Explanatory Statement

Civil Aviation Safety Regulations 1998

Manual of Standards Part 172 Amendment (No. 1) 2008

Purpose
The purpose of *Manual of Standards Part 172 Amendment (No. 1) 2008* (the ***MOS amendment***) is to introduce a new air traffic control separation tolerance utilising global positioning systems. This tolerance will be known as *7 CEP*, and follows from CASA's recently concluded public consultation for its introduction.

Legislation
Section 98 (1) of the *Civil Aviation Act 1988* (the ***Act***) provides that the Governor-General may make regulations for the purposes of the Act and in the interests of the safety of air navigation.

Some of these regulations are contained in the *Civil Aviation Safety Regulations 1998* (***CASR 1998***). In particular, Part 172 of CASR 1998 deals with, among other things, air traffic services (***ATS***).

Under subregulation 172.022 (1) of CASR 1998, CASA may issue a Manual of Standards (***MOS***) for Part 172 setting out various standards for ATS. Under paragraph 172.065 (1) (a), an ATS provider must ensure that an ATS it provides is in accordance with the standards set out in the MOS.

CASA has issued *MOS Part 172 (**MOS***) for this purpose. Chapter 10 of MOS Part 172 contains the Australian separation minima used by air traffic controllers (***ATC***). These separation minima include tables of Circular Error of Position (***CEP)*** tolerances used to determine aircraft separation based on long-range navigation systems such as inertial navigation or reference systems (***INS/IRS***) and Global Navigation Satellite Systems (***GNSS***) (originally known as Global Positioning System [GPS]).

GNSS
When GNSS separation was first implemented in 1995, a 12 nautical mile (***nm***) CEP value was initially established. This CEP value was derived from modelling based on a 24-satellite constellation and the possible use by the US Government of Selective Availability (***SA***) — a system for deliberately degrading the accuracy of the GNSS signal.

Since then, the satellite constellation has increased with up to 32 satellites now available and SA is no longer used.

The 12 nm tolerance is quite conservative when compared to the demonstrated accuracy and reliability of GNSS in flight operations. For example, for an aircraft that meets the GPS RNAV or GPS OCEANIC capability (particular subtypes of GNSS navigation capability), a tolerance of 12 nm (i.e. radius 12 nm [22 km]) must be applied to the reported GNSS position. Separation must then be based on the extremities of this circular tolerance area or CEP.

Accordingly, for 2 aircraft with GPS RNAV or GPS OCEANIC capability reporting GNSS position, the minimum lateral separation must be the sum of both aircraft's

CEP plus a buffer factor of 1 nm [1.8 km], giving a lateral separation minimum of 25 nm [46 km].

More simply put, 2 aircraft at the same cruising level will only achieve minimum lateral separation if they are flying on different air routes spaced at least 25 nm [46 km] apart.

This lateral spacing requirement severely limits the options for efficient and fail-tolerant route structures between airports, particularly in the more remote areas of Australia that are not well provided with traditional navigation aids (for example, VHF Omni Range, non-directional beacons etc), and which are outside surveillance coverage. One area particularly affected is regional Western Australia.

AA assessment

In light of improved GNSS performance and availability, Airservices Australia (***AA***) conducted an assessment of current and historical data relating to GNSS accuracy, possible failure and improved satellite coverage. This assessment, based on Australian and international research, found the current 12 nm CEP value could be reduced to 7 nm for aircraft that have GPS RNAV or GPS OCEANIC capability whilst maintaining appropriate safety levels.

The mathematical analysis has also been reviewed by the International Civil Aviation Organization (***ICAO***) Separation and Safety Panel and found satisfactory.

Subsequently, AA presented a concept and design safety case to CASA arguing the intrinsic safety of the revised tolerance, and asked for approval to use the tolerance for ATC separation. CASA assessed both the design and an implementation safety case and accepted the proposal.

RAIM

Under the current regulatory framework (instrument CASA 425/08), pilots must inform ATS if there is Receiver Autonomous Integrity Monitoring (***RAIM***) loss or outage for more than 10 minutes. RAIM is a software algorithm in most GNSS receivers which gives an indication if the position accuracy of the receiver is suitable for use. A RAIM loss alarm is triggered if position accuracy is outside of limits or if there are insufficient satellites in view of the receiver to provide RAIM.

The AA assessment found that the 10-minute reporting requirement would be too long a delay to preserve the integrity of the 7 nm CEP tolerance, and considered that a 5 minute delay would be more appropriate. A key enabler for a 7 nm CEP tolerance, therefore, would be to change the reporting requirement for RAIM loss or outage to 5 minutes.

ICAO delay

The ICAO is in the process of considering whether to place the revised CEP value for GNSS in the manual of international standards for air traffic control (ICAO Procedures for Air Navigation Services – Air Traffic Management [PANS-ATM] Document 4444).

However, due in part to the requirement for ICAO to consult all 190 contracting states, the process for amending PANS-ATM will take at least 2 years.

Western Australia and elsewhere
The ICAO implementation date will be well past the point at which revisions to the Western Australian airspace structure should be in place.

The 7 CEP tolerance is a critical enabler for the introduction of a revised air route structure for Western Australia. This new route structure is needed for the airways system to better cope with current and projected traffic levels. The implementation date for the new structure, and therefore for the MOS amendment, is 20 November 2008.

CASA has, therefore, decided to introduce the revised GNSS CEP value for use with GNSS-equipped aircraft in advance of ICAO. While the main reason for fast-tracking the revised CEP tolerance is the new Western Australian airspace structure, the tolerance will be introduced throughout all domestic Australian controlled airspace. Accordingly, the revised RAIM outages/failures reporting requirement for pilots (in CASA 608/08) will be introduced throughout all Australian administered airspace.

MOS amendment

Details of the MOS amendment are contained in Attachment 1.

Legislative Instruments Act
Under subsections 98 (5A) and (5B) of the Act, MOS Part 172 is a legislative instrument for the *Legislative Instruments Act 2003* (the ***LIA***).The MOS amendment is, therefore, subject to registration, and tabling and disallowance in the Parliament under sections 38 and 42 of the LIA.

Consultation
Consultation under section 17 of the LIA has taken place in the usual way under the Notice of Proposed Change process and in accordance with the requirements for making a MOS under Subpart 11.J of CASR 1998.

Notice of Proposed Change (***NPC***) 172/03 was released for public consultation on 16 September 2008 and placed on the Safety Consultative Committee (***SCC***) website. The period for comment closed on 20 October 2008. The NPC related to both the 7 nm CEP tolerance and the change to RAIM reporting requirements (CASA 608/08).

There was little public comment on the NPC, and none that requires CASA to reconsider the proposal. This may be a consequence of AA's extensive consultation undertaken for the development of their safety case. AA conducted several hazard identification workshops and industry briefings with major and regional airlines, and industry groups. CASA is, therefore, satisfied that industry is aware of the change and that there are no significant industry concerns.

Office of Best Practice Regulation (*OBPR*)
A preliminary assessment of business compliance costs indicates that the MOS amendment will have no or low cost impact on business. Through the potential for more efficient use of available airspace under ATC, the measure will be advantageous to industry.

The 7 nm CEP tolerance will enable the existing airspace to be more efficiently utilised, and will provide greater capacity for aircraft to achieve their preferred levels

and tracking. Additionally, new routes can be designed (with CASA approval) based on the amended tolerance providing more efficient use of airspace.

Industry can expect significant safety and efficiency benefits due to decrease in delays at interim levels and nose-to-nose traffic outside controlled airspace. The reduced delays will have a positive effect on the environment with the subsequent reduction in fuel burn.

The change to RAIM loss reporting is not expected to significantly increase operational workload. AA intends to track pilot reported RAIM failures based on the 5 minute reporting requirement, and will assess and address any adverse outcomes in a Post Implementation Review. CASA will consult with AA on this review.

Making and commencement
The MOS amendment commences on 20 November 2008 after it is registered.

The instrument has been made by the Director of Aviation Safety, on behalf of CASA, in accordance with subsection 84A (2) of the Act.

[Manual of Standards Part 172 Amendment (No. 1) 2008]

Attachment 1

Manual of Standards Part 172 Amendment (No. 1) 2008

Amendment 1

Under subsection 10.6.9.2 of MOS Part 172, required navigation performance (***RNAV***) minima must not be applied by ATC after pilot advice of, among other things, continuous operation of GPS RNAV equipment in the dead reckoning (***DR***) mode for at least 1 minute or non-RAIM operation for at least 10 minutes. This amendment substitutes new paragraphs which refer to pilot advice of RAIM loss or loss of integrity, for more than 5 minutes; or operation of the GPS receiver in dead reckoning mode, for more than 1 minute; or loss of the GPS receiver navigation function, for more than 1 minute.

Amendments 2 and 3

Subsections 10.6.9.4 and 10.6.9.6 of MOS Part 172 mention certain aircraft capabilities or equipment required for certain forms of ATS separation (including AUSEP, RNP10, RNP4 and INS/IRS). Amendments 2 and 3 omit subsections 10.6.9.4 and 10.6.9.6 because the relevant aircraft capabilities and equipment are now incorporated in Table 10.8.4.

Amendment 4

This amendment removes subsection 10.8.3.9 of MOS Part 172, and the Table 10.8.4 to which it refers, and replaces them with a new subsection and Table.

The new subsection provides that the circular error of position (***CEP***) and cross-track tolerances in the new Table apply to long-range navigation systems, subject to the conditions specified.

The new Table replaces the 12 nm CEP with the new 7 nm CEP tolerance and related conditions.

The new Table also revises the drafting of the conditions for the other existing tolerances (25 nm CEP, 14 nm CEP, and Expanding Formula), and adds plus or minus 30 nm and 15 nm cross-track tolerances with related conditions.

Amendment 5

Subsection 10.9.2.1 of MOS Part 172 mentions plus or minus 30 nm and plus or minus 15 nm cross-track tolerances that may be applied to RNAV derived position for lateral separation. Amendment 5 omits subsection 10.9.2.1 because the relevant cross-track tolerances are now incorporated in new Table 10.8.4.