CIVIL AVIATION ACT 1988

CIVIL AVIATION REGULATIONS 1988

INSTRUCTIONS UNDER REGULATION 179A RELATING TO
THE USE OF THE GLOBAL POSITIONING SYSTEM (GPS)

I, MICHAEL ROBERT TOLLER, Director of Aviation Safety, on behalf of CASA, under regulation 179A of the Civil Aviation Regulations 1988 (CAR 1988):

(a) revoke instrument number CASA 277/97; and

(b) issue the following instructions.

1. Interpretation

1.1 In these instructions:

approved data base means a data base:
(a) supplied by a person approved for the purposes of paragraph 233 (1) (h) of CAR 1988; and
(b) on a medium approved by the manufacturer of the GPS receiver as suitable for use with the receiver; and
(c) incapable of modification by the operator or flight crew of an aircraft in which it is installed.

ATS means Air Traffic Service as defined in the Air Services Regulations.

en-route aircraft means an aircraft engaged in an oceanic, remote area or domestic en-route phase of flight.

ground based navigation aid means:
(a) a non-directional beacon (NDB); or
(b) a VHF omni-directional radio range (VOR); or
(c) distance measuring equipment (DME).

GPS means the United States Department of Defence satellite navigation system known as the Global Positioning System.

RAIM means Receiver Autonomous Integrity Monitoring or another method of monitoring satellite signals approved by CASA under regulation 179A of CAR 1988.

RAIM loss means an indication that the RAIM system is unable to monitor compliance with the applicable horizontal integrity limit.
RAIM warning means an indication that the RAIM system has detected an anomalous condition causing position uncertainty to exceed the applicable horizontal integrity limit.

1.2 The applicable horizontal integrity limit is:
   (a) in an en-route phase of flight — 2 nautical miles; and
   (b) within 30 nautical miles of the departure or destination aerodrome (GPS terminal mode) — 1 nautical mile; and
   (c) during an approach — 0.3 nautical mile.

1.3 For the purposes of these instructions, the order of precision of ground based navigation aids, starting with the most precise, is localizer, VOR, NDB and locator.

2. Use of GPS

2.1 The pilot in command of an aircraft operating under the I.F.R. may use GPS in accordance with these instructions:
   (a) as a supplemental or primary navigation system for an oceanic, remote area or domestic en-route phase of flight; or
   (b) as a supplemental navigation system for an approved non-precision approach procedure, including a related missed approach procedure.

3. Procedures for using GPS for oceanic, remote area or domestic en-route phase of flight

3.1 When an en-route aircraft is within rated coverage of a ground based navigation aid that it is equipped to use, the pilot in command, if using GPS, must monitor the aid and maintain track as defined by the aid.

3.2 The pilot in command of an en-route aircraft must maintain track by reference to the most precise ground based navigation aid whose signal the aircraft is able to receive.

3.3 If there is a discrepancy between the GPS derived information and the information supplied by the ground based navigation aid, the pilot in command of an en-route aircraft must use the information supplied by the ground based navigation aid.

3.4 Except in accordance with section 4, for non-precision approach procedures, and section 6, for DME arrivals and DME or GPS arrivals, the pilot in command of an en-route aircraft must not use GPS as a navigation aid below the relevant lowest safe altitude (LSALT) or minimum safe altitude (MSA) for the aircraft.

3.5 The pilot in command of an en-route aircraft must not use GPS with data that has been manually entered in a database, unless the data entries:
   (a) have been cross-checked by not less than 2 flight crew members for accuracy; or
(b) in the case of a single pilot operation — have been subjected to an
independent check against other aeronautical information, such as current
maps and charts carried in the aircraft in accordance with paragraph
233 (1) (h) of CAR 1988.

3.6 The pilot in command of an en-route aircraft must ensure that GPS derived
position and tracking information obtained from manually entered data or supplied
data is checked:
   (a) at, or before, each compulsory reporting point designated under regulation
       158 of CAR 1988; and
   (b) at, or before, each en-route waypoint; and
   (c) at hourly intervals during area navigation; and
   (d) after the insertion of new data relating to the flight, such as a new flight
       plan or alteration of an existing flight plan.

3.7 A pilot in command must not use GPS as a navigation aid for an oceanic or
remote area phase of flight, unless an appropriate en-route prediction analysis
conducted before the flight ensures that GPS availability will provide a useable
service.

4. Use of GPS for carrying out non-precision approach procedures

4.1 The pilot in command of an aircraft who is using GPS:
   (a) must carry out a GPS non-precision approach procedure in accordance
       with the current approved database setting out that approach; and
   (b) if carrying out a non-precision approach procedure or missed approach
       procedure must not use GPS with data that has been manually entered.

4.2 The pilot in command of an aircraft must not carry out a GPS non-precision
approach in controlled airspace unless he or she has:
   (a) obtained an air traffic control clearance to do so; and
   (b) planned an alternate approach using ground-based navigation aids.

4.3 Subject to paragraph 4.4, the pilot in command of an aircraft carrying out a GPS
non-precision approach procedure that has passed the initial approach fix but not
arrived at the final approach fix must carry out a missed approach procedure if:
   (a) there is a RAIM warning or other reason to doubt the validity of GPS
       derived information; or
   (b) RAIM loss.

4.4 If the RAIM warning or RAIM loss ends before the pilot in command of an
aircraft commences a missed approach procedure under paragraph 4.3, the pilot in
command may execute the missed approach using GPS derived information.
5. Operating without RAIM on domestic en-route phase of flight

5.1 In case of RAIM loss, the pilot in command of an aircraft on a domestic en-route phase of flight, if using GPS, must monitor the aircraft’s track by reference to other navigation aids with which the aircraft is equipped.

5.2 The pilot in command of an aircraft on a domestic en-route phase of flight, if using GPS within a control area, must advise ATS if:
   (a) there is RAIM loss for more than 10 minutes; or
   (b) RAIM is not available when ATS requests the provision of GPS derived information; or
   (c) RAIM is not available when ATS grants a clearance or imposes a requirement, based on GPS derived information; or
   (d) the GPS receiver is in dead reckoning mode, or experiences loss of its navigation function, for more than 1 minute; or
   (e) the indicated displacement of the aircraft from the centre line of its track is found to exceed 2 miles.

5.3 If valid position information is lost, with the GPS receiver being placed in two-dimensional or dead reckoning mode, or if there is RAIM loss for more than 10 minutes, the pilot in command of an aircraft on a domestic en-route phase of flight must use another means of navigation until RAIM is restored and the aircraft is re-established on track.

5.4 If RAIM has been lost for more than 10 minutes, the pilot in command of an aircraft on a domestic en-route phase of flight:
   (a) must not use GPS derived information or supply it to ATS; and
   (b) after RAIM is restored, must notify ATS before using or supplying information of that kind.

5.5 After RAIM is restored, the pilot in command of an aircraft on a domestic en-route phase of flight must notify ATS of the restoration before GPS derived information is used.

5.6 When advising ATS of the loss for more than 10 minutes of RAIM, or of its subsequent restoration, the pilot in command of an aircraft on a domestic en-route phase of flight must use the expression “RAIM failure” or “RAIM restored”.

5.7 If GPS derived information is supplied to ATS when RAIM has been unavailable for less than 10 minutes, the pilot in command of an aircraft on a domestic en-route phase of flight must conclude the report with the expression “Negative RAIM”.

6. Use and supply of GPS derived distance information

6.1 This section applies to pilots in command using GPS in accordance with these instructions.
6.2 On a request from ATS for distance information, without the source of the information being specified, a pilot in command using GPS may provide GPS derived distance information.

6.3 On a request from ATS for a DME distance, a pilot in command using GPS may provide GPS derived distance information instead if a DME distance is not available.

6.4 When supplying GPS derived distance information to ATS, the pilot in command must include the source and the point of reference, for instance “115 GPS ML VOR”, “80 GPS CTM NDB”, “267 GPS BEEZA”.

6.5 A pilot in command must only supply GPS derived distance information by reference to waypoints and navigation aids shown in maps and charts carried in the aircraft in accordance with paragraph 233 (1) (h) of CAR 1988.

6.6 A pilot in command must only supply GPS derived distance information from a current approved database.

7. GPS arrivals and DME or GPS arrivals

7.1 A pilot in command must not use GPS in GPS arrivals, or DME or GPS arrivals, unless:
   (a) the co-ordinates of the destination VOR or NDB to which the procedure relates are obtained from a current approved database; and
   (b) RAIM is available at the time of descending below the applicable LSALT or MSA.

7.2 During a GPS arrival, or DME or GPS arrival, the pilot in command must use the destination VOR or NDB to provide the primary track guidance.

7.3 During a GPS arrival, or DME or GPS arrival, if there is a significant disparity between the track guidance provided by the destination VOR or NDB and the GPS track indication, the pilot in command of the aircraft must discontinue the arrival procedure.

7.4 If at any time during a GPS arrival, or DME or GPS arrival, a significant disparity occurs, or there is reason to doubt the validity of GPS derived information:
   (a) because of a RAIM warning or RAIM loss; or
   (b) for any other reason;
the pilot in command must:
   (c) maintain flight to the missed approach point in the procedure, at the altitude at which the pilot in command was last satisfied with the accuracy of the GPS derived information; or
   (d) after climbing to the en-route LSALT or MSA, use an alternative approach procedure, hold or divert.
7.5 For the purposes of paragraphs 7.3 and 7.4, a significant disparity is:
   (a) in the case of an NDB — a divergence of more than $6.9^\circ$; and
   (b) in the case of a VOR — a divergence of more than $5.2^\circ$.

8. GPS navigation equipment standards

8.1 The pilot in command of an aircraft must not use GPS as a primary navigation system, or as a supplemental navigation system for an approved non-precision approach procedure, unless the aircraft is equipped with navigation equipment that complies with:
   (a) Technical Standard Order C129, C129a, C145, C145a, C146 or C146a issued by the Federal Aviation Administration of the United States of America; or
   (b) a design standard issued by CASA under regulation 21 of CAR 1988.

8.2 GPS receivers must be installed in Australian aircraft:
   (a) in accordance with Civil Aviation Advisory Publication (CAAP) 35.1 (0) and with CAAP 35.2 (0) for oceanic or remote area operations; or
   (b) in accordance with a design that provides an equivalent level of safety and is approved by CASA or an authorised person under subregulation 35 (2) of CAR 1988.

8.3 The automatic barometric aiding function as specified in Technical Standard Order C129, C129a, C145, C145a, C146 or C146a must be connected to the GPS receiver.

[Signed M. Toller]

Mick Toller
Director of Aviation Safety

30 April 2003