Just How Effective is EGPWS?

Significant progress has been made in reducing the CFIT (Controlled Flight Into Terrain) risk for large commercial jet aircraft in the USA, Europe, and other developed countries. In 2003, the averaged CFIT risk is less than one aircraft loss every 91 million departures. In 1974, the CFIT risk was about one large commercial jet aircraft loss every 0.8 million flights. The reduction in risk has been about 100 times over the 30 years! (Figure 1)

**Figure 1**

**CFIT RISK FOR LARGE COMMERCIAL JET AIRCRAFT - NORTH AMERICA**
(excludes Eastern built aircraft) 1965-2002

- **PER MILLION DEPARTURES**
- **CFIT RISK PER MILLION DEPARTURES**
- **3 YEAR AVERAGE**
- **10 YEAR AVERAGE**
The introduction of on-board windshear detection along with pilot training and a standard uniform recovery procedure further helped to reduce the frequency of CFIT accidents. These steps coupled with the installation of anemometers on the ground surrounding the airport area helped the controller identify and notify the pilots of possible windshear. The incidence of windshear accidents has almost been eliminated in spite of the real world weather environment. Doppler radar across the USA on the ground and predictive windshear systems added to large aircraft has further reduced the windshear risk. (Figure 2)

Windshear accidents - Worldwide Commercial Jet Fleet

* No On-board Windshear Alert - Flaps in transition inhibit
In 1994, the FAA mandated the installation of GPWS into regional turbine aircraft with 10 or more passenger seats. Not one aircraft from that fleet of about 1600 aircraft has suffered a CFIT accident in the USA since. With over 36 million departures, the CFIT risk has been reduced by approximately 20 times! Statistically, there have been some 21 fewer CFIT accidents. The return on the investment in equipment and installation proved to be about 1 year. The total savings to date are probably better than $300 Million and many lives have been undoubtedly saved. The application of GPWS technology to regional turbine aircraft is one example of how a simple technology coupled with a simple recovery procedure can significantly improve flight safety. (Figure 3)

**Figure 3**

**U.S.A Part 121 and Part 135 CFIT Accidents**
**Turbine Powered Aircraft, 10 to 30 Passenger Seats**

Excludes Amphibian, Parachuting and Agriculture operations.

May 1994
FAR 135, 153 GPWS Installation for >=10 seats

NO GPWS
CFIT training for the pilot has paid great dividends in helping the pilot to recognize CFIT risks. Practice recovery training in the simulator helps reduce the reaction time and improve the recovery. The real world documented pilot response to a GPWS warning varies, but pilots respond rather quickly. Most respond to a terrain alert within two seconds when flying in instrument meteorological conditions (IMC) especially at night. (Figure 4)

Pilot Response to EGPWS Alerts

![Bar chart showing pilot response times](image)

Figure 4