

**Controlled Flight Into Terrain**

**I.-Description**

Controlled Flight into Terrain (CFIT) occurs when an airworthy aircraft under the complete control of the pilot is inadvertently flown into terrain, water, or an obstacle. The pilots are generally unaware of the danger until it is too late.

Most CFIT accidents occur in the approach and landing phase of flight and are often associated with [non-precision approaches](http://www.skybrary.aero/index.php/Non-Precision_Approach).

Many CFIT accidents occur because of loss of [situational awareness](http://www.skybrary.aero/index.php/Situational_Awareness), particularly in the vertical plane, and many crash sites are on the centreline of an approach to an airfield. Lack of familiarity with the approach or misreading of the approach plate are common causal factors, particularly where the approach features steps down in altitude from the initial approach fix to the final approach fix.

**II.-Effects**

* Collision with the ground resulting in [Hull Loss](http://www.skybrary.aero/index.php/Hull_Loss) and fatalities/injuries.

**III.-Defences**

* Standard Operating Procedures ([SOPs](http://www.skybrary.aero/index.php/SOPs)).
* Terrain Avoidance Warning Systems ([TAWS](http://www.skybrary.aero/index.php/Ground_Proximity_Warning_Systems)).
* [Situational awareness in relation to terrain](http://www.skybrary.aero/index.php/Terrain_Awareness)

**IV,-Typical Scenarios**

* **Pilot-induced situation**: The pilot encountered weather conditions that were worse than forecast and, in an attempt to maintain or regain visual contact with the ground in an area of very low cloud, descended below [Minimum Safe Altitude](http://www.skybrary.aero/index.php/Minimum_Safe_Altitude) and the aircraft struck the ground. Contributing to this accident was the pilot's over-reliance on [GPS](http://www.skybrary.aero/index.php/GPS) while attempting to maintain Visual Meteorological Conditions ([VMC](http://www.skybrary.aero/index.php/VMC)) and a resultant lack of adequate situational awareness of terrain.
* **ATCO-induced situation:** The controller gave an aircraft which was still at 210 KIAS an intermediate heading towards the [ILS](http://www.skybrary.aero/index.php/ILS) centreline during a radar vectored initial approach but was subsequently distracted and failed to issue the intercept heading for the ILS LLZ. When the flight crew, who were unfamiliar with the approach, failed to notice the situation in time to query it, the aircraft flew beyond the centreline and into high terrain on the other side before resolution was possible.

**V.- Contributory Factors**

* Weather: Rain, [turbulence](http://www.skybrary.aero/index.php/Turbulence), and [icing](http://www.skybrary.aero/index.php/In-Flight_Icing), may increase the [workload of the pilot](http://www.skybrary.aero/index.php/Pilot_Workload) and cause interference reducing the accuracy of radio navigation beacons. Poor visibility, particularly at night can contribute to disorientation and loss of situational awareness.
* Approach Design and documentation: The depiction of an approach, and particularly step down fixes, on Terminal Approach Procedure (TAP) plates may not be clear. Approaches may take aircraft close to high terrain in order to comply with diplomatic or [noise abatement](http://www.skybrary.aero/index.php/Noise_Abatement) constraints, or to deconflict with departure routes.
* Failure to use [Standard Phraseology](http://www.skybrary.aero/index.php/Standard_Phraseology) leading to confusion and misunderstanding.
* Pilot [fatigue](http://www.skybrary.aero/index.php/Fatigue) and [disorientation](http://www.skybrary.aero/index.php/Spatial_Disorientation). Approach and landing is a demanding phase of flight for pilots.

**VI.-Accident Precursors**

Study of CFIT accidents has enabled a large number of accident precursors to be identified. These precursors are not necessarily contributing factors, though some may be; but they are warnings revealing that a weakness has been detected in existing defence mechanisms. The identification of an accident precursor usually necessitates action to strengthen these defences.

**VII.-Solutions**

* More widespread equipment of aircraft with [TAWS](http://www.skybrary.aero/index.php/Ground_Proximity_Warning_Systems).
* Greater awareness of [Approach and Landing risks](http://www.skybrary.aero/index.php/Approach_and_Landing_Risks).
* [Continuous Descent Final Approaches](http://www.skybrary.aero/index.php/Continuous_Descent_Final_Approach) (CDFA).
* [Minimum Safe Altitude Warning](http://www.skybrary.aero/index.php/Minimum_Safe_Altitude_Warning) (MSAW) systems.
* Electronic Terrain and Obstacle Data (eTOD)