situation with respect to runway incursions. The meeting noted that the Air Navigation Commission had identified several critical areas that it felt had to be investigated and which had a relation to overall runway safety. These included: radiotelephony phraseology, language proficiency, ATC procedures, standards and performance requirements for equipment, aerodrome lighting and markings, aerodrome charts, operational aspects, situational awareness and human factors.

4.3.4 On completing an overview of relevant ICAO provisions and guidance, the meeting noted that extensive work had already been accomplished. The meeting also noted that ICAO had embarked upon a worldwide education and awareness campaign which encouraged States to implement the relevant provisions and runway safety programmes. In this regard, the meeting was informed that the campaign had begun with the development of an ICAO interactive CD-ROM toolkit, which would include references to relevant ICAO SARPs and other available documentation on runway safety programmes, videos, electronic versions of posters, etc. ICAO had also commenced a series of seminars on runway safety and ATS safety management in the different ICAO regions.

4.3.5 With respect to the significant work already underway in some States and regions, a number of similar proposals were tabled encouraging ICAO to undertake an international approach, which could lead to an effective global solution. Specifically, the availability of standardized runway incursion information was recommended as an essential step towards achieving worldwide risk reduction and improving risk management of runway incursions. The view was expressed that standardization of the definition of a runway incursion, a runway incursion severity and error type categorization taxonomy, and a runway incursion database would provide the following benefits:

a) the development of improved global runway incursion statistical and trend information to support a wider range of risk identification; and

b) improvement of risk management worldwide.

4.3.6 The meeting's attention was also drawn to the results of the work of both Transport Canada and NAV CANADA in analysing the phenomenon of increasing runway incursions. According to the Transport Canada report in this respect, a number of factors were potentially responsible for the upward trend in runway incursions, including increasing traffic volume, capacity-enhancing procedures to deal with the increasing traffic, airport layouts and human factors. Briefly, the report concluded that:

a) the potential for a runway incursion increased more rapidly than the traffic volume;

b) many aerodrome improvement projects had resulted in a more complex aerodrome layout which, together with inadequate aerodrome design, marking and lighting, and a lack of standard taxi routes, had worsened the situation; and

c) the effects of increased traffic volume, capacity-enhancing procedures and aerodrome physical layout may simultaneously exacerbate the runway incursion potential at certain aerodromes; and human error was the mechanism that translates potential occurrences, based on the factors above, into actual occurrences.

4.3.7 Following a survey of pilots and air traffic controllers conducted in 2001 regarding specific runway safety issues and analysis of the available data, runway incursions had been identified as one of the most serious safety issues in airport operations. The resulting European Action Plan for the Prevention of Runway Incursions consisted of the survey findings and contained more than fifty recommendations with supporting material. It was also noted that the Action Plan underlined the need to amend some ICAO provisions. The meeting noted that the Action Plan was in the process of being formally distributed through the national aviation safety authorities of the European Civil Aviation Conference (ECAC) Member States.

4.3.8 The meeting agreed that the implementation of runway safety programmes by States would be an important step to addressing safety of operations at aerodromes, and that the action by ICAO currently underway or planned, would provide the necessary support for such an exercise. In this respect, the meeting noted that the ICAO CD-ROM toolkit might also be a more effective tool in terms of access and maintenance than the development of traditional guidance material. In particular, the material contained in the European Action Plan was considered useful for integration into the toolkit. The discussion also highlighted the importance States placed on the harmonization of radiotelephony speech and the improvement of the use of radiotelephony phraseology. The importance of all States to implement phraseologies published in the PANS-ATM, in particular those related to runway safety, was stressed.

4.3.9 The meeting agreed that ICAO should develop a formal definition of "runway incursion". It was also agreed that ICAO should standardize a runway incursion severity and error type categorization taxonomy, that is harmonized, to the extent possible with existing classifications, and include such a taxonomy into a suitable database. Categorization would help define and measure risk, and the availability of data in a common database would allow for more powerful statistical analyses. In this respect, the meeting noted that further enhancement of the ICAO's Accident/Incident Data Reporting (ADREP) system would facilitate the reporting of runway incursion occurrences by States.

4.3.10 The meeting also recognized that any link between capacity-enhancing procedures and a potential increase in runway incursions should be dealt with through the appropriate safety studies that would

be conducted when a State was considering such procedures. The meeting was informed that a number of States would jointly aim at utilizing guidance contained in the soon to be published ICAO *Manual on Advanced Surface Movement Guidance and Control Systems (A-SMGCS)* to support appropriate capacity safely, in all weather conditions. The meeting noted that the European Community and its Member States had initiated the action of implementing the use of the A-SMGCS Manual and, in particular, that part concerned with surveillance and control functions, for the installation of such a system at European airports. In this regard, the meeting was informed that ICAO had an established task (ATM-9703) in the *Technical Work Programme (TWP) of the Organization in the Air Navigation Field* to continue to advance the operational requirements for A-SMGCS and that such emerging provisions would take account of research and development programmes in a number of States.

4.3.11 With respect to the proposal for the inclusion of requirements for communications and air side driver training for personnel who operate on or near the runway, the meeting was of the view that such action warranted further consideration in the context of the on going effort to review ICAO requirements and guidance.

4.3.12 In concluding its discussion on these topics, the meeting agreed to the following recommendations:

Recommendation 4/5 — Runway safety programmes

That States:

a) take appropriate actions to improve runway safety worldwide through the implementation of runway safety programmes;

b) collect and share runway incursion incidents in accordance with Annex 13 — *Aircraft Accident and Incident Investigation*, Chapter 8, *Accident Prevention Measures*; and

c) take into consideration that part of the ICAO *Manual on Advanced Surface Movement Guidance and Control Systems (A-SMGCS)* related to surveillance and control functions, when implementing such systems at airports.

Recommendation 4/6 — Capacity-enhancing procedures

That States, when considering capacity-enhancing procedures at aerodromes, conduct appropriate safety studies and take due consideration of the effect on runway safety.

Recommendation 4/7 — Global runway incursion risk management

That ICAO:

a) urgently progress the development of a formal definition for "runway incursion" as a prerequisite for further actions to be taken in this domain; and

b) enhance the Accident/Incident Data Reporting (ADREP) to incorporate a common categorization taxonomy of runway incursion severity, error type and/or factors that contribute to incursions.

Rectification of deficiencies in the air navigation field

4.3.13 The meeting recalled efforts by ICAO, PIRGs and States in pursuing the elimination of deficiencies in the air navigation field and the implementation of all regional air navigation plans to further improve the existing levels of safety. Furthermore, the 33rd Session of the ICAO Assembly (September/October 2001), through Resolution A33-16, had urged States to apply the political will to take the remedial action identified by universal safety oversight audit programme (USOAP) audits, to correct the deficiencies identified in the regional planning process and related activities, and to promulgate the necessary regulations to implement the safety systems developed under the Global Aviation Safety Plan (GASP).

4.3.14 In an effort to take advantage of the momentum already evident it was proposed that States and users be urged to review their respective lists of identified deficiencies to ensure validity. Furthermore, plans indicating actions intended and time frames for the elimination of deficiencies in air navigation facilities and services, as listed by PIRGs, should then be formulated and forwarded to ICAO. As a final step in the reporting process, the regional office should be systematically notified of the rectification of deficiencies and receive confirmation from the user which originally identified the deficiency.

4.3.15 The meeting noted that many deficiencies had continued to persist for a number of years, thus causing concern. Furthermore, States should increase their efforts to overcome the delay in mitigating the air navigation deficiencies identified by the respective PIRG and resolve cases of non-implementation of regional plans. It was further noted that while a proper reporting mechanism for deficiencies existed, additional mechanisms in the monitoring and reporting of corrective actions taken and progress towards the elimination of deficiencies were necessary. Within the context of a list of deficiencies, the view was expressed that rectification of deficiencies by States should follow a prioritization process where deficiencies related to Standards, Recommended Practices and procedures should be eliminated in that order.

4.3.16 On concluding its discussion, the meeting agreed to the following recommendation:

Recommendation 4/8 — Rectification of air navigation deficiencies

That ICAO:

a) urge States to:

1) review their respective lists of identified deficiencies and inform the ICAO Regional Office of those that have been eliminated;

2) formulate and forward an action plan and time-table for rectification of outstanding deficiencies to the respective ICAO Regional Office for review; and

3) identify areas, if any, where the establishment of multinational agreements or informal coordination groups may contribute to the resolution of deficiencies;

b) encourage users of air navigation facilities and services to report to the respective regional office once they note that the remedial action on the deficiency they had reported has been taken; and

c) continue to provide assistance to States for the purpose of rectifying deficiencies.

Flight level harmonization

4.3.17 The meeting was invited to consider the need to harmonize flight level assignment procedures wherever reduced vertical separation minimum (RVSM) was being applied through the worldwide adoption of the system of cruising levels specified in Annex 2 — *Rules of the Air*, Appendix 3, Table of Cruising Levels. Of particular concern were operations at the interface between airspaces where different units of measurement were used. Information was presented that illustrated that when the common cruising levels structure and corresponding vertical separation minima, expressed in metres or feet, as outlined in Annex 2 were adhered to, the maximum difference in cruising level experienced by any aircraft transitioning between metres and feet was 23 m (75 ft). By contrast, on some regional boundaries where this conversion was made today using State-specific procedures for conventional vertical separation (500 m or 2 000 ft), the cruising level difference was as great as 287 metres (941 ft) and averaged over 165 m (541 ft). Differences between individual ATS units cruising level procedures were mitigated in many cases by sterilization of altitudes within one or both flight information regions. With the introduction of RVSM, however, the latitude to mask differences in this manner would almost be eliminated. Further, this practice limited capacity and flexibility as States and regions moved towards a more dynamic CNS/ATM environment.

4.3.18 The meeting recalled that substantial consideration of existing transition procedures in operations in the interface airspaces mentioned above had been made by ICAO in the past. Nevertheless, the meeting agreed that the introduction of RVSM should warrant further consideration of the issue.

4.3.19 The meeting concluded its discussion with the following recommendation:

Recommendation 4/9 — Harmonization of flight level assignment methodology across flight information boundaries

That relevant States, when planning for the introduction of reduced vertical separation minimum (RVSM) at interfaces between airspaces where different units of measurement are used, taking into account relevant operational and technical considerations, should apply a common cruising levels structure in accordance with the tables of cruising levels expressed in metres or feet, as outlined in Annex 2 — *Rules of the Air*, Appendix 3.

Recommendation 4/10 — Tables of cruising levels

That ICAO continue to study the common cruising levels structure, as outlined in Annex 2 — *Rules of the Air*, Appendix 3.

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