Submission for NPRM 07-02
Terrain Awareness and Warning Systems (TAWS)

The aviation industry endorses the application of new technologies to the flight deck of aircraft where there is a clear safety gain. However the industry does not consider the fitting of TAWS to fixed wing aircraft operating under Rule Part 135 necessarily the only solution to avoidance of Controlled Flight Into Terrain (CFIT) accidents. In fact it is the industry view that fitting TAWS to some aircraft under 135 operations could actually negate safety in certain circumstances.

Our very strong recommendation is that the better reaction to CFIT accidents would be to address the underlying cause of those accidents, i.e. it is almost always the loss of situational awareness that caused the accident.

This then raises a number of inherent questions:

1. Is a Terrain Awareness system needed on a Part 135 aircraft?
2. Given that a Terrain Awareness system of some type is required, what should the major components of that system be?
3. Should the system necessarily be compliant with TSO-C151b?

1. Is a TAWS system needed on a Part 135 aircraft?

The requirement for a Terrain Awareness system that would alert the pilot(s) of hazardous terrain is seen as very desirable for aircraft operating under part 135. However, while having TAWS as defined under TSO-151b would reduce the chances of CFIT accidents on approach or after takeoff,- the general consensus amongst almost all CAR135 operators is that this is not sufficient for the New Zealand aviation environment. This is especially the case with the TAWS B system, which only provides an aural warning to alert pilots of their proximity to terrain. Given the performance limitations of most light aircraft operating under Part 135, a 60 second aural warning leaves insufficient time to out-climb terrain features commonly found in New Zealand.

The solution that is seen to best provide for safe flying in the New Zealand aviation environment would be one that maintains the pilots situational awareness. In other words, a proactive system that avoids the necessity to take corrective action rather than a reactive system purely designed to alert the pilot when corrective action must be taken.

In its justification for the Forward Looking Terrain Avoidance function, TSO-C151b 3.1 quotes, “The majority of CFIT accidents have occurred because the flight crews did not have adequate situational information regarding the terrain in the vicinity of the aircraft and its projected flight path.” This would appear to substantiate the view that the number of accidents due to CFIT could be substantially reduced through a moving map display allowing pilots to avoid high terrain rather than by mandating TAWS.

2. Given that a Controlled Flight Into Terrain (CFIT) system of some type is required, what should the major components of that system be?

As was established in the Volpe Part 121/135 study, the visual display is the most important function of a TAWS system because it provides flight crews with a picture of the surrounding terrain threat that can be responded to well before the system is required to generate warnings. The use of a Visual Display Unit (VDU) providing the pilot(s) with constant appraisal of the terrain around them, such as a contoured moving map display, would minimise the risk of CFIT accidents while still at a reasonable cost. Most larger aircraft pilots accustomed to TAWS A equipment will strongly assert that the TAWS moving map display enhances situational awareness so well that the aural warning is very unlikely to ever occur; it provides prevention rather than cure. TAWS predecessor GPWS, which was entirely dependent on aural warnings, was so discredited by most of its users that in many CFIT accidents it was either ignored or reacted to far to slowly to provide protection. Those failings are among the reasons why EGPWS or TAWS was developed.

It is recognised that the TAWS B+ system would also provide this capability, but upgrading from a TAWS B system to a TAWS B+ system is seen as prohibitively expensive.

For the best effect the VDU would be placed on the instrument panel, ideally within the 6 primary instruments, but if not, it should be included in such a position on the panel as to be readily available to the pilot in their scan of the instruments.

Many alternatives for this have been presented, including options such as the Aspen AT300 Hazard Awareness Display. This would replace the VSI in the standard instrument panel, thus presenting the pilot(s) with the required information to maintain situational awareness in the most accessible manner possible. The VSI is already accepted in CAR 121 and 125 aircraft to be an appropriate instrument for dual use as it is also the TCAS display on most large aircraft. Should TCAS ever be mandated in 135 aircraft that could be a problem but the display technology is sure to have advanced by then.

3. Should the system necessarily be compliant with TSO-C151b?

It is generally felt that the aircraft operating under Rule Part 135 in New Zealand would not be able to meet the performance required under TSO-C151b, in other words, given a 60 second warning the aircraft would not necessarily be able to out-climb the terrain.

This means that the restrictions and requirements of TSO-C151b are not necessarily applicable to the New Zealand aviation environment, and given that, then if a solution can be found that is not entirely compliant with TSO-C151b but which meets the requirements of the New Zealand aviation environment, then this should perhaps be examined.

Conclusion

Given the performance limitations of most aircraft operating under Rule Part 135 in New Zealand, and the terrain commonly operated in, it is felt that a TAWS system providing only an aural warning would seldom be adequate to prevent CFIT accidents.

While the TAWS B+ system would provide for safe operations it is seen as too expensive for many operators.

It is therefore requested that there be more research done into options such as a moving map display that would increase pilot situational awareness and in doing so reduce the likelihood of CFIT accidents. This evaluation of various systems should not necessarily be referenced to TSO-C151b. It is accepted that this may require an exception to be filed with ICAO but that is a very small price to pay for the significant enhancements to safety that would be provided to the New Zealand aviation industry. Very few countries have the combination of a significant number of CAR 135 operators and New Zealand's terrain. The ICAO exemption process is surely designed to allow for local industry and terrain conditions that vary significantly from the global average.

Other countries do not require the fitting of TAWS to aircraft operating under Rule Part 135. It appears that they do not consider that it is required nor is it a practical solution for reciprocating engined aircraft in this category. We are however faced with a relatively unique situation with this country's terrain and aviation requirements and it is therefore recognised that systems are required to prevent CFIT accidents in aircraft operating in New Zealand under Rule Part 135. As this country would be setting a global precedent for requiring CFIT equipment in aircraft of this category, we must therefore ensure that we get the best possible fit between the aircraft systems and the aviation environment before proceeding.