



GOVERNMENT OF INDIA

OFFICE OF THE DIRECTOR GENERAL OF CIVIL AVIATION

TECHNICAL CENTRE, OPP SAFDURJUNG AIRPORT, NEW DELHI

CIVIL AVIATION REQUIREMENTS

SECTION 2 - AIRWORTHINESS

SERIES 'I', PART VIII

24TH AUGUST, 1997

EFFECTIVE: FORTHWITH

Subject: Installation of Airborne Collision Avoidance System.

1. INTRODUCTION

1.1 With the liberalisation of air transport operations in the country, the domestic operations have increased considerably. Besides, there is congestion in the Indian airspace on account of large number of international flights over flying or transiting through India. While the air traffic services and associated facilities are continuously being upgraded and modernised by the Airports Authority of India for ensuring safety of aircraft operations in the Indian airspace, it is also considered necessary to upgrade the airborne equipment of aeroplanes to reduce the risk of midair collisions between aircraft. Installation of Airborne Collision Avoidance System (ACAS), which is an airborne equipment that functions independently of the ground based air traffic control system, can help in preventing mid-air collisions. However, the level of protection provided by ACAS equipment depends on the type of transponder the intruder aeroplane is carrying.

1.2 This CAR is issued under the provision of Rule 29C and Rule 133A of the Aircraft Rules 1937.

2. APPLICABILITY

The requirements of this CAR are applicable to aeroplanes referred in paras 5 and 6 and engaged in commercial and general aviation operations to, through, within and overflying the Indian airspace.

3. DEFINITIONS

For the purpose of this CAR, the following terms shall have the meanings as given against each:-

3.1 **Airborne Collision Avoidance System (ACAS)** : An aeroplane system based on Secondary Surveillance Radar (SSR) transponder signals which operates independently of ground-based equipment to provide advice to the pilot on potential conflicting aeroplane that are equipped with SSR transponders.

- 3.2 **ACAS I:** An ACAS which provides information as an aid to 'see and avoid' action but does not include the capability for generating resolution advisories (RAs).
- 3.3 **ACAS II:** An ACAS which provides vertical resolution advisories (RAs) in addition to the traffic advisories. TCAS – II with change 7 is equivalent to ACAS II.
- 3.4 **Commercial air transport operation.** An aircraft operation involving the transport of passengers, cargo or mail for remuneration or hire.
- 3.5 **General aviation operation.** An aircraft operation other than a commercial air transport operation or an aerial work operation.
- 3.6 **Intruder:** An SSR transponder-equipped aeroplane within the surveillance range of ACAS for which, ACAS has an established track.
- 3.7 **Resolution Advisory (RA):** An indication given to the flight crew recommending:
- a) a maneuver intended to provide separation from all threats; or
 - b) a maneuver restriction intended to maintain existing separation
- 3.8 **Secondary Surveillance Radar (SSR):** A surveillance radar system which uses transmitters/receivers (interrogators) and transponders.
- 3.9 **Traffic Advisory (TA):** An indication given to the flight crew that a certain intruder is a potential threat.
4. **FUNCTIONAL REQUIREMENTS of ACAS I and ACAS II**
- 4.1 ACAS I shall perform the following functions:
- a) surveillance of nearby SSR transponder equipped aeroplanes; and
 - b) provide indications to the flight crew identifying the approximate position of nearby aeroplanes as an aid to the visual acquisition.
- 4.2 ACAS II shall perform the following functions:
- a) surveillance;
 - b) generation of TAs;
 - c) threat detection;
 - d) generation of RAs;
 - e) co-ordination; and
 - f) communication with ground stations.
- 4.3 Airborne Collision Avoidance System should be of an approved type meeting the specifications contained in Annex 10 (Volume IV) to the Convention on International Civil Aviation or FAA TSO C-119 or any other equivalent specification acceptable to DGCA.

5. Aeroplanes engaged in Commercial air transport operation:

- 5.1 All turbine-engined aeroplanes having a maximum certificated take-off mass in excess of 15000 kg or authorized to carry more than 30 passengers or maximum payload capacity of more than 3 tonnes shall be equipped with an airborne collision avoidance system (ACAS II).
- 5.2 All turbine-engined aeroplanes having a maximum certificated take off mass in excess of 5700 kg but not exceeding 15000 kg or authorized to carry more than 19 passengers, which are imported on or after 1st April 2006, shall be equipped with an airborne collision avoidance system (ACAS II).
- 5.3 All turbine-engined aeroplanes having a maximum certificated take off mass in excess of 5700 kg but not exceeding 15000 kg or authorized to carry more than 19 passengers, which are imported before 1st April 2006, shall be equipped with an airborne collision avoidance system (ACAS I).
- 5.4 All turbine-engined aeroplanes having a maximum certificated take off mass 5700 kg or less and authorized to carry 10 to 19 passengers shall be equipped with an airborne collision avoidance system (ACAS I).
- 5.5 All twin jet-engined aeroplanes having a maximum certificated take off mass 5700 kg or less and authorized to carry less than 10 passengers shall be equipped with an airborne collision avoidance system (ACAS I).
- 5.6 It is recommended that all aeroplanes covered under paras 5.3, 5.4 and 5.5 should be equipped with an airborne collision avoidance system (ACAS II).
- 5.7 An airborne collision avoidance system shall operate in accordance with the relevant provisions of Annex 10, Volume IV.

6. Aeroplanes engaged in General aviation operation:

- 6.1 All turbine-engined aeroplanes of a maximum certificated take-off mass in excess of 15000 kg, or authorized to carry more than 30 passengers, for which the individual airworthiness certificate is first issued after 24 November 2005, shall be equipped with an airborne collision avoidance system (ACAS II).
- 6.2 It is recommended that all turbine-engined aeroplanes of a maximum certificated take off mass in excess of 5700 kg but not exceeding 15000 kg, or authorized to carry more than 19 passengers, for which the individual airworthiness certificate is first issued after 01 January 2008, should be equipped with an airborne collision avoidance system (ACAS II).

Note 1. – The term “individual airworthiness certificate is first issued” means certificate of airworthiness issued to the individual aircraft after manufacture.

Note 2. – The term “turbine-engined” includes turbo-jet, turbo-prop and turbo-fan engines.

Note 3. – The term “authorised to carry number of passengers” implies the passengers seating capacity as per type certificate.

7. OPERATIONAL REQUIREMENTS

7.1 The Airplane Flight Manual shall contain the appropriate procedures for the ACAS II or ACAS I, as applicable, duly approved by the concerned regulatory authority.

7.2 The Operations Manual and the Training Manual of the operator shall respectively include the operational procedures and the training required for the flight crew on the ACAS.

7.3 The operating crew shall be adequately trained and kept proficient on the functioning of the ACAS. It should be emphasised that maximum benefit of ACAS is obtained when pilots of both the aeroplanes respond promptly and correctly to their respective TAs/RAs.

Note 1. – Procedures for the use of ACAS equipment are specified in the procedures for Air Navigation Services - Aircraft operations (PANS –OPS, Doc 8168), Volume I – Flight procedures. ACAS Training Guidelines for pilots are provided in PANS – OPS, Volume I, Attachment A to Part VIII.

Note 2. – Appropriate training, to the satisfaction of DGCA, to competency in the use of ACAS equipment and the avoidance of collisions may be evidenced, for example by:

- a) possession of a type rating for an aeroplane equipped with ACAS, where the operation and use of ACAS are included in the training syllabus for the type rating; or
- b) possession of a document issued by a training organization or a person approved by the DGCA to conduct training for pilots in the use of ACAS, indicating that the holder has been trained in accordance with the guidelines referred to in Note. 1; or
- c) a comprehensive pre-flight briefing by a pilot who has been trained in the use of ACAS in accordance with the guidelines referred to in Note 1.

7.4 In addition to the other applicable requirements, the following procedures shall be followed by the flight crew for the operation of ACAS:

- a) The pilots shall not maneuver the aeroplanes in response to a TA only. The pilots, however, shall search for the approaching traffic.

- b) In the event of RA to alter the flight path, the search for the conflicting traffic shall include a visual scan of the airspace into which own ACAS aeroplane might maneuver.
- c) The alteration of the flight path shall be limited to the minimum extent necessary to comply with the RA.
- d) Pilots who deviate from an ATC clearance in response to an RA, shall promptly return to the terms of the previous ATC instruction or clearance when the conflict is resolved.
- e) The pilots shall, as soon as practicable, notify the ATC unit of the direction of the RA, and, when the conflict is resolved, that they are returning to the terms of the current ATC clearance.

Note. – When RA is initiated and in response thereof the pilot deviates from ATC clearance, he is not considered to be violating the ATC instructions.

- 7.5 The ACAS system shall be kept 'ON' while operating in the Indian airspace.
- 7.6 Every flight plan for a flight in the Indian airspace shall indicate that the aeroplane is equipped with a serviceable ACAS equipment required as per this CAR.
- 7.7 Any pilot experiencing RA while flying in Indian airspace, shall file a report on R/T with the handling Air Traffic Control Unit in India followed by a written report to the DGCA India and Airports Authority of India. A proforma for filing the written report is given as Appendix "A".
- 7.8 The ATC controllers shall be adequately trained on the capabilities and limitations of ACAS and on the procedures to be applied for the provision of Air Traffic Services to aeroplanes equipped with ACAS in accordance with the ICAO requirements.
- 7.9 Once an aeroplane departs from an assigned ATC clearance in compliance with an RA, the ATC controller ceases to be responsible for providing ATC separation between that aeroplane and other aeroplane affected by the direct consequence of that RA maneuver. Controller's responsibility for providing separation for all affected aeroplanes resumes when either:
 - (i) the aeroplane returns to the assigned clearance; or
 - (ii) the pilot reports the ATC Controller that the RA maneuver is completed and the ATC controller confirms that separation is established.

8. MAINTENANCE REQUIREMENTS

- 8.1 The ACAS equipment shall be maintained in accordance with the manufacturer's maintenance programme. The inspection schedules shall include the manufacturer's maintenance requirements.
- 8.2 The performance of the ACAS is highly sensitive to altimetry error both for the ACAS-equipped aeroplane and intruder aeroplane. It is therefore necessary that the accuracy of the aeroplane altimetry system be sufficiently high for successful operational use of ACAS. This aspect should be highlighted in the maintenance system manual and to all concerned personnel.
- 8.3 The Aircraft Maintenance Engineer (AME) holding licence in Category 'R'/'V' on the type of aeroplane shall undergo adequate training on the maintenance of the ACAS. After successful completion of the training and oral check, the Quality Control Manager of the organisation shall issue a certificate after which the AME licence is deemed to cover the inspection and certification of ACAS. A copy of the certificate shall be forwarded to the Regional Airworthiness office of the DGCA.
- 8.4 The type training of AMEs on Radio/Avionics System shall include training on ACAS installed on the aeroplane.
- 8.5 The provisions contained in the MEL with regard to unserviceability of ACAS as approved by the concerned Civil Aviation Authorities shall be acceptable. However, in no case the ACAS shall be unserviceable for more than ten days.



**(K Gohain)
Director General of Civil Aviation**

PILOT/OBSERVER RA REPORT

Aircraft Operator _____ Pilot _____ Observer _____

Name _____ Telephone _____ SSR _____

(Information requested on this line is optional)

Aircraft ID _____ Aircraft Type _____

Aerodrome of Departure _____ Destination _____

Date and time of event _____ UTC

Own aircraft altitude _____

Own aircraft position FIR _____ VOR _____ Radial _____ DME _____

Or

LAT _____ LONG _____

Phase of Flight

Take-off _____ Climb _____ Cruise _____ Descent _____ Hold _____

Final _____ Missed approach _____

Clearance _____ ft/FL

TA Information

TA issued ? YES _____ NO _____

Visual contact prior to RA? YES _____ NO _____

ATS advisory? YES _____ NO _____

RA Information

Intruder bearing _____ o'clock

Intruder range _____ NM

Relative altitude _____ ft

Type of RA _____ (climb, crossing climb, VSL500, etc.)

Did you follow the RA ? YES _____ NO _____

If applicable, did ATS instruction conflict with the RA ? YES _____ NO _____

Was RA necessary ? YES _____ NO _____

General information

Flight conditions: IMC _____ VMC _____ Day _____ Night _____

Visibility: _____ NM

Air traffic service provided : En-route control _____

Aerodrome/ approach control _____ Flight information _____

Remarks

Note: The report should be forwarded to the Director of Air Safety, Office of the Director General of Civil Aviation, Opp. Safdarjung Airport, Aurobindo Marg, New Delhi - 110003 (Phone 24620272, Fax No. 24633140)

With a copy to the Director of Air Routes and Aerodrome (Operations), Airport Authority of India, Rajiv Gandhi Bhavan, Safdarjung Airport, New Delhi-110003 (Phone 24631684, Fax 24629567)

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