
PAPUA NEW GUINEA

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CHANGES TO IAL CHARTS

1 - INTRODUCTION

1.1 - This AIC is to advise information related to changes that will progressively be made to all IAL charts produced by the CAA.

2 - GENERAL

2.1 - The IAL charts currently produced by the CAA do not fully meet the Charting Standards in ICAO Annex 4. Many other ICAO Contracting States have already moved to implement changes relating to waypoint symbols, procedure titles and the terminology used to identify the various types of fix used in GPS NPA procedures. All of these changes will be incorporated in IAL charts produced by the CAA.

2.2 - ICAO and all Contracting States have become concerned at the world-wide increase in CFIT accidents. One of the measures that has already been implemented by some States is based on the way in which the procedure is portrayed, in the profile section of the IAL chart. These measures have been adopted by the CAA as part of the policy in the design of approach procedures.

2.3 - Another practice that is becoming increasingly widespread is the use of "S-1", denoting "Straight-In", to replace "LDG" in the minima box for runway-aligned approaches. This practice also identifies the nav aids that are used to achieve the landing MDA and, therefore, is believed to be more specific than the current specification of "LDG RWY 14L". An example of the change, in this instance, would be "S-1 VOR/DME", but further information will be provided in section 3 of this AIC.

2.4 - As a consequence of the implementation of 2.2 (a), above, the opportunity has been taken to apply a similar principle to the DME/Altitude table. The changes are minor but the table will become more specific about the descent angle on which it is based and more columns will be added.

2.5 - The opportunity is also being taken to make provision for the use of GPS in lieu of DME into all relevant IAL charts. This was foreshadowed in AC 91-2, dated 6 July 2005.

3 - EXPLANATION

3.1 - Waypoint Symbols

3.1.1 - The symbols currently in use to depict "Fly-by" and "Fly-over" waypoints does not accord with the charting standards specified in ICAO Annex 4. The changes are minor in respect of the "Fly-by" waypoint symbol but are significant for the "Fly-over" symbol. An amendment to IAL Legend page 5-4 is in production, showing the current symbols and the new symbols that will progressively replace them.

3.2 - Terminology for Fixes in GPS NPA Procedures

3.2.1 - In accordance with a change to Pans Ops, all waypoints will be classified as fixes in the same way as is done in non-precision procedures using nav aids. Therefore the following changes will occur in all GPS NPA IAL charts, progressively:

- (a) IAWP becomes IAF
- (b) IWP becomes IF
- (c) FAWP becomes FAF
- (d) MAWP becomes MAPt
- (e) MATWP becomes MATF
- (f) MAHWP becomes MAHF

3.3 - Procedure Titles

3.3.1 - The current format of chart titles does not conform to the new ICAO convention on titles. The need for a new convention has arisen because, in many instances, chart titles require the use of more characters than can be accommodated in electronic databases - which can result in non-conformity between paper charts and electronic database. This lack of correlation is undesirable and has human factors safety implications.

3.3.2 - The new convention uses only the navigation aid that provides final approach lateral guidance in the title. For example, a procedure currently titled RWY 14 VOR/DME will become RWY 14 VOR.

3.3.2.1 - Other navigation aids, which may have previously been included in the procedure title, will be identified by a note in the body of the chart, directly below the title. Only those nav aids which are essential to the approach procedures will be listed as required aids.

3.3.2.2 - Marker beacons are considered to be part of a normal ILS installation and so, are not listed separately as one of the required aids. For ILS installations that are equipped with marker beacons, DME is available as an alternative to marker beacons and, therefore, DME will not be noted as a required aid. DME will, however, be listed whenever marker beacons are not available for a prolonged period or if marker beacons are not installed.

3.3.2.3 - If any other nav aids are necessary to navigate to a position that allows an approach procedure to be commenced, but are not essential to the approach, they will not be listed as required aids. Pilots must therefore consider the available options for joining an approach and whether other nav aids, apart from those listed in the IAL chart, will be needed.

3.3.3 - In cases where there is more than one of the same type of approach to any aerodrome, or runway, these will be identified by an alphabetical suffix starting from the letter "A". As an exception to this specification, where a GPS approach is an alternative circling procedure, the title will identify it by use of the cardinal compass point (e.g. N, S, E or W) which identifies the approach direction.

3.3.4 - GPS NPA procedures will be titled as "RNAV_(GNSS)" procedures, in accordance with the new international convention. The term "GPS" refers to one of several possible types of satellite based navigation systems which, together with other independent navigation systems, is classified under the broad grouping of RNAV systems.

3.3.4.1 - GPS Arrival and Departure procedures are non-ICAO procedures and, therefore, not covered by the change in the Pans Ops convention. Therefore, the titles for DME or GPS Arrival and Departure procedures will not change.

3.4 - Profile View of IAL Charts

3.4.1 - Approach procedures are designed to facilitate descent to an altitude from which either a straight-in landing, circling or cloudbreak manoeuvre can be conducted. Approaches are classified as either Precision or Non-precision approach, with the latter divided into two categories - those with distance information (e.g. LLZ/DME, VOR/DME, GPS) and those without (e.g. NDB and VOR). Both categories of NPA provide obstacle clearance in accordance with the provisions of ICAO Doc 8168 (Pans Ops), but those approaches which include distance information also provide approach gradient information.

3.4.1.1 - Vertical Profile - NPA WITH Distance Information

3.4.1.1.1 - NPAs with distance information are designed to provide a constant angle descent from a procedure altitude to a point that is 50 FT above the THR (or to the circling altitude for procedures that only permit a circling approach. A constant angle descent profile is provided to reduce risks associated with Controlled Flight into Terrain (CFIT) and is the recommended descent path. Each segment also specifies a minimum altitude, which is identified by shading on the profile diagram.

3.4.1.1.2 - Descent to a segment's minimum altitude is permitted at pilot discretion, but descent below this altitude will erode the required minimum obstacle clearance. During the conduct of a constant angle descent in accordance with the published profile, the pilot must ensure that the aircraft remains above each segment's minimum altitude. The constant angle descent path will be shown in the profile view on the chart, with the descent angle annotated in degrees, and a distance/altitude scale is provided to assist in maintaining the descent path.

3.4.1.1.3 - This minimum published descent path angle is 3° (5.24%) but, where obstacles require a steeper descent, this angle may be increased on 3.72° (6.50%) for categories A and B, or 3.5° (6.1%) for categories C and D.

3.4.1.2 - Vertical Profile - NPA WITHOUT Distance Information

3.4.1.2.1 - This type of procedure is time based and, therefore, a constant angle descent path cannot be specified. Accordingly, a procedure altitude will be published to establish the top of descent at the start of the final approach segment. This altitude will provide the necessary obstacle clearance in addition to ensuring that rates of descent are within Pans Ops limits.

3.4.2 - Where a vertical profile is shown in the profile view, the following considerations will apply to the design of the descent:

3.4.2.1 - For runway-aligned approaches, the descent path will connect a procedure altitude at a point no later than the FAF with a point that is 50 FT above THR elevation. This path will intersect with the procedure MDA at a point no later than the MAPt. It should be noted that the point of intersection with the MDA may occur at some considerable distance prior to the MAPt. depending on the height loss required between MDA and TCH.

3.4.2.2 - For procedures that only allow circling, the descent path will connect a procedure altitude at a point no later than the FAF with a point that can be up to 2 NM prior to the MAPt. There may be instances where this distance is slightly greater, or considerably less, if any of the descent steps affect the provision of a 3° descent path. Steeper descent paths will only be used as a last resort in the event that no distance can be provided prior to the MAPt. for aircraft to level-off at the MDA.

3.4.2.3 - Climb procedures will not usually be provided with a constant descent angle as there is often no distance information available. However, if distance information is used in a specific procedure, the vertical profile will lead directly to the MAPt. That is, there will be no provision for lead distance prior to the MAPt to level the aircraft.

3.4.2.4 - It has been decided not to implement a constant descent angle on DME Homing and Descent procedures for two reasons. Firstly, the navigational accuracy of the approach is limited by the operational assumptions used in the design of the procedure and, therefore, the distance at which the descent should commence may not be appropriate in all circumstances. Secondly, it is expected that the CAA will be able to phase out all DME-only procedures with the provision of "RNAV (GNSS)" procedures and the wider availability of Receivers that meet the specifications of TSO C-145A/146A.

3.4.3 - A review of all runway-aligned approach procedures has found that there are instances where a standard 3° descent profile intersects the MDA at a point beyond the MAPt. It has been found that, in some cases, it is not possible to relocate the MAPt. closer to the landing THR and, therefore, these procedures cannot be maintained.

3.4.3.1 - It has been decided, therefore, that procedures will be withdrawn where they are provided at an international aerodrome. Procedures at other aerodromes, will be withdrawn if the nominal point of intersection with the MDA does not exceed 0.3 NM beyond the MAPt.

3.4.3.2 - In such cases, the 3° descent profile will lead directly to the MAPt. and a note will be provided to alert pilots to the need to maintain MDA, upon establishing visual reference, until reaching the specified distance beyond the MAPt. This will ensure that the aircraft can be placed on a standard 3° descent path from the MDA to the runway.

3.4.3.3 - If a procedure can be redesigned so that the MAPt. is more favourably located for the 3° descent profile, a new procedure will be published.

3.5 - Identification of landing Minima in IAL Charts

3.5.1 - The current practice of declaring landing minima is to use the expression "LDG RWY XX" in the minima box. This practice dates back approximately 40 years and is not in common use in other States. In order to conform to wider world practice, the current expression will be replaced with "S-I" (Straight-In).

3.5.2 - The new term will be supported by nomination of the nav aids which must be used in order to qualify for the S-I minima. Examples of the way this will be shown are as follows:

S-I LLZ/DME
S-I VOR/DME
S-I GNSS

3.6 - Use of GPS in lieu of DME in IAL Procedures

3.6.1 - In accordance with advice issued in AC 91-2, effective 6 July 2005, GPS will be permitted to be used in lieu of DME, in some IAL procedures. Approval was given in AIP Supplement 3/97, dated 4 December 1997, to use GPS distance in Arrival and Departure procedures. It is now possible to extend this approval to selected approach procedures and the contents of AC 91-2 are repeated in this AIC to ensure that a complete understanding of the basis of this approval is understood.

3.6.2 - The AC relates specifically to Civil Aviation Rule Part 91, Section 421 (6) (I), 423 (c) (5) (ii), 423 (c) (6) (iii). These sections of CAR Part 91 relate to the use of DME for distance indication in holding and approach procedures. It has now been determined that there are circumstances in which it will be possible to use GPS distance information, whenever DME information cannot be obtained, to conduct a holding or approach procedure. Adherence to the specifications contained herein will allow the substitution of GPS for DME distance, whenever indicated on an IAL chart.

3.6.3 - Approval

3.6.3.1 - Aircraft involved in IFR flight that can comply with the specifications of this AC may use GPS in lieu of DME for NDB/DME, L/DME, VOR/DME, ILS/DME, LLZ/DME and DME Descent approach procedures, when the IAL chart states that GPS may be used in lieu of DME and:-

- (a) the DME required for the procedure is able to be selected from the database, or
- (b) the DME is co-located with the NDB or VOR and the co-ordinates of these nav aids exist in the database.

3.6.4 - Requirements

3.6.4.1 - The following requirements must be satisfied for GPS to be used in lieu of DME:-

(a) Airworthiness Requirements

- (1) GPS navigation equipment must have TSO C129, C129a, C145, C145a, C146 , C146a (or CAA approved equivalent) authorisation;
- (2) GPS receivers must be installed in Papua New Guinea civil registered aircraft in accordance with the CAAP 35-1; and
- (3) Automatic barometric aiding function, as provided by TSO C129, C129a, C145, C145a, C146 or C146a must be functional.

Note: Operators should be aware that TSO C129, C129a, C145, C145a, C146 or C146a receivers may not be able to take advantage of future enhanced GPS capabilities, such as Wide or Local Area Augmentation Systems (WAAS or LAAS).

(b) Operational Requirements

- (1) Operating instructions for GPS navigation equipment must be carried on board the aircraft and, for commercial operations, incorporated into the operator's exposition (or Operations Manual).
- (2) GPS navigation equipment must be operated in accordance with manufacturer's operating instructions and any additional requirements specified in the approved aircraft flight manual, or flight manual supplement.
- (3) In addition to GPS, aircraft must be fitted with serviceable radionavigation systems as specified in CAR Part 91.519, or the operator's approved Minimum Equipment List.
- (4) The database medium (card, chip, etc) must be current and of a kind endorsed by the receiver manufacturer.
- (5) Co-ordinates of the destination aid to which the procedure relates must not be capable of modification by the operator or crew.
- (6) RAIM must be available before descending below the LSALT/MSA.
- (7) The destination azimuth aid (VOR, NDB, L, LLZ or ILS) nominated in the IAL chart must be used to provide primary track guidance during the procedure.
- (8) GPS must not be used as a navigation reference for flight below the LSALT/MSA, except as provided in this AC, or as otherwise approved by the CAA.
- (9) Pilots must have completed the training for the use of GPS under the IFR as detailed in AIP Supplement 3/97 and their log books must be endorsed in accordance with paragraph 7 of that AIP Supplement.

3.6.5 - Flight Notification

3.6.5.1 - Qualified pilots of aircraft equipped with GPS systems that comply with the specifications of this AC should indicate compliance as follows:-

- (a) On domestic flight plan, insert "NAV/GPSRNAV" in the Remarks section.
- (b) On ICAO flight plan, insert "Z" in field 10, and NAV/GPSRNAV in field 18.

3.6.6 - Review

3.6.6.1 - Comment will be sought from operators on or after 6 July, 2006, but operators and pilots are encouraged to provide submissions, reports or comments at any time. It is hoped that the formal review will produce results that will allow the ASR Directorate to make suitable amendments to CAR Part 91, to formalise this approval and to, therefore, make it an examinable item in flight crew examinations and oral tests.

3.6.7 - It is expected that most procedures that use DME can be endorsed for use of GPS distance information and the design of all such procedures is under progressive review.

3.7 - Distance/Altitude Table

3.7.1 - The Distance/Altitude table provided at the bottom of each approach chart will be modified to provide more columns. It is expected that this will be useful to pilots in allowing the approach profile to be established prior to the FAF, such as when using an approach with a long final segment.

3.7.2 - The table will also specify the approach angle upon which the descent steps at each nautical mile are based. This angle will be the same as the approach angle declared in the profile view and, as such, will provide immediate confirmation of the need to use any angle steeper than 3⁰.

3.7.3 - The table will be further modified for "RNAV_(GNSS)" procedures so that the steps relate to the information displayed to the pilot by the Receiver. Each distance indication will be based on the next waypoint and those waypoints will be named in the table, rather than using a distance from the MAPt.

4 - REGULATORY IMPACT

4.1 - Due to magnitude of the task and the limited resources available for it, it is expected that it will take in excess of two (2) years to complete the changes to all IAL charts. As a result of this, it is not considered appropriate to require these changes to be examinable in written examinations for the time being. This will be reviewed within twelve (12) months and a date will be set for the changes to be incorporated in written and oral examinations.

4.2 - Due to the complex nature of the changes that will be made, all affected IAL charts will be reissued as new procedures. It is expected that this precaution will help to highlight the nature of the changes.

5 - CANCELLATION

5.1 - This AIC will remain current until the contents can be included in regulatory material.

6 - DISTRIBUTION:

6.1 - All holders of PNG AIP and Flight Supplement.

7 - CURRENT AIC:

1985:	5, 8
1991:	6
1993:	4, 5
1994:	1, 3
1996:	4
1997:	6, 7, 9, 11
1998:	1
2000:	3
2001:	2
2002:	1
2003:	1
2004:	1
2005:	1