



WELLINGTON NEW ZEALAND

PURSUANT to Section 28 of the Civil Aviation Act 1990

I, HARRY JAMES DUYNHOVEN, Associate Minister of Transport,

HEREBY MAKE the following ordinary rules.

SIGNED AT Wellington

This *24th* day of *June* 2003

by **HARRY JAMES DUYNHOVEN**

Associate Minister of Transport

Civil Aviation Rules

Part 121, Amendment 9

Air Operations - Large Aeroplanes

TAWS

Docket 2/CAR/4

Contents

Rule objective	3
Extent of consultation.....	3
Summary of comments.....	4
Examination of comments.....	5
Insertion of Amendments	5
Effective date of rule.....	5
Availability of rules.....	5
Subpart A – General	
121.13 Exemptions	6
Subpart F—Instruments and Equipment	
121.379 Ground proximity warning system	6
121.381 Terrain awareness and warning system (TAWS).....	6
Appendix B – Instruments and Equipment Airworthiness Design Standards	
B10 Terrain awareness and warning system (TAWS).....	7
Consultation Details	
Notice of Proposed Rule Making	9
General comments on the NPRM.....	9
Specific comments on the NPRM	10
Relief from compliance dates.....	20
Comments on proposed Civil Aviation (Offences) Regulations.....	26

Rule objective

The objective of this rule is to require holders of air operator certificates to ensure that their aeroplanes used to conduct air operations under Part 121 after the effective date of this rule are progressively equipped with a terrain awareness and warning system (TAWS) with effect from various dates prescribed in the rule.

Extent of consultation

In August 2001 the Civil Aviation Industry Rules Advisory Group (CIRAG) Executive accepted the terms of reference for the establishment of a Technical Study Group (TSG) to participate in a rule making project to upgrade the New Zealand requirements for ground proximity warning systems in accordance with the ICAO standards. The details of this proposal have been developed in consultation with the TSG under the CIRAG consultative process.

Participants on the TSG were drawn from the following sectors of the aviation industry:

- (a) Air traffic services (ATS);
- (b) New Zealand Airline Pilots Association (NZALPA);
- (c) Part 121 operators;
- (d) Part 125 operators;
- (e) Operators of freighter aeroplanes.

In addition, operators of sightseeing aircraft in the Queenstown area were briefed on the rule proposals and given the opportunity to provide feedback.

A total of four TSG meetings were held from August 2001 to November 2001.

A Notice of Proposed Rulemaking, NPRM 02-03, containing the proposed rule to require Part 121 aeroplanes to be equipped with TAWS was issued for public consultation under Docket 2/CAR/4 on 14 December 2001.

The publication of this NPRM was notified in the Gazette on 13 December 2001 and advertised in the daily newspapers in the five main provincial centres on 15 December 2001. The NPRM was published on the CAA web site and mailed to identified stakeholders including representative organisations who were considered likely to have an interest in the proposal.

A period of 84 days was provided for comment on the proposed rule.

Summary of comments

One oral comment and six written submissions were received on the NPRM.

No commenters questioned the safety benefit of TAWS. The issues of concern to commenters arose primarily from the cost of fitting TAWS equipment to existing aeroplanes.

In particular the Aviation Industry Association (AIA), which represents the great majority of Part 121 operators, expressed concern over the decision to issue the NPRM without further consultation. At that point the consultation had extended over four months with four half-day TSG meetings having been held. At the last of these meetings agreement was reached that the NPRM should proceed.

In their submission on the NPRM the AIA proposed alternative compliance dates by which existing Part 121 aeroplanes would have to be equipped with TAWS. The AIA stated that acceptance of these alternative dates in the final rule would address their concerns over the consultation process.

After reviewing the AIA submission, the CAA sought further clarification on the impact of the proposed rule on AIA member airlines' fleets. The CAA then developed an amended rule proposal that provided some, but not all, of the relief sought on compliance dates. This relief was specifically targeted to those aeroplanes that the AIA submitted would be most affected by the TAWS retrofit requirement proposals.

To provide certainty that all Part 121 aeroplanes would be equipped with TAWS no later than one year after the applicable date prescribed in the

amended rule, a new rule 121.13 was added that restricts the Director's power to grant exemptions from the rule requirements for TAWS.

The amended rule proposals also included a requirement for piston powered aeroplanes to be equipped with TAWS Class B, consistent with ICAO Annex 6 Amendment 27 requirements which were received after the NPRM was published.

The amended rule proposal was then circulated to all commenters and a period of 14 days was provided for commenters to respond. The AIA responded that the amended rule proposals were largely accepted. No other comments on the amended rule proposals were received.

The rule as amended was then referred to Parliament's Regulations Review Committee before being signed by the Associate Minister of Transport.

Examination of comments

Comments may be examined by application to the Docket Clerk at the Civil Aviation Authority between 8:30 am and 4:30 pm on weekdays, except statutory holidays.

Insertion of Amendments

The amendments to the rules in this Part are reflected by:

- (a) the revocation and replacement of existing rules; and
- (b) the insertion of new rules.

Effective date of rule

Amendment 9 to Part 121 comes into force on 1 August 2003.

Availability of rules

Civil Aviation Rules are available from–

CAA web site: <http://www.caa.govt.nz/>

Freephone: 0800 GET RULES (0800 438 785)

Subpart A – General

The following new rule is inserted:

121.13 Exemptions

(a) The Director may not grant an exemption from a requirement under 121.381 if the exemption would extend by more than one year the date by which an aeroplane must be equipped with the applicable TAWS.

(b) Notwithstanding paragraph (a), the Director may not grant an exemption from —

- (1) the requirement under 121.381(b) for an aeroplane with a passenger seating configuration of 40 or less seats if the details specified under 47.55(b) in respect of that aeroplane already appear in the New Zealand Register of Aircraft on 1 August 2003; or
- (2) the conditions to the requirements under 121.381(c).

Subpart F—Instruments and Equipment

Rule 121.379 is revoked and the following new rule is inserted:

121.379 Ground proximity warning system

(a) Except as provided in paragraph (b), a holder of an air operator certificate must ensure that a turbine powered aeroplane being operated under that certificate is equipped with GPWS.

(b) The holder of an air operator certificate is not required to comply with paragraph (a) if the aeroplane is equipped with a TAWS Class A.

The following new rule is inserted:

121.381 Terrain awareness and warning system (TAWS)

(a) A holder of an air operator certificate must ensure that a turbine powered aeroplane manufactured on or after 1 April 2002 and being operated under that certificate is equipped with a TAWS Class A.

(b) Except as provided in paragraph (c), a holder of an air operator certificate must ensure that a turbine powered aeroplane manufactured before 1 April 2002 and being operated under that certificate is equipped with a TAWS Class A by 1 July 2005.

(c) A holder of an air operator certificate is not required to equip a turbine powered aeroplane manufactured before 1 April 2002 with a TAWS Class A until 1 January 2007 if—

- (1) that aeroplane has a passenger seating configuration of 40 or less seats; and
- (2) the details specified under 47.55(b) in respect of that aeroplane already appear in the New Zealand Register of Aircraft on 1 August 2003; and
- (3) that aeroplane is already being operated under that certificate before 1 April 2005; and
- (4) a plan certified by the certificate holder is submitted in writing to the Director by 1 April 2005 confirming that compliance with TAWS Class A requirements will be achieved by 1 January 2007; and
- (5) the operation of that aeroplane after 1 July 2005 is conducted in accordance with a terrain collision risk assessment and risk mitigation programme that is acceptable to the Director.

(d) A holder of an air operator certificate must ensure that a piston powered aeroplane being operated under that certificate is equipped with a TAWS Class B by 1 January 2007.

Appendix B – Instruments and Equipment Airworthiness Design Standards

The following new provision is inserted into Appendix B:

B10 Terrain awareness and warning system (TAWS)

TAWS Class A must meet the requirements of TSO C151a or TSO C151b for Class A equipment.

TAWS Class B must meet the requirements of TSO C151a or TSO C151b for Class B equipment.

Consultation Details

(This statement does not form part of the rules contained in Part 121. It provides details of the consultation undertaken in making the rules.)

Notice of Proposed Rule Making

A Notice of Proposed Rule Making 02-03 was published under Docket Number 2/CAR/4 on 14 December 2001. This notice proposed amendments to Part 121 *Air Operations – Large Aeroplanes*, and a consequential amendment to Part 1 *Definitions and Abbreviations*.

Summary of Comments on NPRM Docket Number 2/CAR/4

General comments on the NPRM

A total of six written submissions were received, all from New Zealand aviation industry or aviation recreation organisations. One oral submission was also received. There were no submissions from the general public.

No commenters questioned the safety benefit of TAWS. The issues of concern to commenters arise primarily from the cost of fitting TAWS equipment to existing aeroplanes.

One commenter supported the NPRM completely.

Two commenters requested the NPRM be withdrawn for further industry consultation and another requested that the NPRM be set aside until a detailed cost benefit analysis (CBA) had been conducted.

Some commenters expressed strong disagreement with the proposed rule to require aeroplanes already on the register to be fitted with the new equipment. One considered the justification case to be deficient. Two commenters considered that more industry consultation should have occurred prior to release of the NPRM. Three considered a full cost-benefit analysis should have been provided. One commenter considered provision should be made for alternative anti-collision technologies in the rules and one felt that more cost-effective equipment was available and should be permitted under the rule.

No comments were received on the proposed Part 1 change introducing an abbreviation for TAWS.

Specific comments on the NPRM

Specific comment on the NPRM covered seven main areas – industry consultation prior to rule making, the safety case for TAWS, a cost-benefit analysis, the application to aeroplanes added to the NZ register of aircraft in the future, the application to aeroplanes already on the register, alternative systems and ICAO compliance.

Industry consultation prior to rule making

The Aviation Industry Association (AIA¹) expressed strong concerns regarding the industry consultation process and the decision to issue the NPRM, stating that the majority of the members of the Air Transport Division unanimously expressed their disapproval over the lack of a robust, analytical and comprehensive consultation process in respect of the issuance of the NPRM. The AIA also considered that there had been a breach of the agreed CIRAG process in that there was dissent about the NPRM content at the CIRAG meeting of 13 Dec 2001. In view of this dissent AIA considered that the NPRM should have been referred either back to the TSG for further debate or alternatively to the Director of CAA for a decision before being issued.

The AIA submitted that the issue of safety at reasonable cost had not been explored by CAA with the specific group of operators affected and that doing so would be extremely worthwhile.

Air National also requested further consultation and asked that the NPRM be withdrawn until consultation and general agreement within the industry could move the proposals forward.

CAA comment: The CAA does not agree that the CIRAG process was breached because the informal consultation process on proposed rules under CIRAG does not require unanimous CIRAG

¹ The AIA submission was made on behalf of Air New Zealand, Mount Cook Airline, Air Nelson, Eagle Airways, Freedom Air International, Air National, Airwork (NZ) and Air Freight NZ.

Executive support before the proposal is published as an NPRM. The CAA is satisfied that an appropriate informal consultation process was followed prior to the issue of the NPRM.

Consultation with industry occurred over a four month period from August 2001 via the TSG process that included four meetings and numerous exchanges of information between meetings.

Eight of the nine Part 121 operators in New Zealand were represented on the TSG and all had ample opportunity through the TSG forum to comment on, influence, and provide alternative proposals for rule development. These eight operators account for all but one of the Part 121 aeroplanes on the register.

The CAA presented its rule proposals at the TSG and these were widely debated.

All TSG members in attendance at the final meeting of the TSG's Part 121 TAWS deliberations on 8 November 2001 agreed that the NPRM should proceed, although one later retracted.

Little hard data was put to the TSG by any AIA member in relation to aircraft phase-out plans, alternative rule proposals or compliance dates. In general AIA members on the TSG were very non-committal in relation to their fleet plans.

For these reasons, the CAA does not accept that the industry participation in the development of the NPRM or the consultation process was deficient.

The Safety Case for TAWS

The submissions were generally supportive of the safety benefit of TAWS. However one commenter considered that the justification case supporting retrofit of TAWS equipment to aeroplanes currently on the New Zealand register of aircraft (“existing aeroplanes” and “the register”) was the cause of much dissent in industry.

Air National submitted that there is much dissent in the industry over the justification case as put by certain intransigent individuals within the CAA. Air National did not provide any specific information on the

deficiencies in the justification case or who in the industry was dissenting.

CAA Comment: Controlled flight into terrain (CFIT) remains the largest single cause of commercial air transport accidents. There have been further CFIT accidents overseas involving large transport aeroplanes resulting in a number of deaths since the NPRM was published. TAWS is designed to address the known deficiencies of existing ground proximity warning systems (GPWS) and provide longer warning times to pilots of hazardous terrain.

The CAA concurs with the view of ICAO and leading regulatory authorities worldwide that requiring large transport aircraft to be equipped with TAWS has the potential to virtually eliminate CFIT accidents. For this reason CAA has determined that rules requiring Part 121 aeroplanes to be equipped with TAWS are justified and appropriate.

Cost-benefit analysis and benefits to the nation

Three commenters considered the cost benefit analysis to be inadequate.

The AIA submitted that the NPRM lacked a meaningful cost benefit analysis (CBA) and was therefore deficient.

Aaleda Systems submitted that the NPRM failed to show that the cost to the nation is exceeded by the benefit to the nation, resulting in the NPRM being procedurally defective. Aaleda Systems believed that the NPRM should be put to one side until a detailed CBA is conducted using a recognised methodology.

Air Freight NZ submitted that no cost-benefit analysis had been done showing justification for the rule. The commenter also felt that the cost of TAWS on non-GPWS equipped freighter aeroplanes should not have been discounted by the saving of not having to fit GPWS on the basis that exemptions from rule 121.379 were granted to provide operators of freight aeroplanes time to take advantage of TAWS technology rather than be compelled to fit GPWS. The commenter also considered that it was erroneous for CAA to assume 50% of the freighters would not be retrofitted with TAWS should the rule be adopted.

CAA Comment: As stated in the NPRM, the CAA concluded that it is very difficult to assess in a statistically meaningful way the benefit of reducing the risk of events that are rare yet may have catastrophic consequences. The CAA considers that the consequences of a CFIT accident involving an aircraft seating 30 people will be severe and for a CFIT accident involving an aircraft seating upwards of 100 people simply unacceptable when there is well proven and internationally accepted and mandated technology available that will virtually eliminate that risk.

The CAA estimate the benefit to the nation of the avoidance of one CFIT accident to be \$34.2m against the estimated cost of TAWS equipment over 15 years of \$7.47m to \$8.85m.

The CAA considers it entirely appropriate that the cost of TAWS in non-GPWS aeroplanes be discounted to account for the savings that these operators have accrued through not having to fit GPWS. Rule 121.379 required Part 121 turbine aeroplanes to be equipped with GPWS from 1 January 2000. The exemptions were granted to provide operators of freighter aeroplanes time to develop TAWS based proposals that CAA could consider as an alternative means of compliance with 121.379 or that may meet a yet to be developed TAWS rule. These exemptions expired on 31 December 2001².

There was no certainty at the time the exemptions were granted, or at the date the NPRM was published, that alternative TAWS-based solutions would be approved. At the time of the NPRM publication, some two years after the GPWS compliance date, operators had made little progress in developing their alternative means of compliance with 121.379 and therefore had no certainty that any alternatives developed would be approved.

CAA considers that the operators of freighter aeroplanes with exemptions from 121.379 should have continued to provide for the cost of GPWS as required by the rule until there was an approved alternative.

² The exemptions were reissued in late December 2001 to provide a further year for alternative TAWS based systems to be developed and approved as an alternative means of compliance with 121.379.

The NPRM proposal for TAWS Class A to be fitted to Part 121 turbine powered aeroplanes, including freighters, provided a means by which GPWS fitment could be avoided and TAWS fitment funded on an incremental cost basis.

The CAA accepts that the assumption in the NPRM that 50% of existing freighters would not be retrofitted due to their age may be unfounded. The CAA understands that some of these freighters have no finite airframe life and could continue to operate indefinitely.

However the CAA considers that the possibility of all of these aeroplanes remaining on the register for a considerable time makes it even more beneficial to equip them with TAWS.

For these reasons the CAA considers that the high level cost and benefit estimates contained in the NPRM provide a realistic and sufficient indication of the costs and benefits to the nation of the TAWS rule.

Application to future aeroplanes

The AIA submitted that requiring future aeroplanes to be equipped with TAWS Class A was an acceptable approach.

CAA Comment: This has been retained in the final rule.

Application to existing aeroplanes

A number of submissions were received in relation to the proposed requirement that existing Part 121 aeroplanes be equipped with TAWS Class A from 1 July 2005. These submissions variously requested: (1) the exclusion of some aeroplanes; and (2) relief on compliance dates.

Exclusion of some aeroplanes from the rule

The AIA submitted that the industry accepted that the proposed requirements for the existing heavy jet fleet (apart from one aeroplane³) and all existing turboprop aeroplanes over 50 seats to be equipped

³ The one aeroplane referred to is a jet aeroplane engaged primarily in freight but convertible to enable passengers to be carried.

(retrofitted) with TAWS Class A are appropriate relative to the rest of the world.

However the AIA expressed concern over the impact of the proposed TAWS Class A retrofit requirement on “ageing” aeroplanes and submitted that its “preferred position” was that all existing Part 121 aeroplanes over 11 years of age should be excluded from the TAWS rule.

The AIA submitted that the “ageing” aircraft issue applies to the one jet aircraft engaged primarily in freight, the Saab 340 fleet and a very limited number of other aircraft engaged in passenger but primarily freight operations. The AIA suggest that the operators of these aeroplanes may voluntarily equip some of them with TAWS Class A.

CAA Comment: The CAA does not agree that aeroplanes over 11 years of age should be totally excluded from the TAWS rule. The CAA considers 11 years is relatively young, the economic life of Part 121 passenger aeroplanes in New Zealand being generally 15-20 years and considerably more for freighter aeroplanes.

In particular the CAA does not agree that the one existing jet over 11 years of age not already fitted or planned by its operator⁴ to be fitted with TAWS Class A should be excluded permanently from the rule on the basis of its age. The CAA considers the speed, flight characteristics⁵ and passenger capacity of jet aeroplanes make TAWS Class A particularly important safety equipment. The AIA offers no reason other than the aeroplane’s age and its current primary use as a freighter for its exclusion.

⁴ There are a number of jets both under and over 11 years of age on the register not currently fitted with TAWS. However all the operators of these jets, except the one jet operated by Airwork Ltd, have firm voluntary plans in place to fit TAWS prior to the date required by the final rule.

⁵ The speed of jet aircraft and their flight characteristics reduce the ability for pilots to change the aeroplane’s flight path to avoid terrain.

The CAA notes that this aeroplane: (1) is convertible such that it can carry either up to 110 passengers or palletised freight; (2) is available for passenger charters; and (3) was used in 2001 for a period of several months for scheduled passenger services.

The remaining existing aeroplanes the AIA submit should be excluded from the Part 121 TAWS rule are those with 50 or fewer seats. There are approximately 26 of these aeroplanes of which 19 are turboprop passenger aeroplanes and seven are turboprop freighters. The 19 passenger aeroplanes make up about 50% of the total domestic Part 121 passenger fleet and about 70% of the Part 121 turboprop passenger fleet.

The AIA did not indicate what level of voluntary fitting of TAWS Class A equipment might occur and therefore what expectation CAA may have on the level and timing of reductions to the percentage of the fleet that is not equipped with TAWS. The CAA notes that voluntary fitment of domestic aeroplanes in the past has generally been confined to new or near new aeroplanes.

The AIA did not provide any reason why 11 years of age is a suitable cut-off or provide any indication of the likely remaining life of these aeroplanes on the NZ register. No information was provided by the AIA as to why 50 seats was proposed as the cut-off below which TAWS Class A compliance by 1 July 2005 was considered to be inappropriate.

The CAA notes that the Air Nelson SF340 fleet comprises about 80% of the fleet of 19 passenger aeroplanes with 50 or fewer seats for which the AIA seeks exclusion from the TAWS rule. The AIA gives no indication of how long it would expect these aeroplanes to remain on the New Zealand register.

The average age of the SF340 fleet is about 14.5 years and it is quite possible that some of these aeroplanes could remain on the NZ register for many years, especially if converted to freight operations. Currently there are seven Part 121 freight aeroplanes over 34 years of age operating in New Zealand.

The CAA considers the 50 seat cut-off proposed by the AIA can be reduced to 40 seats as, to the CAA's knowledge, there are no turboprop aeroplanes between 41 and 50 seats currently on the register.

For this reason the final rule limits the size of passenger aeroplane granted relief beyond 1 January 2005 to those with 40 or fewer seats. There are approximately 26 of these aeroplanes in total, 19 passenger and 7 freighter.

Aaleda Systems submitted that Part 121 embraces aircraft and operations that do not form a homogeneous population (for example large fast jet transport aeroplanes operating scheduled services in high traffic density areas through to smaller slower turboprop transport aeroplanes operating occasional charter flights in low traffic density areas) and therefore rules should be different for various categories of aeroplanes within Part 121.

Aaleda Systems did not disagree with exclusions proposed in the NPRM for piston and freighter aeroplanes but submitted that there should be a rational basis for such exclusions.

CAA comment: The CAA agrees there should be a rational methodology and considers that, in relation to Part 121 TAWS rule requirements, ICAO Standards and Recommended Practices (SARPS) provide this.

In formulating these rules the CAA was guided by ICAO SARPS and the practices of other leading regulatory authorities. These authorities have a long established principle of specifying aircraft equipment and operational requirements based on classification of aircraft by size, motive power, and degree of public risk (i.e. whether the aircraft is used for private or air-transport operations). These classifications are fundamental to Parts 91, 121, 125 and 135.

Within these classifications, aircraft and operations are generally subject to the same requirements and are generally entitled to operate unfettered as long as the requirements are complied with. For example, once approved under Parts 119 and 121, CAA does not place restrictions on operators as to aircraft utilisation, airports used, type of operation (i.e. scheduled or charter), the type of airspace which may be operated in or

the value of contents that may be carried so long as operations are within the applicable rules and the operator's exposition.⁶

ICAO Annex 6 Part 1 Standards require all turbine-powered aeroplanes equivalent to Part 121 aeroplanes to be equipped with TAWS Class A from 1 January 2003. The final rule adopts this but with compliance dates two to four years later.

Amendment 27 to ICAO Annex 6 Part 1, which New Zealand supports⁷, extends this standard, from 1 January 2007, to all turbine powered aeroplanes over 5700 kg maximum certificated takeoff mass or authorised to carry more than nine passengers. Amendment 27 also introduces a new standard requiring piston powered aeroplanes over 5700 kg maximum certificated takeoff mass or authorised to carry more than nine passengers to be equipped with TAWS Class B from 1 January 2007.

The CAA did not include Part 121 piston powered aeroplanes in the NPRM as there are none on the New Zealand register and CAA considered it unlikely that any would be added to the register in the future. The CAA also understood that the collision avoidance algorithms in TAWS Class A might not be valid for lower performance piston aeroplanes.

The CAA has, since receiving Amendment 27 to Annex 6, reviewed the proposed exclusion of piston powered aeroplanes from the New Zealand TAWS rules and, in order to retain maximum alignment with ICAO SARPS has decided to include in the Part 121 final rule a requirement that piston powered aeroplanes be equipped with TAWS Class B from 1 January 2007. TSG members, including those who represent the Part 121 industry, have been consulted on this proposal and have not expressed any disagreement.

⁶ The operator's exposition is the set of policy and procedures manuals that are the basis for the issue of an Air Operator Certificate.

⁷ New Zealand advised ICAO in July 2002 that it disapproved of some of the ICAO comments in relation to Amendment 27, but agreed with the proposed amendment itself.

In summary the CAA considers that it has used a rational methodology for determining TAWS rule applicability for Part 121 aeroplanes by adopting the ICAO SARPS for all Part 121 aeroplanes.

Air Freight NZ submitted that CAA's approach to the TAWS rule development ignored costs to individual operators in favour of a blanket assessment. The commenter felt that this approach is seriously flawed as it does not allow for the financial impact of high cost equipment on the operation of older lower cost aircraft.

CAA comment: Air Freight NZ currently operates four CV580 turboprop freighter aeroplanes. These aeroplanes are currently operating under an exemption from rule 121.379 GPWS requirements.

The CAA does not believe that it is required to, or should, consider individual operators when assessing the impact of the Part 121 TAWS rule as the rule applies to the aircraft irrespective of its operator.

The CAA has considered the application of the TAWS rule to freighter aeroplanes as a group. The NPRM stated that the approach and landing accident rate (which includes the great majority of CFIT accidents) is approximately eight times higher worldwide for freighter, ferry and positioning flights. The nature of freight operations in New Zealand being: (1) generally at night; (2) often outside radar controlled airspace; and (3) frequently using non-precision approaches, suggests a much higher level of risk than in passenger operations.

The incremental cost of fitting TAWS Class A to a turboprop freighter is estimated to be approximately \$100 000 one-off capital cost and \$4 500 ongoing costs per year.

A CFIT accident that resulted in the death of two pilots would have a cost in terms of loss of life of approximately \$5m plus the economic cost of loss of the aeroplane and its cargo, the cost of accident investigation, other government agency costs and possible collateral damage to property and persons on the ground.

For these reasons the CAA has concluded that turbine powered freighter aeroplanes should also be required to be equipped with TAWS Class A.

Relief from compliance dates

The AIA submitted that, as an alternative to its preferred option of excluding all aeroplanes over 11 years old from the TAWS Class A requirement, a finite compliance date of 1 January 2010 might be viable. The AIA considered that the 1 July 2005 compliance date proposed in the NPRM for turboprop aeroplanes would place significant financial stress on the operators of turboprops with 50 or fewer seats and that this stress could be avoided altogether if the compliance date was shifted to January 2010.

CAA Comment: The CAA notes that a compliance date of 1 January 2010 is seven years later than the ICAO compliance date of 1 January 2003. The CAA accepts that the current climate for aviation is one of financial stress but does not accept that a delay of seven years in achieving ICAO compliance is appropriate in relation to adopting improved terrain collision avoidance systems.

However the CAA is prepared to provide some relief on the proposed turboprop compliance date of 1 January 2005 but only on the basis that: (1) the size of aeroplanes provided with relief is tightly controlled; and (2) operators are required to take positive action to both minimise their exposure to CFIT risk and to achieve compliance during the relief period.

As indicated earlier the CAA considers that the relief need only apply to aeroplanes with 40 or fewer passenger seats.

The Air Nelson fleet of 15 SF340 aeroplanes accounts for 58% of the existing fleet of approximately 26 Part 121 aeroplanes with 40 or fewer seats. The Air Freight NZ and Airwork combined fleet of seven turboprop freighter aeroplanes account for a further 27%.

The SF340 aeroplanes will average approximately 17 years in age by 2005. The CAA understands a number of these aeroplanes are leased and that the operator may choose to achieve compliance by terminating the leases and acquire newer replacement aeroplanes that are TAWS Class A equipped.

In this situation it is quite likely that, should the final rule retain the NPRM compliance date of 1 July 2005, an application for an exemption

from this date would be made to CAA by the operator to cover a fleet rollover timetable.⁸

Retrofitting the 19 existing passenger aeroplanes of less than 40 seats with TAWS Class A will require capital expenditure of the order of \$3.5m. To require expenditure of this order on leased aeroplanes that the operator seems likely to dispose of in the several years would clearly be imposing an unreasonable financial burden and may actually discourage the operators from acquiring more modern aeroplanes.

The seven existing CV580 and F27-500 turboprop freighters will average 42 years of age respectively in 2005. Six of these aeroplanes are currently operating under an exemption from rule 121.379 GPWS requirements.⁹ The CAA understands two of the six have been fitted with TAWS Class A to comply with 121.379.¹⁰

Providing relief until 1 January 2007 will enable the cost of retrofitting the five remaining non-TAWS Class A equipped turboprop freighters to be spread over the next four years rather than two and a half, or provide additional time for operators to acquire TAWS Class A compliant aeroplanes rather than retrofit.

For these reasons the CAA has decided to grant relief by extending the compliance date for aeroplanes with 40 or fewer passenger seats from 1 July 2005 to 1 January 2007 provided: (1) operators submit to CAA by 1 April 2005 a plan for achieving TAWS compliance by 1 January 2007; and (2) operators implement an approved CFIT risk assessment and mitigation programme from 1 July 2005. Failure to meet either of these

⁸ A similar situation occurred recently when two operators applied for and were granted 12 month exemptions from GPWS requirements to enable replacement compliant aeroplanes to be acquired.

⁹ The seventh is already equipped with GPWS.

¹⁰ The CAA understands that the other four are planned to be fitted with a TAWS Class B system that includes a cockpit display as an equivalent means of meeting 121.379.

requirements will result in TAWS compliance being required from 1 January 2005.

The CAA considers the requirement to implement a CFIT risk assessment and risk mitigation programme is not onerous. The Flight Safety Foundation has published an Approach and Landing Accident Reduction Toolkit that includes a considerable amount of CFIT avoidance training material for flight crew and operational procedures that airlines can adopt to minimise their risk of CFIT. ICAO provides similar material. The CAA consider that this requirement could be met through operators using this material as a basis for reviewing their operating environment, crew training and operating procedures to ensure they adopt best-practice CFIT avoidance measures.

The requirement to submit a TAWS Class A compliance plan to CAA is proposed to ensure that operators do not approach the Director for an exemption beyond 1 January 2007 because they have not planned sufficiently far ahead to achieve compliance by that date. The operator will be required when submitting the plan to certify that the plan will enable compliance to be achieved by 1 January 2007.

For existing non-TAWS Class A aeroplanes of over 40 passenger seats the final rule retains the NPRM compliance date of 1 July 2005. The CAA considers that this is realistically achievable and, based on submissions received on the NPRM¹¹, has been accepted by the operators of all affected aeroplanes with the exception of the one convertible passenger/freight 737-200.

To ensure that there is an absolutely final date by which all Part 121 aeroplanes will be TAWS Class A equipped, the final rule includes a provision that will prevent exemptions being granted beyond 1 July 2006 (for turbine powered aeroplanes over 40 seats), and beyond 1

¹¹ The AIA indicated this in its submission on behalf of the Air New Zealand Ltd and Mount Cook Airline. Origin Pacific Airways, the only other operator of aeroplanes with over 40 passenger seats, did not comment on the NPRM.

January 2008 (for aeroplanes with 40 or fewer seats, including existing F27 and CV580 freighters). The provision will also prevent exemptions being granted from the requirement that operators file plans to take advantage of the relief until 1 January 2007 for turbine powered aeroplanes with 40 or less seats manufactured before April 2002 that were on the New Zealand Register of Aircraft as at 1 August 2003.

The CAA has included this “no-exemption” provision in the final rule because: (1) past experience has shown that, despite being granted considerable lead-time, some operators are unwilling to comply with equipment rule requirements and exert considerable pressure on the Director to grant exemptions; and (2) the relief being granted on compliance dates extends up to four years beyond the 1 January 2003 ICAO TAWS Class A compliance date and further extensions via exemptions must, in CAA’s view, be very tightly controlled.

The date of 1 January 2008 beyond which no exemptions can be granted for the 40 or fewer seat aeroplanes gives some flexibility to cover totally unexpected circumstances that may prevent the operator from achieving TAWS Class A compliance by 1 January 2007. However the CAA will be taking a stringent approach to exemptions beyond 2007 on the basis that the operator has developed a compliance plan that: (1) the operator itself has certified as being achievable; and (2) has had over two years to implement.

Alternative Systems

The AIA submitted that the future technology should be provided for in the TAWS rules on the basis of equivalent safety.

CAA Comment: The CAA does not consider that the rule needs to specifically provide for new technology. TAWS technology is the state-of-the-art system for CFIT avoidance and has been accepted internationally as the standard for Part 121 sized aeroplanes. If and when new anti-collision technologies become internationally accepted and appropriate international standards are developed, approval may be provided to NZ operators on the basis of equivalent safety via the existing rule exemption process.

Air Freight NZ submitted that use of TAWS Class B systems should be given further consideration. The commenter considered that TAWS Class B would provide an acceptable level of safety at reasonable cost.

CAA Comment: The CAA does not consider TAWS Class B is an alternative to TAWS Class A for Part 121 aeroplanes.

GPWS had been the internationally accepted terrain warning system for these aeroplanes from its adoption by ICAO in 1978 until the TAWS Class A SARPS were published in 1999. In the 20 years since its introduction, GPWS has proven to be an effective, but by no means foolproof, terrain warning system. TAWS A was developed to address the known deficiencies in GPWS. It does so by retaining all the “classic” GPWS functionality and adding additional “forward looking” functionality and a flight deck terrain warning display.

TAWS Class B was developed as a low cost system intended to provide CFIT protection, using the “forward looking” functionality developed for TAWS Class A, for small turbine aeroplanes (up to 9 passenger seats and 5700kg MCTOW) that were not previously required to fit GPWS.

TAWS Class B has significantly less functionality than Class A. TAWS Class B does not provide the following warnings that are provided by both GPWS and TAWS Class A:

- Mode 2: excessive terrain closure rate
- Mode 4: unsafe terrain clearance while not in the landing configuration with:
 - (a) gear not locked down;
 - (b) flaps not in a landing position; and
 - (c) excessive descent below the instrument glide path

TAWS Class B is also totally dependent on GPS position information for its functioning. TAWS Class A has redundancy in that terrain proximity data is obtained from both GPS derived position and radio altimeter information. If either is unavailable then the system will continue to provide reduced functionality. In particular, should GPS

position information be unavailable, TAWS Class A will continue to provide all the terrain warning functions of “classic” GPWS. This is not the case with TAWS Class B.

The CAA considers the final rule achieves safety at reasonable cost and that it is inappropriate to develop alternative TAWS standards for four aeroplanes that comprise approximate 3% of the total Part 121 aeroplane fleet.

ICAO Obligations

Aaleda Systems submitted that strict compliance with ICAO obligations is not necessary and that the CAA's ICAO obligations may be met in a number of ways. Aaleda Systems suggested that an entirely valid alternative to strict implementation of an ICAO standard or recommended practice is to notify ICAO of a State difference, so long as there is a proper basis for the difference.

CAA Comment: The commenter provided no suggestions as to what may constitute a “proper basis” for a difference. In filing a difference, States are also obliged to advise when they will comply with the standard.

The CAA acknowledges that States are not bound to implement ICAO SARPS and may file differences.

However, as a signatory to the 1944 Chicago Convention, which developed agreed worldwide standards for the regulation of civil aviation through ICAO, New Zealand is obligated to adopt ICAO SARPS to the greatest extent it considers reasonable. In meeting the statutory obligations placed on the Minister under section 14 of the Civil Aviation Act 1990, the development of the CAA rules over recent years has been based on progressively adopting SARPS wherever this can be done at reasonable cost.

The economic burden of the TAWS rule identified by industry relates almost entirely to the retrofit requirements for existing aeroplanes. The final rule provides significant relief by delaying TAWS compliance dates up to four years beyond that required under ICAO standards. This difference will be notified to ICAO.

The CAA considers that there is no justification for any other difference from ICAO SARPS in relation to Part 121 TAWS rules.

Comments on proposed Civil Aviation (Offences) Regulations

The NPRM contained a proposal to amend schedule 1 of the Civil Aviation (Offences) Regulations, 1997 relating to non-compliance with Part 121 and 129 TAWS requirements.

No comment was received on these proposals.

Since the issue of the NPRM, CAA has decided to pursue these amendments in conjunction with various outstanding offences relating to rules within Part 121 and Part 125. This comprehensive update will be commenced at a future date.