

CAR Section II Series I Part VII is proposed to be amended. The propose amendments are shown in subsequent affect paragraphs.

The text of the amendment is arranged to show deleted text, new or amended text as shown below:

- (a) deleted text is marked with strikethrough;
- (b) new or amended text is highlighted in grey;
- (c) an ellipsis (...) indicates that the remaining text is unchanged in front of or following the reflected amendment

**CIVIL AVIATION REQUIREMENTS SECTION 2 - AIRWORTHINESS**

**SERIES 'I', PART VII**

SUBJECT: **GROUND PROXIMITY WARNING SYSTEM (GPWS).**

**1 INTRODUCTION**

ICAO introduced Ground Proximity Warning System (GPWS) carriage requirements in 1978 to alleviate the Controlled Flight Into Terrain (CFIT) problem. A significant decline in the number of incidents was observed after installation of GPWS. The CFIT, however, continued to be a critical flight safety problem. ICAO has, therefore, amended the GPWS provisions in Annex 6. This issue of CAR brings out the revised requirements for installation of GPWS keeping in view the amendments to Annex 6 issued by ICAO and also the Indian experience of CFIT problem.

Rule 57 of the Aircraft Rules, 1937 stipulates that every aircraft shall be fitted and equipped with instruments and equipment, including radio apparatus and special equipment, as may be specified according to the use and circumstances under which the flight is to be conducted. This CAR is issued under the provisions of Rule 133A of the Aircraft Rules, 1937.

**2 DEFINITION**

**Ground Proximity Warning System (GPWS):** An equipment installed in an aeroplane for the purpose of providing automatically a timely and distinctive warning to the flight crew when the aeroplane is in potentially hazardous proximity to the earth's surface.

### 3 REQUIREMENTS

- ~~3.1 No person shall operate turbine-engined aeroplane unless it is equipped with GPWS.~~
- ~~3.2 No person shall operate piston-engined aeroplane of maximum certified take-off mass in excess of 5700 Kgs or type certified to carry more than 9 passengers, unless it is equipped with GPWS.~~
- 3.1 All turbine-engined aeroplanes of a maximum certificated take-off mass in excess of 5 700 kg or authorized to carry more than nine passengers shall be equipped with a ground proximity warning system.
- ~~3.3 No person shall operate turbine-engined aeroplane of maximum certified take-off mass in excess of 15000 kgs or type certified to carry more than 30 passengers, for which the individual certificate of airworthiness is first issued on or after 1 January 2001, unless it is equipped with ground proximity warning system which has a forward looking terrain avoidance function also in addition to the normal functions as given in para 4.1 below.~~
- 3.3.2 All turbine-engined aeroplanes of a maximum certificated take-off mass in excess of 15 000 kg or authorized to carry more than 30 passengers shall be equipped with a ground proximity warning system which has a forward looking terrain avoidance function.
- ~~3.4 No person shall operate on or after 30<sup>th</sup> March, 2005, turbine-engined aeroplane of maximum certified take-off mass in excess of 15000 kgs or type certified to carry more than 30 passengers unless it is equipped with ground proximity warning system which has a forward looking terrain avoidance function also in addition to the normal functions as given in para 4.1 below.~~
- ~~3.5 No person shall operate turbine-engined aeroplane of maximum certificated take-off mass in excess of 5 700 kg or type certified to carry more than nine passengers, for which the individual certificate of airworthiness is first issued on or after 1 January 2004, unless it is equipped with ground proximity warning system which has a forward looking terrain avoidance function.~~
- 3.5.3 All turbine-engined aeroplanes of a maximum certificated take-off mass in excess of 5700 kg or authorized to carry more than nine passengers, for which the individual certificate of airworthiness is first issued on or after 1 January 2004, shall be equipped with a ground proximity warning system which has a forward looking terrain avoidance function.
- ~~3.6 No person shall operate from 1 January 2007, turbine-engined aeroplane of a maximum certificated take-off mass in excess of 5700 kg or type certified to carry more than nine passengers unless equipped with ground proximity warning system which has a forward looking terrain avoidance function.~~

3.6.4 All turbine-engined aeroplanes of a maximum certificated take-off mass in excess of 5 700 kg or authorized to carry more than nine passengers shall be equipped with a ground proximity warning system which has a forward-looking terrain avoidance function.

~~3.7 No person shall operate from 1 January 2007, piston-engined aeroplane of a maximum certificated take-off mass in excess of 5 700 kg or authorized to carry more than nine passengers unless equipped with a ground proximity warning system which provides the warnings for excessive descent rate, excessive altitude loss after take off or go-around, warning of unsafe terrain clearance and a forward-looking terrain avoidance function.~~

3.7.5 It is recommended that all turbine-engined aeroplanes of a maximum certificated take-off mass of 5 700 kg or less and authorized to carry more than five but not more than nine passengers should be equipped with a ground proximity warning system which provides the warnings as para 4.1 a) and c), warning of unsafe terrain clearance and a forward looking terrain avoidance function.

3.6 All piston-engined aeroplanes of a maximum certificated take-off mass in excess of 5 700 kg or authorized to carry more than nine passengers shall be equipped with a ground proximity warning system which provides the warnings in para 4.1 a) and c), warning of unsafe terrain clearance and a forward-looking terrain avoidance function.

3.7 A ground proximity warning system shall provide automatically a timely and distinctive warning to the flight crew when the aeroplane is in potentially hazardous proximity to the earth's surface.

*Note: The forward looking terrain avoidance warning equipment is commonly known Enhanced Ground Proximity Warning System (EGPWS) or Ground Collision Avoidance System (GCAS).*

#### 4 OPERATIONAL REQUIREMENTS

4.1 ~~The GPWS should provide automatically, as a minimum~~ A ground proximity warning system shall provide, unless otherwise specified herein, warnings under the following circumstances :

- a) excessive descent rate ;
- b) excessive terrain closure rate ;
- c) excessive altitude loss after take off or go-around ;
- d) unsafe terrain clearance while not in landing configuration ;
  - i) gear not locked down ;
  - ii) flap not in landing position ; and
- e) excessive descent below the instrument glide path.

4.2 Prior to operation of the aeroplane fitted with GPWS as required by para 3, the aeroplane flight manual shall contain appropriate procedures for-

- a) the use of GPWS equipment;
- b) amendment to the checklist to include GPWS;
- c) flight crew action with respect to the warnings provided by GPWS equipment;
- d) de-activation for planned abnormal and emergency conditions;
- e) inhibition of mode 4 warnings based on flap being in other than the landing configuration if the system incorporates a mode 4 flap warning inhibition control.

4.3 Deactivation of GPWS can only be in accordance with the procedures contained in the aeroplane flight manual.

4.4 Whenever GPWS is de-activated, an entry shall be made in the aeroplane maintenance record that includes the date and time of the de-activation and the deactivation properly placarded in the cockpit.

5. The operators are encouraged that in addition to the warning modes given in para 4.1, the following modes may also be provided for the purpose of enhanced safety of flight operations:

5.1 Forward-looking wind shear warning system - jet aeroplanes All turbo-jet aeroplanes of a maximum certificated take-off mass in excess of 5 700 kg or authorized to carry more than nine passengers may be equipped with a forward-looking wind shear warning system. A forward-looking wind shear warning system should be capable of providing the pilot with a timely aural and visual warning of wind shear ahead of the aircraft, and the information required to permit the pilot to safely commence and continue a missed approach or go-around or to execute an escape maneuver, if necessary. The system should also provide an indication to the pilot when the limits specified for the certification of automatic landing equipment are being approached, when such equipment is in use.

5.2 Altitude call-out and excessive bank angle alert.

## **6. GENERAL REQUIREMENTS**

6.1 The GPWS shall be of an approved type and meet the specifications given in the FAA TSO C-92 C or any other specification acceptable to DGCA. In case of EGPWS and GCAS they should meet the specifications given in FAA TSO-C151a or JAA JTSO C151a or any other specifications acceptable to DGCA. The Forward looking Wind shear Warning Systems should meet the requirements given in FAA TSO-C117a or any specifications acceptable to DGCA

6.2 The GPWS shall be installed in an approved manner by an approved organisation/manufacture and shall be maintained in serviceable condition.

- 6.3 Engineers certifying the maintenance of GPWS should hold appropriate type rated CAR 66 as applicable and should be adequately trained on this equipment.
- 6.4 The Operations Manual shall be amended to reflect any change in the operating procedures, where applicable.

Director General of Civil Aviation