

6/2007

### Applicability: All Aeroplane AOC Holders

#### AVOIDANCE OF CONTROLLED FLIGHT INTO TERRAIN (CFIT) - OPERATIONAL AND TRAINING CONSIDERATIONS

##### 1 Introduction

1.1 To avoid the risk of an aeroplane flying into the ground, water, or a man-made obstacle, operators should introduce sound procedures reinforced by training and monitoring of crews. Aeronautical Information Circular (AIC) 122/2006 (Pink 108) contains guidelines that when followed should help avoid situations in which controlled flight into terrain (CFIT) becomes a possibility. Other guidance of interest to operators can be found in the [Flight Safety Foundation's \(FSF\) CFIT Education and Training Aid](#) including a video, which has been widely distributed.

1.2 Recent studies undertaken by International Civil Aviation Organization (ICAO) and the FSF (and quoted in the latest [CAA SRG Safety Plan](#)) highlighted that "crews do not always react immediately to Terrain Awareness and Warning Systems (TAWS) hard warnings". The Civil Aviation Authority (CAA), with the cooperation of UK operators, used Flight Data Monitoring (FDM) data and the Mandatory Occurrence Reporting (MOR) scheme database to determine if this reflected operational experience.

1.3 The purpose of this FODCOM is to highlight findings from the CAA study and to address specific operational and training aspects of CFIT risk avoidance that operators should apply.

##### 2 UK Crews' Reactions to TAWS Hard Warnings

2.1 The FDM data gathered by the CAA during the period April 2005 to March 2006 showed that for the data sample (37% of flights), 54 TAWS hard warning events were recorded of which 12 were genuine hard warnings with crew reaction times in all cases being well within the expected time. The MOR data did not record crew reaction times. A comparison of the two data sets indicated that the whole UK fleet could expect approximately 26 hard warnings per million flights, although differences in the data quality and quantity suggested that a degree of under and mis-reporting of TAWS hard warnings was occurring.

2.2 The data sets revealed that false and nuisance warnings were approximately seven times more frequent than genuine hard warnings. This was a cause for concern as crews that had frequent exposures to nuisance or false warnings might begin to react more slowly to genuine hard warnings. The following contributory factors had been identified:

- Non-adherence to published procedures.
- Crews adopting non-standard or unusual procedures e.g. late selections of gear or flaps.
- Operator crew training not fully emphasising strict adherence to published procedures.

2.3 As part of the study, current TAWS guidance material was reviewed. CAP 516 had been superseded by JAA Temporary Guidance Leaflet (TGL) No 27, which provided equivalent guidance in relation to TAWS training. Small improvements have been suggested to the JAA; they have been asked to include in the TGL the guidance that is included in this FODCOM at paragraph 4 below.

##### 3 Operational Considerations

3.1 Operators should follow the guidance contained in AIC 122/2006 (Pink 108), together with that contained in the FSF CFIT Education and Training Aid and in JAA TGL 27. In addition, operators should emphasise to their crews, particularly during initial and recurrent training, the necessity of fully adhering to published procedures. If TAWS hard warnings are received they should be acted upon promptly and all occurrences should be reported to the CAA via the MOR scheme. It would assist subsequent analysis if MOR reports were supported by FDM information where available.

## 4 Flight Simulator CFIT Scenarios for Training in the Use of TAWS

4.1 Where operators have access to flight simulators with TAWS installed, pilots should be given practice in responding to alerts and warnings. In addition to providing demonstrations of the different TAWS modes and inhibitions that apply when the aeroplane is in a landing configuration, two specific exercises should be considered:

- In the first exercise, the pilot flies towards terrain at a constant altitude in clear visual conditions with the aeroplane not in a landing configuration. The pilot should be instructed not to begin a terrain avoidance manoeuvre until the TAWS gives a 'Pull Up' warning. The instructor must, before running this exercise, satisfy himself that if, at this point, the pilot responds correctly to the warning, the aeroplane will clear the terrain feature. This lesson will demonstrate that the TAWS warning comes very late, but when followed, a collision with the terrain will be avoided. It will also demonstrate that if action had been taken when the alert first occurred, the terrain clearance would have been much greater.
- In the second exercise, the pilot is 'instructed by radar' whilst flying in reduced visibility to fly towards a similar terrain feature, without placing any constraints upon when he should respond to any TAWS alerts and warnings he might encounter. Again, this exercise will enhance both the need to respond promptly to the TAWS alert (and warning, if this should be annunciated). It will demonstrate that timely and correct action will enable the aircraft to clear the terrain.

4.2 When flight simulators are not able to allow CFIT exercises (such as those described above) to be carried out, consideration should be given to making use of flight simulators that can do so, or of modifying the former accordingly.

4.3 Training staff should note the extent to which pilots make use of situational information and their readiness to respond promptly when the situation demands, the aim being to discourage over-dependence on automatic mode operations when early - and correct - manual intervention is feasible. Advice should be provided if any shortcomings are observed during the monitoring of effective crew resource management in terms of information and load sharing, and of decision making in order to avoid CFIT.

## 5 Recommendation

5.1 Operators should ensure that the guidance recommended in this FODCOM is incorporated into the appropriate parts of the Operations Manual which will include the Training Manual.

5.2 Operators should submit MOR reports for all TAWS hard warnings and these should be supported by FDM information, when available, to assist with subsequent analysis.

## 6 Queries

6.1 Any queries as a result of this FODCOM should be addressed to Head of Flight Operations Policy Department at the following e-mail address: [FOD.Admin@srg.caa.co.uk](mailto:FOD.Admin@srg.caa.co.uk).

19 February 2007

**Recipients of new FODCOMs are asked to ensure that these are copied to their 'in house' or contracted maintenance organisation, to relevant outside contractors, and to all members of their staff who could have an interest in the information or who need to take appropriate action in response to this Communication.**

Review FOP(C) February 2008