Evaluating a Direct-To Routing

One of the risks involved in proceeding directly to a waypoint is that you may be yet unaware of any significant terrain between the present position and the waypoint. A terrain display offers a convenient way of seeing clearly what lies between here and there as reported and documented in the database. Always consult the MEF values along the path of flight to ensure terrain and obstruction clearance.

Terrain Awareness and Warning Systems

A terrain awareness and warning system (TAWS) offers you all of the features of a terrain display along with a sophisticated warning system that alerts you to potential threats posed by surrounding terrain. A terrain awareness and warning system uses the aircraft's GPS navigation signal and altimetry systems to compare the position and trajectory of the aircraft against a more detailed terrain and obstacle database. This database attempts to detail every obstruction that could pose a threat to an aircraft in flight.

TAWS A and TAWS B

There are presently two classes of certified terrain awareness and warning systems that differ in the capabilities they provide to the pilot: TAWS A and TAWS B.

A TAWS A system provides indications for the following potentially hazardous situations:

1. Excessive rate of descent
2. Excessive closure rate to terrain
3. Altitude loss after takeoff
4. Negative climb rate
5. Flight into terrain when not in landing configuration
6. Excessive downward deviation from glideslope
7. Premature descent
8. Terrain along future portions of the intended flight route

A TAWS B system provides indications of imminent contact with the ground in three potentially hazardous situations:

1. Excessive rate of descent
2. Excessive closure rate to terrain (per Advisory Circular (AC) 23-18, to 500 feet above terrain)
3. Negative climb rate or altitude loss after takeoff

TAWS Alerts

Aural alerts issued by a terrain awareness and warning system warn you about specific situations that present a terrain collision hazard. Using a predictive "look ahead" function based on the aircraft's ground speed, the terrain system alerts you to upcoming terrain. At a closure time of approximately 1 minute, a "Caution! Terrain!" alert is issued. This alert changes to the more serious "Terrain! Terrain!" alert when the closure time reaches 30 seconds. In some areas of the world, this terrain warning may very well be too late, depending on the performance of the aircraft. You need to determine the equipment's criteria and note if the unit makes allowances for lower power output of the powerplant(s) at higher elevations, resulting in lower climb rates than may be programmed into the unit for that aircraft.

A second type of aural alert warns about excessive descent rates sensed by the system ("Sink Rate!") or inadvertent loss of altitude after takeoff ("Don't Sink!").

The introduction of terrain awareness and warning systems has sharply reduced the number of CFIT accidents. Despite this significant leap forward in safety, incidents and accidents involving terrain still happen. In the modern TAWS-equipped cockpit, some of these incidents have been related to pilot reaction to TAWS alerts. TAWS sometimes gives nuisance alerts that desensitize the pilot to TAWS alerts, which can result in the pilot's decision to ignore a valid alert deemed unnecessary by the pilot. Most TAWS systems contain software logic that attempts to recognize and remain silent in situations in which proximity to terrain is normal. This logic is partly based on the aircraft's distance from the runway of intended landing. For example, flying at an altitude of 200 feet AGL when 3,500 feet away from the runway is reasonable, but flying at an altitude of 200 feet AGL when 5 miles from the runway is not reasonable. TAWS' logic attempts to silence itself in normal situations, and to sound in abnormal situations.

Risk: Silencing TAWS Alerts

Despite efforts to minimize nuisance alerts, they still occur occassionally. For this reason, most TAWS systems offer a terrain inhibit switch that allows you to silence TAWS alerts. There have been cases in which pilots have used the inhibit switch or ignored TAWS alerts, thinking they were nuisance alerts, when in fact the alerts were valid indications of a dangerous situation. For this reason, you should train yourself to respond to TAWS alerts just as you would to any other sort of emergency. Always, if in any doubt, set "Full Power and Climb" at V_X or V_Y, depending on the equipment manual and AFM/POH. The practice of simply ignoring or disabling TAWS alerts based on pilot intuition has not proved to be a safe one. Your manufacturer's reference manual and aircraft flight manual supplement will prescribe specific procedures for responding to TAWS alerts.

The only current, fully certified systems, known as TAWS, are certified under Technical Standards Order (TSO)-C151.