CIVIL AVIATION AUTHORITY, BANGLADESH

ADVISORY CIRCULAR
FOR AIR OPERATORS

Subject: **GUIDANCE FOR OPERATORS FOR CONDUCTING CONSTANT DESCENT FINAL APPROACH (CDFA) FOR NON-PRECISION APPROACHES**

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1. PURPOSE

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a. Traditional step-down approaches are based on an obstacle-clearance profile and such approaches are not optimum for modem turbine aircraft and turboprop aircraft. Flying a constant-angle approach profile provides a more stabilized flight path, reduces workload, and reduces the risk of error.

b. The ICAO *Procedures for Air Navigation Services — Aircraft Operations* (PANS-OPS), prescribes a stabilized approach in that the aircraft must be in a stabilized position at a certain altitude. For an optimum approach technique, the stabilization should not only exist at a certain position, but should be a continuous state, established as early as possible after joining the final approach track. An optimum landing manoeuvre requires the aircraft to reach the decision altitude or point in a stabilized state, in order to allow sufficient time for the pilot to assess the visual cues for the decision to land or to go around. The aircraft's attitude and position relative to the runway should be similar in each approach, to the greatest extent possible, in order to permit the pilot to utilize Standard Operating Procedures (SOP) which are similar for all types of instrument approaches.

c. Advantages of CDFA

Compared to the step descent approach technique where the aircraft descends step by step prior to the next minimum altitude, a Constant Decent Final Approach (CDFA) technique has the following advantages:

(i) The technique enhances safe approach operations by the utilization of simplified standard operating practises;

(ii) Approach technique reduces pilot workload and enhances situational awareness;

(iii) Approach profile affords greater obstacle clearance along the final approach course;

(iv) Approach technique is similar to ILS techniques, including the missed approach and the associated go-around manoeuvre;

(v) Approach technique affords procedural integration with VNAV approaches;

(vi) Aircraft attitude when on the required constant angle descent path facilitates acquisition of visual cues;

(vii) The constant angle descent profile flown in a stabilized manner is the safest approach technique for all type of approach operations;

(viii) Approach profile is fuel efficient; and

(ix) Approach profile affords reduced noise levels.

d. This Advisory Circular (AC) contains information to encourage air operators to develop Standard Operating Procedures and train pilots to fly a constant descent final approach (CDFA) when flying a published non-precision approach procedure.

e. The AC provides information that air operators may utilize to develop constant descent final approaches when flying non-precision approach procedures for all aircraft types.

f. Modern aircraft may utilize aircraft navigation systems to achieve CDFA non-precision approach procedures utilizing VNAV and other navigation system capabilities.

2. BACKGROUND

Analysis of accident data indicates that the accident rate is five times greater during non-precision approaches than when aircraft are conducting precision approaches. In the interest of safety, air operators should discontinue the use of step-down or "dive-and-drive" non-precision approach procedures as soon as, and wherever possible. Air operators who have yet to do so should, at the earliest possible date, develop procedures and train pilots to fly constant descent final approaches (CDFA) when flying non-precision approach procedures. All types of aircraft can fly procedures utilizing a constant rate descent, even those with just basic navigation capabilities.

Instrument approach procedures are normally identified by the name of the city or town or area which the aerodrome serves, the name of the aerodrome, the abbreviation of the type of radio navigation aid(s) on which the instrument approach procedure or the visual manoeuvring (circling) procedure is established and the designator of the runway where applicable.

When an instrument approach procedure is designed for RNAV, the additional abbreviation "RNAV" is given. If the procedure is restricted to specific sensors, these are indicated in subscript and parenthesis "$RNAV_{(DME/\ DME)}$".

For a VOR/DME RNAV procedure, the additional abbreviation "RNAV" or "$RNAV_{(VOR/DME)}$" is followed by the identification of the reference VOR/DME, and when the instrument approach procedure is designed for RNP, the abbreviation "RNP" shall be applied, and the RNP value shall be published in subscript and parenthesis, e.g. "$RNP_{(0.3)}$".

When operationally required, separate charts shall be published for each sensor or for a combination of navigation sensors. Separate charts shall only be published if the routes differ laterally or vertically.

Therefore, regardless of the additional on board navigation capability an aircraft may have, the navigation aid(s) on which the instrument approach procedure is based are always to be used as primary navigation aid to conduct all instrument approaches. However, the additional aircraft navigation capability can be used to supplement the information provided by the primary aids.

The International Civil Aviation Organization has amended *Procedures for Air Navigation Services — Aircraft Operations* (PANS-OPS), Volume I, Part III, Chapter 3, paragraph 3.5.4. The revision states that compatible with the primary safety consideration of obstacle clearance, non-precision approach design shall provide the optimum final approach descent gradient of 5.0 per cent, or constant approach slope of 3 degrees, providing a rate of descent of 50 m per km (300 ft per NM). Information provided in approach charts shall display the optimum constant approach slope.

In addition the revision requires air operators to include in their standard operating procedures specific guidance to utilize on-board technology, combined with ground-based aids such as distance measuring equipment (DME), to facilitate the execution of optimum constant approach slope descents during non-precision approaches.

3. CDFA PROCEDURES

a. Definition of non-precision approach

Non-precision approach and landing operations: An instrument approach and landing which utilizes lateral guidance but does not utilize vertical guidance.

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b. Derived Decision Altitude (Height) (DDA(H)) Concept

In order to support timely implementation of CDFA approaches and reduce the risk of CFIT , this Advisory Circular also introduces a new definition of the term DDA(H). Flight Standards may apply the information in this Advisory Circular to aid operators in approving those expanded VNAV operations.

Air operators need to determine a DDA(H) for each CDFA approach they intend to fly. DDA(H) must be established by adding a safety margin to the published OCA(H) or the published MDA whichever is higher. The safety margin should be sufficient to ensure that

the aircraft will not descend below the published MDA (H) when a decision to execute a missed approach is made at the DDA(H).

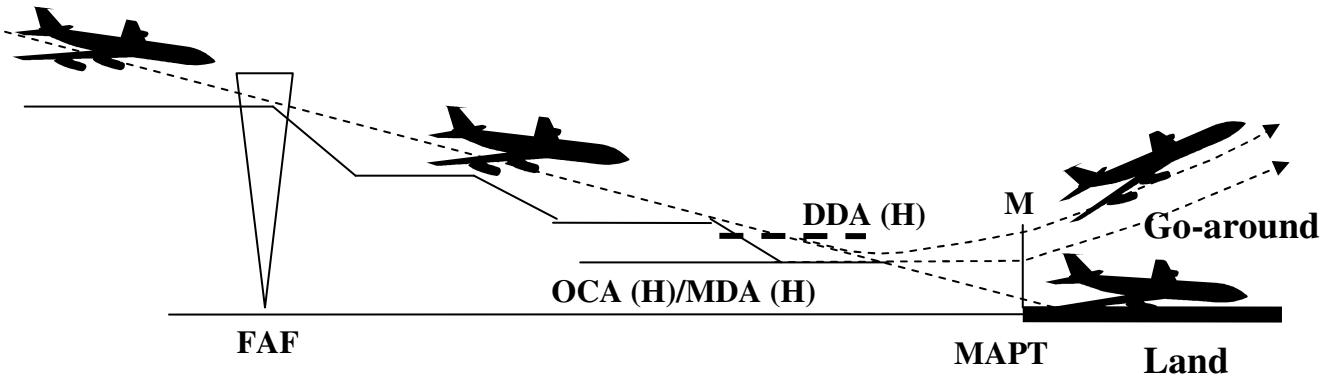
Air operators may need to establish aircraft type specific safety margins for each aircraft type operated and establish type specific DDA(H) for each approach.

The Derived Decision Altitude (Height) is a point located on the centreline of the approach track and of the stabilized descent profile at an altitude defined by the operator.

CDFA would allow the aircraft to be flown on the published descent path from the final approach fix (FAF) to the DDA. The DDA is a point from which a stabilized approach can be continued visually to a landing; or, if still in instrument meteorological conditions (IMC), a point from which a missed approach can be initiated and conducted with the assurance that the aircraft will not descend below the MDA(H) or below the State published OCA (H), whichever is higher.

Flight crews need to confirm that the descent path will remain at or above all step-down fixes published on the approach chart. An example of a typical CDFA profile is depicted in Figure 1.

Typical CDFA descent profile



DDA (H) = Derived decision altitude (Height)
FAF = Final approach fix
MDA (H) = Minimum descent altitude (Height) ***Must be equal to or higher than State published*** **OCA (H)**
OCA (H) = Obstacle clearance altitude (Height)
MAP = Missed approach point

Figure 1

c. Flight technique

The continuous descent approach technique can be flown on almost any published non-precision approach when the control of the descent path is aided by either:

- a recommended descent rate based on estimated ground speed is provided on the approach chart ; or

- the descent path is depicted on the chart.

In order to facilitate the requirement above, the operator should either provide charts that depict the appropriate cross check altitudes/heights with the corresponding appropriate range information, or such information should be calculated and provided to the flight-crew in an appropriate and useable format.

To achieve a continuous descent flight path on an approach procedure where stepdown fixes are specified, descent may be delayed until after passing the FAF, or the FAF crossed at an increased altitude height. If a greater height is used, ATC clearance should be obtained to assure separation.

For approaches flown coupled to a designated descent path using computed electronic glide-slope guidance, (nominal 3 degree path) the descent path should be appropriately coded in the flight management system data base and the specified navigational accuracy should be determined and maintained throughout the operation of the approach.

With an actual or estimated ground speed and a designated decent profile/path and required descent rate the approach is flown by crossing the FAF configured and on-speed. The tabulated or required descent rate is established and flown to the DDA(H) where the decision to land or go-around must be made, observing any step-down crossing altitudes if applicable. The aeroplane should be configured and on-speed as early as practicable but preferably not later than the FAF.

To assure the appropriate descent path is flown the pilot not flying should announce crossing altitudes as published fixes and other designated points are crossed, giving the appropriate altitude or height for the appropriate range as depicted on the chart. The pilot flying should promptly adjust the rate of descent as appropriate.

An option to ensure that the go-around manoeuvre is initiated not later than the DDA (H) , is to annunciate by the pilot not flying at an altitude of 100 ft above the DA/MDA, that the minima are approached.

With the required visual reference requirements established, the aircraft should be in position to continue descent through the DDA(H) and below the MDA(H) with little or no adjustment to attitude or thrust/power.

When the visual reference requirements are not established at the DDA(H) the missed-approach procedure is executed without delay. Prompt go-around action is necessary if the required visual reference is not obtained on reaching the DDA(H) in order that the aircraft does not descend below MDA.

The maneuver associated with the vertical profile of the missed approach should be initiated not later than reaching the DDA(H) specified by the operator for the approach. Any turning maneuver associated with the missed approach should not be initiated before reaching the MAPt.

The Missed Approach Point may be located prior to the runway threshold. If the aircraft is above the optimum flight path the missed approach point could be reached prior to the DDA (H). An immediate climb must be initiated in such a case.

Descending Below MDA(H)

During a non-precision approach, the pilot flying (PF) is either hand-flying the aircraft or supervising AP operation; the pilot not flying (PNF) is responsible for acquiring and calling out the visual references. Continuing the approach below the MDA(H) is permitted only if the required visual references has been acquired by the PF.

Note: Some organizations are utilizing the term pilot monitoring (PM) instead of pilot not flying (PNF).

If adequate visual references are not acquired when reaching DDA:

- Initiate a go-around climb; and,
- Continue on the approach track until over the MAP (to guarantee obstacle clearance during the go-around) and fly the published missed approach procedure. No turn should be initiated before reaching the missed approach point and, if a minimum altitude is indicated on the approach chart, until the indicated altitude has been reached.

(ICAO states that although the flight crew should over fly the MAP before conducting the published missed approach procedure, "this does not preclude flying over the MAPt at an altitude/height greater than that published in the procedure".

Training

The operator should ensure that prior to conducting CDFA each flight crewmember undertakes:

- The appropriate training and checking to include training on the techniques and procedures appropriate to the operation to be conducted that are stipulated in paragraph above;

- When approved to operate CDFA the operator proficiency check should include at least one CDFA to a landing or go around as appropriate. The approach should be operated to the lowest appropriate DDA(H); and if conducted in a Simulator the approach should be operated to the lowest approved RVR/Visibility;

- The policy for the establishment of continuous descent paths and approach stability are to be enforced both during initial and recurrent pilot training and checking. The relevant training procedures and SOPs should be documented in the Operations Manual; and

- The training should emphasize the need to establish and facilitate joint crew procedures and CRM to enable accurate descent path control and the requirement to establish the aeroplane in a stable condition as required by the operator operational procedures.

Emphasis during training should be placed on the flight crews:

- Need to maintain situational awareness at all times, in particular with reference to the vertical and horizontal profile;

- Need to maintain good communication channels throughout the approach; and

- Ability to maintain accurate descent path control particularly during any manually flown descent phase. The non operating/non-handling/monitoring pilot should facilitate good flight path control by:

  Monitoring of flight path during the whole approach including flight below DDA(H) to the landing;

  Communicating any altitude/height crosschecks prior to the actual passing of the range/altitude or height crosscheck;

  Prompting as appropriate changes to the target rate of descent.

Actions to be taken at the DDA(H):

- Need to ensure that the decision to go around must at the latest have been taken upon reaching the DDA(H) in order to avoid a temporary descent below the published MDA(H), specifically in case of a very early missed approach point (application of an "approaching minima" call);

- Understanding of the need for prompt go around action when at DDA(H) if the required visual reference has not been obtained;

- Understanding and significance of a CDFA flown to a DDA(H) with an associated MAPt;

- Understanding of the implications of early go around manoeuvres when undertaking CDFA to a DDA (H) with an associated MAPt; and

- Understanding of the possible loss of the required visual reference when not conducting a CDFA for aeroplane types/class that require a late change of configuration and or speed to ensure the aeroplane is in the appropriate landing configuration.

4. APPLICABILITY

While operators can develop additional standard operating procedures for aircraft with more advanced navigation systems, they can also establish similar CDFA procedures utilizing a DDA (H), for all aircraft types**.** This AC does not list every important SOP topic or dictate exactly how CDFA procedures should be developed. It provides guidance on some of the considerations for implementation of CDFA which air operators may adapt for their particular aircraft and operation.

: END :