APPENDIX

DRAFT AMENDMENT TO ANNEX 10, VOLUME I

NOTES ON THE PRESENTATION OF THE AMENDMENT

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. ~~Text to be deleted is shown with a line through it.~~	text to be deleted
2. New text to be inserted is highlighted with grey shading.	new text to be inserted
3. ~~Text to be deleted is shown with a line through it~~ followed by the replacement text which is highlighted with grey shading.	new text to replace existing text

INTERNATIONAL STANDARDS
AND RECOMMENDED PRACTICES

AERONAUTICAL
TELECOMMUNICATIONS

ANNEX 10
TO THE CONVENTION ON INTERNATIONAL CIVIL AVIATION

VOLUME I — RADIO NAVIGATION AIDS

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ATTACHMENT B. STRATEGY FOR INTRODUCTION AND APPLICATION OF NON-VISUAL AIDS TO APPROACH AND LANDING

(see Chapter 2, 2.1)

1. Introduction

1.1 Various elements have an influence on all weather operations in terms of safety, efficiency and flexibility. The evolution of new techniques requires a flexible approach to the concept of all weather operations to obtain full benefits of technical development. To create this flexibility a strategy enables, through identification of its objectives and thoughts behind the strategy, incorporation of new technical developments or ideas into this strategy.

1.2 The strategy does not assume a rapid transition to a single globally established system or selection of systems to support approach and landing operations. ~~The strategy is intended to accommodate future systems or system architectures to be standardized and certified for international use in addition to the present standard non-visual aids.~~

1.3 The strategy addresses the application of non-visual aids to approach and landing with vertical guidance (APV) and precision approach and landing operations.

2. Objectives of strategy

The strategy must:

a) maintain at least the current safety level of all weather operations;

b) retain at least the existing level or planned improved level of service;

c) maintain global interoperability;

d) provide regional flexibility based on co-ordinated regional planning;

e) be applicable until at least the year ~~2015~~2020; and

f) take account of economic, operational and technical issues.

3. Considerations

3.1 General

The following considerations ~~(as of the SP COM/OPS/95 Meeting)~~ are based on the assumption that the operational requirement and the required commitment are available and the required effort is applied.

~~3.2 Standardization considerations~~

~~a) A concept which describes the performance criteria for approach, landing and departure operations in generic terms is under development;~~

~~b) acceptance and introduction of the generic performance criteria is expected to facilitate the application of emerging technologies for the approach, landing and departure phases of flight; and~~

~~c) introduction of the generic performance criteria for approach, landing and departure operations will not eliminate the need for safety and interoperability-related SARPs, and these SARPs are to be developed to support the generic performance criteria.~~

3.~~3~~2 ILS-related considerations

a) There is a risk that ILS Category II or III operations cannot be safely sustained at specific locations;

b) operators ~~must equip~~, as required, are equipped with ILS receivers which meet the interference immunity performance standards ~~by 1 January 1998~~ (Annex 10, Volume I, Chapter 3, 3.1.4);

c) expansion of ILS is limited by channel availability (40 channels);

d) many aging ILS ground installations will need to be replaced; and

e) in most areas of the world, ILS can be maintained in the foreseeable future.

3.~~4~~3 MLS-related considerations

a) MLS Category I is operational;

b) ~~Category II capable ground equipment is certified~~ground and airborne Category IIIB certification is in progress and is scheduled to be completed by early 2004; and

c) ~~Category III capable ground equipment is available~~MLS implementation is planned at specific locations to improve runway utilisation in low visibility conditions.

3.5~~4~~ GNSS-related considerations

a) Standards and Recommended Practices (SARPs) are in place for GNSS with augmentation to support APV and Category I precision approach;

b) SARPs for ground-based regional augmentation system (GRAS) for APV operations are under development;

c) GNSS with satellite-based augmentation system (SBAS) for APV operations is operational;

~~a~~d) GNSS with ground-based augmentation system (GBAS) ~~has been demonstrated, for at least two States, to meet accuracy, integrity, continuity and availability requirements~~ for Category I precision approach operations is expected to be operational by 2006;

~~b) GNSS with differential augmentation has been demonstrated, for at least two States, to meet accuracy requirements for Category II and III approach and landing operations, and integrity, continuity and availability requirements are under evaluation for such operations~~;

~~c~~f) technical and operational issues associated with GNSS approach, landing and departure operations must be solved in a timely manner~~;~~.

~~d) institutional issues associated with GNSS approach, landing and departure operations must be solved in a timely manner~~;

~~e) it is expected that an internationally accepted GNSS with augmentation as required may be available for Category I operations within the 2000-2005 time frame; and~~

e~~f~~) it is not expected that an internationally accepted GNSS with augmentation as required may be available for Category II and III operations before the 20~~05~~10-2015 time frame~~.~~; and

~~3.6 Emerging technologies-related considerations~~

~~Emerging technology systems are expected to contribute to improved service performance. Only core systems (ILS, MLS and GNSS with augmentation as required) are considered to play a major role in supporting all weather operations.~~

3.~~7~~5 ~~Multi-mode receiver (MMR)-related~~ Multi-modal airborne approach and landing capability considerations

~~The MMR (also known as multi-mode avionics landing system (MMALS)) can provide a means for a flexible transition. For maximum flexibility, this receiver is expected to include critical landing functions in a single box. A multi-mode~~To enable this strategy, a multi-modal airborne approach and landing capability ~~could equally be used;~~is necessary and is expected to be available.

~~b) the multi-mode receiver is under development and is expected to become available for progressive implementation within the 1997-2002 time frame; and~~

~~c) the MMR, with a high integrity data link, can support GNSS operations. The differential GNSS data link could be integrated into the MMR.~~

3.~~8~~6 Other considerations

a) There is an increasing demand for Category II and III operations;~~ and~~

b) GNSS can potentially offer unique operational benefits for low-visibility operations, including new procedures, flexible siting requirements and provision of airport surface guidance;

c) only the three standard systems (ILS, MLS and GNSS with augmentation as required) are considered to play a major role in supporting all weather operations. The use of head-up displays in conjunction with enhanced and/or synthetic vision systems may provide operational benefits;

d) a consequence of the global strategy is that there will not be a rapid transition from ILS to new systems such as GNSS or MLS. It is therefore essential for the implementation of the strategy that the radio frequency spectrum used by all of these systems is adequately protected;

~~b~~e) ~~while a single step~~to the extent practical a transition directly from ILS to GNSS is preferable~~;~~. ~~I~~In some States, however, it may not be possible to make this transition ~~towards new technology systems (e.g. GNSS Category II/III)~~ without losing the current level of Category II or III operations~~.~~;

f) as long as some users of a given runway continue to rely on ILS, the potential operational benefits resulting from the introduction of new landing systems may be limited by the constraints of mixed-system operations;

g) APV operations may be conducted using GNSS with augmentation as required or barometric vertical guidance and GNSS with ABAS or DME/DME RNAV lateral guidance; and

h) APV operations provide enhanced safety and generally lower operational minima as compared to non-precision approaches.

4. Strategy

Based on the considerations above and a need to consult aircraft operators and international organizations as appropriate, the global strategy is to:

a) continue ILS operations to the highest level of service as long as operationally acceptable and economically beneficial;

b) implement MLS where operationally required and economically beneficial;

c) implement GNSS with augmentation as required for APV and Category I operations where operationally required and economically beneficial;

~~e~~d) promote the ~~use of MMR or equivalent airborne capability to maintain aircraft interoperability~~development and use of a multi-modal airborne landing capability;

~~d) validate the use of GNSS, with such augmentations as required, to support approach and departure operations, including Category I operations, and implement GNSS for such operations as appropriate;~~

e) promote the use of APV operations, particularly those using GNSS vertical guidance, to enhance safety and accessibility;

~~e~~f) ~~complete feasibility studies for~~ identify and resolve operational and technical feasibility issues for GNSS with ground-based augmentation system (GBAS) to support Category II and III operations~~;~~. ~~based on GNSS technology, with such augmentations as required. If feasible, i~~Implement GNSS for Category II and III operations where operationally ~~acceptable~~ required and economically beneficial; and

~~f~~g) enable each region to develop an implementation strategy for ~~future~~these systems in line with the global strategy.

— END —