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AIC
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PRECISION CAT I ILS APPROACH AND DEPARTURE PROCEDURES WITH REDUCED OPERATING MINIMA BY ADDITIONAL USE OF THE HEAD-UP DISPLAY (HUD)

Period of validity: 23 MAY 2019 a PERM.

1 PRELIMINARY ARRANGEMENTS

1.1 PURPOSE

This Aeronautical Information Circular (AIC) gives the requirements for the establishment of Category I ILS Authorization Required approach procedure charts (CAT I ILS AR) and Low Visibility Takeoff (LVTO) operations.

The CAT I ILS AR procedures described in this AIC, destined to Operators specifically approved by the competent unit, will use a minimum of 450 m Runway Visual Range (RVR) and 150 ft Decision Height (DH), determined by the Radar Altimeter Setting Height (RA), being required by the Pilot in Control the use of the Head-up Display (HUD) up to the DA/DH.

Low Visibility Takeoff (LVTO) operations addressed in this AIC, also aimed at Operators specifically approved by the competent unit, can be performed with minimum RVR values which could reach 75 m, at least, according to specific criteria, and it is not required that the landing and takeoff runways dispose of touchdown zone lights or runway centerline lights since the Pilot in control of the aircraft uses the HUD.

The requirements for publication of relevant information in the mentioned CAT I ILS AR and LVTO charts are also presented in this AIC.

1.2 SCOPE

The provisions set forth in this AIC apply to everyone involved in the implementation and operation of precision instrument approach procedures of CAT I with Authorization Required and takeoff minima lower than the regular minima.

2 GENERAL PROVISIONS

2.1 The air navigation procedures set forth in this AIC (CAT I ILS AR and LVTO) may only be performed by Operators and aircraft approved by the State of Registry or State Operator, as appropriate. The process for the approval of aircraft and Operators is established within the Brazilian State by the National Civil Aviation Agency (ANAC).

2.2 Historically, ground navigation equipment is correlated with a specific operation. For example, in ICAO Annex 10, Volume I, a system with performance CAT II ILS is associated with an operational performance of CAT II procedure. The basic assumption of this correlation is

that a certain performance level of ground navigation equipment is required to support the corresponding air operation.

2.3 The term "Type" is used in this AIC in order to differentiate the ground facility from the category of flight operation (i.e.: Type II ILS facility as opposed to CAT II operations). This distinction is intended to eliminate existing confusion between facility establishment criteria and operational criteria for approval of CAT I flight operations. Typically, the "Type" classification defines the ground equipment necessary to support the precision approach and landing operations by aircraft and Operators which meet the minimum airborne equipment requirements for that category of operation. While certain ground facilities requirements are needed to support all levels of either CAT I, CAT II or CAT III operations, a higher category of operations may be performed on different "Types" of ground equipment if the airborne equipment, crew training or other factors offset any changes in ground facility requirements. The higher performance capabilities of new and improved avionics have mitigated some of the performance requirements of the ground-based navigation equipment.

2.4 A Type I facility is defined as all Localizer (LOC) and glideslope (GS) facilities not meeting the definition of Type II or Type III and which have a published straight-in course coincident with the centerline of the runway or an offset Localizer which is not offset in excess of 3 degrees from the centerline of the runway.

2.5 A Brazilian Type II facility meets or exceeds all requirements for an ICAO facility performance CAT II, as specified in Annex 10, Volume I, Chapter 3.

2.6 A Brazilian Type III facility meets or exceeds all ICAO criteria as specified in Annex 10, Volume I, Chapter 3 and is identified as CAT III in standards, recommended practices and guidance material. A Type III facility typically consists of a dual-frequency LOC which meets all CAT III requirements to at least a point 3000 ft from the approach end of the runway, a GS which meets CAT III requirements to the threshold, executive integrity monitors which identify any degradation of signal integrity exceeding CAT III standards, a far field monitor to identify critical area incursions or signal variations in the far field which may affect signal integrity, backup transmitters and backup power to ensure continuous power for critical systems.

3 CONCEPTS

3.1 MANEUVERING AREA

It is the part of an aerodrome used by aircraft for landing, takeoff and taxiing that does not include the aprons.

3.2 MOVEMENT AREA

It is the part of an aerodrome used by aircraft for landing, takeoff and taxiing, consisting of the maneuvering area and aprons.

3.3 CONTINUITY

Capability of the system to provide navigation information during the accomplishment of the procedure, with specified accuracy and integrity, considering that it was available since the beginning of the operation.

3.4 AVAILABILITY

Percentage of time during which the information provided by the system is used. It is an indication of the system's ability to provide usable information within a given coverage area, as well as the percentage of time during which navigation signals are transmitted from external sources. The availability is a function of the physical characteristics of the environment and of the technical capabilities of the transmitter facilities.

3.5 BASIC AIR NAVIGATION EQUIPMENT

Equipment provided in the quantities established by the Brazilian Requirements for Aeronautical Certification (RBHA 91), Civil Aviation Brazilian Regulation (RBAC 121 and RBAC 135) and on the dispositions of the ICA 100-11 “Flight Plan”.

3.6 SPECIAL INSTRUMENT FLIGHT PROCEDURES

A special instrument flight procedure can be public or private; in both cases the Operator must specifically request permission to use these procedures. A special instrument flight private procedure is not generally available to the public, but is developed exclusively for the applicant, which may be an Operator or some other private entity. These special procedures are developed at the request of an Operator / applicant so that it can perform scheduled or non-scheduled transport of passengers or cargo under instrument flight rules (IFR), where there are no standard procedures for instrument flight or these are inappropriate.

3.7 ADDITIONAL AIR NAVIGATION EQUIPMENT

Equipment must be used together with basic air navigation equipment. The approval of additional equipment for a given phase of flight requires airborne basic equipment for air navigation for the referred stage. Concerning the performance, additional air navigation equipment must meet the requirements of accuracy and integrity for such an operation or phase of flight and it is not necessary to satisfy the requirements of availability and continuity.

3.8 INTEGRITY:

Assurance that all functions of the navigation system are within the limits of operational performance. It is the ability of the air navigation system to provide timely warnings to users in cases where it should not be used.

3.9 PRECISION

It is the degree of uniformity between information on position and time provided by the navigation system and the real position and time.

3.10 LOW VISIBILITY TAKEOFF (LVTO)

Term used in relation to takeoff operations on a runway where the RVR is less than 350 m.

3.11 HEAD-UP DISPLAY (HUD)

An optical and electronic system that generates and projects flight information into the pilot's forward external field of view. It provides basic flight and navigation data that overlap the outdoor scene, including the graphical representation of the landing and takeoff runway, during the approach operations using the system on a full-scale (1:1).

3.12 TAKEOFF

The criteria to determine the regular take-off minima (or SID minima, when it is the case) are defined in the AIP, PART 3 – AERODROME (AD), AD 1. AERODROMES/HELIPORTS – INTRODUCTION, item 1.1.4 – AERODROME OPERATING MINIMA.

NOTE 1: This Circular shows criteria for takeoff in low visibility conditions, where additional equipment helps the pilot of the aircraft on a runway with low visibility, or when it is necessary to ensure safe operations with minima below acceptable values for the exclusive use of visual reference.

NOTE 2: To perform the takeoff operation with minima operating below the level supported by the isolated use of visual reference, the Operator must be specifically approved to use the additional guidance system with minima additional of the intended operation.

3.13 PILOT-IN-COMMAND

The pilot designated by the owner, as being in charge of the operation and safety of the flight.

3.14 PILOT IN CONTROL

The pilot who operates the aircraft controls in order to conduct its movements on the ground or in the air.

4 THE HEAD-UP DISPLAY (HUD) ACCORDING TO THE INTERNATIONAL CIVIL AVIATION ORGANIZATION (ICAO)

The HUD presents flight information into the pilot's forward external field of view, without significantly restricting that external view.

A variety of flight information may be presented on a HUD depending on the intended flight operation, flight conditions, systems capabilities and operational approval. The information presented by the system may include:

a) airspeed;

b) altitude;

c) heading;

d) vertical speed;

e) angle of attack;

f) flight path and velocity vector;

g) attitude with "bank" and "pitch" references;

h) course and glidepath with deviation indications;

i) status indications (navigation sensor, autopilot, flight director etc.); and

j) alerts and warning displays (ACAS, wind shear, ground proximity warning etc.).

4.1 HUD OPERATIONAL APPLICATIONS

4.1.1 Flight operations with HUD can improve situational awareness by combining flight information located on displays with the external view to provide pilots with more immediate awareness of relevant flight parameters and situation information while they continuously view the external scene. This improved situational awareness can also reduce errors in flight operations and improve the pilot's ability to transition between visual and instrument references as meteorological condition changes. Flight operations applications may include the following:

a) enhanced situational awareness during all flight operations, but especially during taxi, takeoff and approach and landing;

b) reduced flight technical error during takeoff, approach and landing, especially in all-weather; and

c) improvements in performance due to precise projection of touchdown area, tail strike awareness and fast recognition and recovery from unusual attitudes.

4.1.2 According to the Convention on International Civil Aviation (CACI) Annex 6, the HUD may be used for the following purposes:

a) to supplement conventional flick deck instrumentation in the performance of a particular task or operation. The primary cockpit instruments remain the primary means for manually controlling or maneuvering the aircraft; and

b) as a primary flight display.

- information presented by the HUD may be used by the pilot in lieu of scanning displays. Operational approval of a HUD for such use allows the pilot to control the aircraft by reference to this system for approved ground and flight operations; and
- information presented by the HUD may be used as a means to achieve additional navigation or control performance. The required information is displayed on the HUD. Operational credit in the form of lower minima for HUD used for this purpose may be approved for a particular aircraft.

4.1.3 The characteristics of HUD cited above, recognized by ICAO, may contribute to the increased accessibility of aerodromes eligible for certain operations, duly approved by the competent authority, such as those discussed in this AIC.

4.2 TRAINING WITH RESPECT TO HUD

4.2.1 REQUIREMENTS FOR THE AIRCRAFT OPERATOR

The establishment of the requirements for the pilots training, as well as the monitoring and approval of the training program proposed by the Operator, are the ANAC's competency.

4.2.2 REQUIREMENTS FOR THE AIR NAVIGATION SERVICE PROVIDER (ANSP)

The ANSP must guarantee that the ATCO involved in ILS CAT I AR and LVTO operations are aware about the information included in this AIC and in the letter of operational agreement associated to the referred operations, mentioned in the following item 5.2.2.

4.2.3 REQUIREMENTS FOR THE AERODROME OPERATOR

The establishment of requirements for the training of Operators of aerodromes for which ILS CAT I AR and LVTO operations have been implemented, as well as the approval of the training program proposed by the aerodrome Operator, through a letter of operational agreement related to the mentioned operations, is the competence of ANAC.

5 CAT I ILS OPERATIONS WITH REQUIRED AUTHORIZATION

This chapter deals with ILS approach operations with RVR as low as 450 m and DH as low as 150 ft, based on RA, using the HUD to DH, on runways provided with installation Type I, for which there is no requirements for Touchdown Zone (TDZ) lights nor runway landing and takeoff axis (RCL) lights.

5.1 REQUIREMENTS

a) to be eligible for ILS CAT I AR approaches runways have to be qualified for ILS CAT I operation, with minimum DH of 200 ft and minimum visibility of not more than 800 m;

b) only aircraft operated by two pilots are allowed to use the ILS CAT I AR landing minimums;

c) the runway must dispose of the following lighting aids and auxiliary equipment:

- Simplified Short Approach Lighting System With Runway Alignment Indicator Lights (SSALR), Medium Intensity Approach Light System With Runway Alignment Indicator Lights (MALSR) or ALS Cat I, with flash (ALSF-1) / ALS Cat II, with flash (ALSF-2);
- runway edge lights;
- RVR sensor on touchdown zone.

d) instrument approach procedure

- the angle of the Surface Electronic Glide Path (GP) published in the CAT I ILS procedure in force must be 3º. A different angle requires specific approval by the DECEA'S Operation Subdepartment regarding the process of accomplishing the instrument flight procedure;
- maximum RDH of 60 ft;
- OFZ in accordance with the standards set out in Appendix 14 to CAT I ILS;
- plan of approach lights free of obstructions according to CACI Annex 14;
- the process of approval of the procedure will depend on the in-flight Inspection detailed in CIRCEA 121-4;
- the missed approach segment must meet the current Terminal Instrument Procedures (TERPS) CAT II/III standard, until Order 8260.3 is revised with new CAT I missed approach surfaces which accommodate CAT I ILS AR, or meet the criteria of DOC 8168 when concerning the implementation of the Collision Risk Model (CRM) method, adding the option CAT II to the CRM. If the DH is increased to accommodate an obstacle in accordance with TERPS CAT II/III standards, the RVR must be increased in accordance with the Table 1 below. If the DH using TERPS CAT II/III standards is increased by 50 ft or less to accommodate an obstacle, the CAT I ILS AR DH need not be adjusted.
- enter a separate line of CAT I ILS AR minima immediately below the standard minimums on the CAT I ILS approach chart. Separate them with the heading "SPECIAL OPERATOR AND AIRCRAFT APPROVAL REQUIRED". The new line of minima shall be published as RA minima. Include the following in the notes section: "Requires specific Operative Specifications (OpSpec) or Letter of Authorization (LOA) approval and the use of HUD to DH, referenced to the CAT I ILS AR minimum."

TABLE 1 - Minimum Visibility Values

DH	RVR
150-170	450 m
171-185	500 m

5.1.1 Table 2 below summarizes the operational constraints to the execution of ILS CAT I AR procedure in case of Localizer (LOC), Glide Path (GP) or visual aids being out of service.

TABLE 2 – Operational Restrictions relating to IAC ILS CAT I AR

COMPONENT	SITUATION	EFFECT
LOC	INOPERATIVE	Prohibited Operation
GP	INOPERATIVE	Prohibited Operation
RVR TDZ	INOPERATIVE	Prohibited Operation
RVR MID	INOPERATIVE	No effect
RVR RO	INOPERATIVE	No effect

COMPONENT	SITUATION	EFFECT
SSALR, MALSR, or ALSF-1/ALSF-2	INOPERATIVE	Prohibited Operation
Runway edge lights	INOPERATIVE	Prohibited Operation

5.2 OPERATIONAL APPROVAL CONCERNING DECEA

5.2.1 The ILS flight inspection report will be part of the approval process on a specific runway.

5.2.2 Airport sponsor involvement through a letter of operating agreement is required and such letter must be submitted to a regional unit. This agreement may include the airport administrator willingness to maintain the operability of the referred runway, including surveillance concerning ZPA and OFZ obstacles, as well as the maintenance of lights and the minimum required equipment.

5.2.3 The documentation for the approval of each CAT I ILS AR chart procedure, when referred to DECEA, must be filed in the Regional Authority within jurisdiction in the area. Operators interested in using CAT I ILS AR minima must obtain ANAC approval.

5.2.4 Only those Operators authorized for CAT II operations using aircraft operationally approved for CAT II operations and equipped with an operable HUD which is approved for at least CAT II operations are eligible for this operation. The HUD must be operated in the mode used for CAT II or CAT III operations. The OpSpec or LOA must include the limitation requiring the use of HUD to DA/DH and the limitation prohibiting single pilot Operators from using CAT I ILS AR minimums.

6 LOW VISIBILITY TAKEOFF (LVTO) OPERATIONS WITH AUTHORIZATION REQUIRED

The standard takeoff minimums are defined in the CIRCEA 100-54, Standardized Rules for Elaboration of Air Navigation Procedures.

6.1 GENERAL PROVISIONS

6.1.1 For operations with RVR below 350 m, the aerodrome must have operating procedures in low visibility, detailed in a Letter of Operational Agreement, to be followed in the operation of the aerodrome for the areas of Air Traffic Control, Apron Management, Vehicle Control, Access Control, Maintenance, Emergency and Fire Fighting Service and Follow Me Vehicle Service.

6.1.2 The procedures contained in the operating agreement between the Managements of Operations and Air Navigation, for Low Visibility Operation, should be designed to enable the TWR and the Apron Management to ensure a safe, efficient and orderly flow in order to avoid the incorrect displacement and to prevent inadvertent entry to Movement Area by unauthorized aircraft, vehicles and persons.

6.1.3 As stated in the ANAC RBAC 154, a stopbar must be installed in all runway holding positions, which serve to a landing and takeoff runway, when it is intended for use in runway visual range conditions less than a value of 350m, except when:

a) appropriate aids and procedures are available to protect against incursions of aircraft and vehicles to the landing and takeoff runway; or

b) there are operational procedures, when the runway visual range is less than 550 m, to limit the amount of:

(1)aircraft on the maneuvering area to one at a time; and

(2)vehicles on the maneuvering area to the essential minimum.

6.1.4 Aerodrome where the SOCMS (Surface Movement Guidance and Control System) is already implemented is exempt from the above requirements.

6.2 TAKEOFF MINIMA LOWER THAN REGULAR MINIMA WITH THE USE OF HUD

6.2.1 The certificate holder is authorized to use the take-off minima prescribed in Table 3.

6.2.2 The certificate holder is authorized to conduct operations using the lowest RVR authorized in Table 3 below, based on the applicable criteria in this OpSpec.

Table 3 – Requirements and lowest RVR values authorized for take-off.

EXCLUSIVE FOR AIRCRAFT SUBJECT TO RBAC 121 or 135 (WITH HUD)	
REQUIREMENTS	**RVR**
HUD	500 m
(RCLM or REDL or RCLL or HIRL) + one RVR (TDZ) + HUD	350 m
(RCLM and REDL, or RCLL) + one RVR (TDZ) + HUD	300 m
(REDL and RCLL) + two RVR (TDZ and RO) + HUD	175 m
(REDL and RCLL) + three RVR (TDZ, MID and RO) + HUD	150 m
(HIRL and RCLL) + three RVR (TDZ, MID and RO) + HUD	75 m

6.2.3 The certificate holder authorizations listed in Table 3 above are dependent upon the following criteria:

a) RVR 350 m on the beginning of takeoff (TDZ RVR), RVR 350 m on the middle of the runway (MID-RVR if installed) and RVR 300 m on the zone of deceleration after touchdown (Rollout RVR or RO RVR if installed), if authorized, may be used, provided one of the following visual aids combinations is available:

- Daytime hours: Runway Centerline Marking (RCLM) or Operative Runway Edge Lights (REDL) or Operative RCL Lights.
- Night Time hours: Operative REDL or Operative RCL Lights

b) TDZ-RVR 300m, MID-RVR 300m (if installed) and RO-RVR 300m, if authorized, may be used provided one of the following visual aids combinations is available:

- Operative RCL Lights, or
- Operative REDL and RCLM.

c) TDZ-RVR 175 m (or) MID-RVR 175m and RO-RVR 175 m, if authorized, may be used provided all of the following visual aids operative combinations are available:

- Operative REDL; and
- Operative RCL Lights.

6.2.4 Other requirements for using the reduced takeoff minima for the LVTO approval by employing HUD.

6.2.4.1 The certificate holder is authorized to use the takeoff minima of TDZ RVR-300 m, MID-RVR 300 m and RO-RVR 300 m, specifically based upon the use of HUD takeoff guidance system, provided that:

a) all takeoffs using such takeoff minima must be conducted by the certificate holder using the HUD; and
b) the following special provisions and limitations for the authorization to use the HUD for takeoff are established:
   - Operative REDL.
   - Front course guidance from the Localizer, providing roll-out CAT III guidance, must be available.
   - The crosswind component on the takeoff runway is less than the aircraft flight manual's crosswind limitation, or 15 Kt, whichever is more restrictive.

6.2.4.2 The certificate holder is authorized to use the takeoff minima of TDZ-RVR 150 75 m, MID-RVR 150 m and RO-RVR 150 75 m, specifically based upon the use of HUD takeoff guidance system, provided that:

a) all takeoffs using such takeoff minima must be conducted by the certificate holder using the HUD; and
b) the following special provisions and limitations for the authorization to use the HUD for takeoff are established:
   - Operative HIRL (high intensity runway lights).
   - Front course guidance from the Localizer, providing roll-out CAT III guidance, must be available.
   - Operative RCL lights.
   - The crosswind component on the takeoff runway is less than the aircraft flight manual's crosswind limitation, or 15 Kt, whichever is more restrictive.

6.2.5 Table 4 below summarizes the operational restrictions to the accomplishment of the SID LVTO relating to the inoperativeness of LOC, GP and lighted visual aids.

TABLE 4 – Operational Restrictions relating to SID LVTO.

COMPONENT	SITUATION	EFFECT
LOC	INOPERATIVE	Prohibited Operation
GP	INOPERATIVE	No effect

RVR TDZ	INOPERATIVE	According to table 3
RVR MID	INOPERATIVE	According to table 3
RVR RO	INOPERATIVE	According to table 3
SSALR, MALSR, or ALSF-1/ALSF-2	INOPERATIVE	No effect
Runway edge lights	INOPERATIVE	According to table 3

7 RESPONSIBILITIES OF THE PILOT-IN-COMMAND

The Pilot-in-Command must:

a) inform the air traffic control unit the intention of performing the CAT I ILS AR or LVTO procedure with use of HUD; and

NOTE: The act of the Pilot in Command in manifesting the intention of accomplishing a procedure ILS CAT I AR or LVTO by employing the HUD must be understood by the air navigation service provider as a declaration that the crew is qualified and the aircraft is certified for the referred question.

b) report, immediately, the control unit any anomaly or disability found in the equipment.

8 FINAL ARRANGEMENTS

8.1 This AIC shall enter into force on 23 MAY 2019, repealing, on this date, AIC A 19/12, of JAN 10, 2013.

8.2 Cases not provided for in this AIC shall be settled by the Head of DECEA's Operations Subdepartment.