



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 10

Air Operations - Large Aeroplanes

ACAS

Docket 2/CAR/2

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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 equipped with an airborne collision avoidance system (ACAS II) 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 introduce New Zealand requirements for airborne collision avoidance 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;
- (f) Aircraft Owners and Pilots Association (AOPA);
- (g) Gliding New Zealand (GNZ).

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 02-02, containing the proposed rule to require Part 121 aeroplanes to be equipped with ACAS

It was issued for public consultation under Docket 2/CAR/2 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

Eleven written submissions and one oral comment were received on the NPRM. No commenters questioned the safety benefit of ACAS II. The issues of concern to commenters arose primarily from the cost of fitting ACAS II equipment to existing aeroplanes and the possible implications for glider flying.

Gliding New Zealand (GNZ) expressed concerns over the possibility that additional areas of airspace would be designated transponder mandatory as a consequence of aeroplanes being required to be equipped with ACAS II. GNZ also expressed concerns that the Part 91 rule clarifications removed an understanding that they considered existed which allowed gliders to operate in transponder mandatory airspace with “Mode A only” transponders.

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 ACAS II. 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 ACAS II retrofit requirement proposals.

To provide certainty that all Part 121 aeroplanes would be equipped with ACAS II 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 ACAS II.

The amended rule proposals also include a requirement for piston powered aeroplanes to be equipped with ACAS II, consistent with the ICAO Annex 6 Part 1 recommendation that all aeroplanes be equipped with ACAS II.

The amended rule proposals were 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. Origin Pacific Airways responded that the proposed changes were acceptable.

The Airways Corporation of New Zealand responded to the amended proposal that they supported the inclusion of piston powered aeroplanes.

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 10 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

Rule 121.13 is revoked and the following new rule is inserted:

121.13 Exemptions

(a) The Director may not grant an exemption from a requirement under 121.381 or 121.383 if the exemption would extend by more than one year the date by which an aeroplane must be equipped with any of the following:

- (1) the applicable TAWS prescribed by 121.381;
- (2) an ACAS II prescribed by 121.383.

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

- (1) the requirement under 121.381(b) or 121.383(b)(1) 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) or 121.383(b)(2).

Subpart F—Instruments and Equipment

The following new rule is inserted:

121.383 Airborne Collision Avoidance System (ACAS II)

(a) Except as provided in paragraphs (b) and (c), a holder of an air operator certificate must ensure that an aeroplane being operated under that certificate is equipped with ACAS II.

(b) A holder of an air operator certificate is not required to equip an aeroplane with ACAS II until —

- (1) 1 January 2005 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) 1 January 2007 if—
 - (i) that aeroplane has a passenger seating configuration of 40 or less seats; and
 - (ii) 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
 - (iii) that aeroplane is being operated under that certificate before 1 October 2004; and
 - (iv) a plan certified by the certificate holder is submitted in writing to the Director by 1 October 2004 confirming that compliance with ACAS II requirements will be achieved by 1 January 2007; and
 - (v) the operation of that aeroplane after 1 January 2005 is conducted in accordance with an airborne collision risk assessment and risk mitigation programme that is acceptable to the Director.
- (c) A holder of an air operator certificate conducting freight only operations with Convair 580 or F27-500 aeroplanes under that certificate is not required to comply with paragraph (a) if—
- (1) the details specified under 47.55(b) in respect of the Convair or F27 aeroplane already appear in the New Zealand Register of Aircraft on 1 August 2003; and
 - (2) the Convair or F27 aeroplane is operating as a freight only aeroplane as at 1 August 2003; and

- (3) the operation of the Convair or F27 aeroplane after 1 January 2005 is conducted in accordance with an airborne collision risk assessment and risk mitigation programme that is acceptable to the Director.

Appendix B – Instruments and Equipment Airworthiness Design Standards

The following new rule is inserted into Appendix B:

B11 Airborne Collision Avoidance System (ACAS II)

ACAS II must meet the requirements of TSO C119b

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.)

An NPRM was published under Notice of Proposed Rule Making 02-02 (Docket Number 2/CAR/2) on 14 December 2001. This notice proposed amendments to Part 121 *Air Operations – Large Aeroplanes*, and consequential amendments to Part 1 *Definitions and Abbreviations*, Part 91 *General Operating and Flight Rule* and Part 129 *Foreign Air Transport Operator – Certification*. Eleven written submissions and one oral comment were received on the NPRM. The following summary of comments has been prepared.

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

General comments on the NPRM

A total of eleven written submissions were received, ten from New Zealand aviation industry or aviation recreation organisations and one from an overseas commenter. One oral submission was also received. There were no submissions from the general public.

No commenters questioned the safety benefit of ACAS II. The issues of concern to commenters arise primarily from the cost of fitting ACAS II equipment to existing aeroplanes and the need for other aircraft to carry and operate transponders to be able to be detected by an ACAS II equipped aircraft.

One commenter requested a complete review of the NPRM and another requested that the NPRM be set aside until a detailed cost benefit analysis (CBA) had been conducted. A third commenter considered that introducing ACAS rules on their own was a “piecemeal approach” and that the ACAS NPRM should be deferred until a complete package of changes relating to ACAS requirements, controlled airspace designation, and transponder mandatory (TM) airspace was prepared.

Some commenters expressed strong disagreement with the proposed rule to require aeroplanes already on the register to be fitted with the new equipment and three considered the safety case to be deficient or lacking in data. Several commenters considered that more industry consultation should have occurred prior to release of the NPRM. Two considered a

full cost-benefit analysis should have been provided. Two commenters considered the CBA should include the cost of increased TM airspace. Several commenters considered provision should be made for alternative anti-collision technologies in the rules.

No comments were received on the proposed Part 1 change introducing a definition for ACAS.

Three comments were received on the proposed Part 91 transponder requirement changes.

The Board of Airline Representatives of New Zealand (BARNZ), representing foreign airlines, commented that they had no objections to the proposed rule Part 129 ACAS II requirement.

Specific comments on the NPRM

Specific comment on the NPRM covered nine main areas – industry consultation prior to rule making, the safety case for ACAS II, a cost-benefit analysis, the application to aeroplanes added to the NZ register of aeroplanes in the future, the application to aeroplanes already on the register, alternative technologies, transponder specifications, TM airspace and ICAO compliance.

Industry consultation prior to rule making

The Aviation Industry Association (AIA)¹ 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 the NPRM content was clearly in dissent at the CIRAG meeting of 13 December 2001. In view of this dissent AIA considered that the NPRM should have been referred

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 Field Air Holdings.

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 can move the proposals forward.

GNZ also submitted that there had been inadequate consultation, commenting that the rights and operational requirements of all airspace users had not been appropriately or adequately considered or consulted on.

CAA comment: The CAA does not agree that the CIRAG process was breached in that the informal consultation process on proposed rules under CIRAG does not require unanimous CIRAG Executive support prior to the proposal being published as an NPRM.

The CAA is satisfied an appropriate informal consultation process on the proposed rule was followed prior to issue of the NPRM, which is the start of the formal consultation process.

Consultation with industry occurred over a four month period from August 2001 via the CIRAG 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 ACAS deliberations on 8 November 2001 agreed that the NPRM should proceed.²

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.

CAA notes that, in relation to TM airspace changes, consultation with all airspace users has been conducted during 2001 and is continuing through the airspace review process.

The Safety Case for ACAS II

The submissions were generally supportive of the safety benefit of ACAS II. However three commenters considered that the safety case supporting retrofit of ACAS II equipment to aeroplanes currently on the New Zealand register of aircraft (“existing aeroplanes” and “the register”) is inadequate:

Airwork submitted that the safety case is flawed and does not present a reasoned argument supporting ACAS II but Airwork provided no information explaining why the safety case was considered to be flawed.

Aaleda Systems submitted that the mid-air collision risk estimated in the NPRM suggested that equipping aeroplanes with ACAS II would avoid one mid-air collision (MAC) in a 15 year period and that that is unrealistic and overly pessimistic. Aaleda Systems suggested that FAA mid-air collision risk forecast data for US airspace, suitably adjusted, should be used instead.

² Airwork did not attend the final TSG meeting but consistently stated its disagreement with the draft NPRM and safety case to CAA during earlier TSG meetings and shortly after the fourth meeting.

GNZ submitted that they had not been provided with information regarding incidents within airspace that could have been prevented by the use of ACAS II.

CAA Comment: The NPRM stated that approximately 70 TCAS resolution advisory (RA) alerts have been reported to CAA since early 1999, of which about 40% were in NZ airspace. A number of these events involved intruder aircraft not known to air traffic control (ATC) or not reported to the target aircraft by ATC.

Further information indicating that about 50 “close proximity” events involving at least one air transport aircraft have occurred in NZ airspace since 1994 was supplied to the TSG during the public comment period.

While CAA accepts that air traffic density in NZ is lower than that in the US it does not consider direct comparison of mid-air collision risk rates between the US and NZ is valid due to differences in ATC systems, radar cover, airspace design, transponder requirements and separation applied between air-transport and general aviation operations.

The fifteen-year period referred to in the NPRM was intended for illustrative purposes and is not a statistically based prediction that one such event is likely to occur in fifteen years. In fact the benefits identified in the NPRM, which were very conservatively estimated (for example due to the assumption that a MAC involved one 40 seat and one two seat aircraft rather than two larger aircraft), outweigh the identified costs by a factor of almost four, resulting in a benefit if only one MAC accident is avoided in approximately fifty years.

The CAA remains of the view that, on the basis of the NZ operating environment, the ATC system, and airspace occurrence reports contained in the CAA database, a significant risk of MAC exists in NZ skies.

Cost-benefit analysis and benefits to the nation

Three commenters considered the cost benefit analysis (CBA) to be inadequate.

The AIA submitted that the NPRM lacked a meaningful 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.

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 MAC involving an aircraft seating 30 people will be severe and for a MAC involving an aircraft seating upwards of 100 people simply unacceptable when there is well proven, internationally accepted and mandated technology available that will greatly reduce that risk.

The benefit to the nation of one MAC avoided was estimated to be \$46.2m against the estimated cost of ACAS II equipment over 15 years of \$12.29m to \$13.79m.

The CAA considers that these high level cost and benefit estimates, together with the universal adoption of ACAS II equipage rules for Part 121 size turbine-powered aeroplanes by ICAO and leading Civil Aviation Authorities make a further Cost Benefit Analysis unnecessary.

Aaleda Systems and Gliding New Zealand (GNZ) submitted that the cost of owning, installing, maintaining and carrying transponder equipment on small aircraft must be included in the CBA.

CAA Comment: Changes to TM airspace, which may affect the number of aircraft requiring transponders, are made in accordance with Part 71 which prescribes: (1) the Director's powers to designate airspace; (2) airspace changes that can be made; and (3) the airspace review consultation process. A future NPRM, currently in draft form, will propose changes to Part 71 to enable TM airspace to be designated outside radar cover and outside controlled airspace. However any actual changes to the TM designation of airspace will still be subject to the airspace review consultation process on a case by case basis.

The CAA does not consider it is appropriate to include the cost of any new transponder installations required due to increased TM airspace as a cost of the ACAS II rule as: (1) the ACAS II rule does not alter existing

transponder requirements; (2) the extent of changes to TM airspace and the consequent number of additional transponders required will only be known after the airspace review process is completed; and (3) the majority of operations by Part 121 aeroplanes are in airspace that is already transponder mandatory.

Application to future aeroplanes

The AIA and Airwork submitted that requiring future aeroplanes to be equipped with ACAS II 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 ACAS II from 1 January 2003 (turbojet/turbofan) or 1 January 2005 (turboprop). These submissions variously requested: (1) the exclusion of some aeroplanes; (2) relief on compliance dates; and (3) a robust airborne collision risk avoidance and mitigation plan for existing freighters.

Exclusion of some aeroplanes from the rule

The AIA submitted that “the industry” accepted the proposed requirements for the existing heavy jet fleet (apart from one aeroplane) and all existing turboprop aeroplanes over 50 seats to be equipped (retrofitted) with ACAS II are appropriate relative to the rest of the world.

However the AIA expressed concern over the impact of the proposed ACAS II 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 ACAS II rule.

The AIA submitted that the “ageing” aircraft issue applies to 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 ACAS II.

CAA Comment: The CAA does not agree that aeroplanes over 11 years of age should be totally excluded from the ACAS II 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 ready fitted with ACAS II should be excluded permanently from the rule on the basis of its age. The CAA considers the speed, climb performance and passenger capacity of jet aeroplanes makes ACAS II particularly important as safety equipment. The AIA offers no reason other than the aeroplane's age and its current primary use as a freighter for its exclusion.

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 ACAS II 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 ACAS II 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 ACAS II. The CAA note that voluntary fitting 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 ACAS II compliance by 1 January 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 ACAS II 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 year of age operating in New Zealand.

The CAA considers the 50 seat cut-off proposed by the AIA could be reduced to 40 seats as, to 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 19 of these aeroplanes.

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 ACAS II rule requirements, ICAO Standards and recommended practices (SARPS) provide this.

In formulating rules the CAA is 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, the CAA does not place restrictions on operators as to aircraft utilisation, airports operated, type of operation (i.e. scheduled or charter), the type of airspace which may be operated or the value of contents that may be carried so long as the operations are within the applicable rules.

ICAO Annex 6 Part 1 Standards require all turbine-powered aeroplanes equivalent to Part 121 aeroplanes to be equipped with ACAS II. The final rule adopts this in total, with relief available by reason of age, relatively short service life remaining and low public risk only for seven existing freighter aeroplanes provided an airborne collision risk assessment and mitigation programme acceptable to the Director is put in place.

ICAO Annex 6 Part 1 contains a recommendation that all aeroplanes (including piston-powered) be equipped with ACAS II. Canada is understood to be at the early stage of considering such a requirement and the FAA have issued an NPRM that would require piston powered aeroplanes to be equipped with TCAS I from Oct 31, 2003.

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 ACAS II might not be valid for lower performance piston aeroplanes.

The CAA has reviewed the proposed exclusion of piston powered aeroplanes and, in order to retain maximum alignment with ICAO SARPS has decided to include piston powered aeroplanes in the final rule. TSG members have been consulted on this proposal and have not expressed any disagreement.

In summary the CAA considers that it has used a rational methodology for determining ACAS II rule applicability for Part 121 aeroplanes by

adopting the ICAO SARPS for all Part 121 aeroplanes except (for reasons stated above) for seven existing freighter aeroplanes.

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 ACAS II requirement, a finite compliance date of 1 January 2010 might be viable. The AIA considered that the 1 January 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 airborne collision avoidance.

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 MAC 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 almost 80% of the existing fleet of Part 121 passenger aeroplanes with 40 or fewer seats.

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 ACAS II equipped.

In this situation it is quite likely that, should the final rule retain the NPRM compliance date of 1 January 2005, an application for an exemption from this date would be made to CAA by the operator to cover a fleet rollover timetable.³

Retrofitting the 19 existing aeroplanes of less than 40 seats with ACAS II will require capital expenditure of the order of \$8m.⁴ To require expenditure of this order on leased aeroplanes that the operator seems likely to dispose of in several years would clearly be imposing an unreasonable financial burden and may actually discourage the operators from acquiring more modern aeroplanes.

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 January 2005 to 1 January 2007 provided: (1) operators submit to CAA by 1 October 2004 a plan for achieving ACAS II compliance by 1 January 2007; and (2) operators implement an approved mid-air collision risk assessment and mitigation programme from 1 Jan 2005. Failure to meet either of these requirements will result in ACAS II compliance being required from 1 January 2005.

The CAA considers the requirement to implement a mid-air collision risk assessment and risk mitigation programme is not onerous. For example it could involve a review of the air traffic separation service available over the routes and the times the operations occurs to determine if adequate separation management is available and what alternative measures to reduce the risk of loss of separation could be put in place.

The requirement to submit an ACAS II compliance plan to CAA will ensure that operators do not approach CAA for an exemption beyond 1 January 2007 because they have not planned sufficiently far ahead to

³ A similar situation occurred recently when two operators applied for and were granted 12 month exemptions from GPWS requirements to enable replacement GPWS equipped aeroplanes to be acquired.

⁴ Three of the aeroplanes are already fitted with TCAS II that is relatively easily and cheaply upgradeable to ACAS II.

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-ACAS II turbojet or turbofan aeroplanes, of which there is currently only one, the NPRM proposed a compliance date of 1 January 2003. With delays in completing the final rule this date has now become unrealistic.

The CAA considers that the same compliance date can apply to this aeroplane as will apply to the existing turboprop aeroplanes of the same seating capacity. Accordingly the final rule will require existing turbojet and turbofan aeroplanes to be retrofitted by 1 January 2005 if configured with more than 40 passenger seats and by 1 January 2007 if configured with 40 or fewer passenger seats.

To ensure that there is an absolutely final date by which all Part 121 aeroplanes will be ACAS II equipped, the final rule includes a provision that will prevent exemptions being granted beyond 1 January 2006 (for aeroplanes over 40 seats) and beyond 1 January 2008 (for aeroplanes with 40 or fewer seats, excluding 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 aeroplanes with 40 or less seats.

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 CAA to grant exemptions; and (2) the relief being granted on compliance dates extends up to four years beyond the 1 January 2003 ICAO ACAS 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 ACAS 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.

Existing Turbo-prop Freighters

The AIA submitted that it supports the proposed exclusion provision for the seven existing Convair 580 and F27-500 turboprop freighters from the ACAS rule.

NZALPA submitted that it has reservations about the exclusion provision, commenting that these freighters regularly operate through airports without air traffic control and at times when the crew are in their window of circadian low. For this reason NZALPA submitted that there should be a robust plan to provide protection from MAC before the exclusion is allowed.

CAA comment: The requirement for the collision risk assessment and risk mitigation programme to be acceptable to the Director enables CAA to ensure the plan is robust.

Accordingly there is no change to the NPRM proposals for the existing five F27 and CV580 freighters in the final rule i.e. they remain excluded from the requirement to fit ACAS provided an acceptable MAC risk assessment and risk mitigation programme is put in place.

New and Alternative Technologies

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

CAA Comment: The CAA does not consider that the rule needs to specifically provide for new technology. If and when new anti-collision technologies become internationally accepted and appropriate international standards are established, approval may be provided to NZ operators on the basis of equivalent safety via the existing rule exemption process.

GNZ submitted that ADS-B technology would be a more cost-effective collision avoidance technology for gliders and would be adopted in New Zealand in a few years. GNZ commented that the cost of equipping a

glider with ADS-B was likely to be considerably less than equipping with an acceptable Mode C transponder.

CAA Comment: The CAA believes there are many issues to resolve before alternative technologies are internationally accepted for collision avoidance, especially interoperability with existing ACAS equipped aircraft.

ADS-B requires a significant investment in ground infrastructure and also requires aircraft to carry a means of transmitting ADS-B data to the ground. The Airways Corporation advise it has no plans at this time to introduce ADS-B technology to New Zealand.

Existing Mode A and C transponders cannot transmit ADS-B GPS data to the ground. It is possible in the future Mode A and C transponders with the additional messaging capability required may be developed but there is no certainty of this. In addition no standard for downlink of ADS-B messages has been decided yet. Various alternatives are under consideration including dedicated transceivers and Mode S transponders.

The limiting factors for gliders are generally space for transponder equipment and provision of an adequate electrical power supply to power the transponder and particularly its altitude encoder. ADS-B equipment will not necessarily be smaller or have lower power consumption as an ADS-B installation still requires an altitude encoder and radio data transmission⁵.

ADS-B is primarily a surveillance tool and has not been developed to interact with ACAS II. While such development may occur in the future, there are significant issues of compatibility to address before this can occur. ICAO is currently considering the use of ADS-B and has identified the issues to be addressed. Any implementation of ADS-B that avoided the need for gliders to carry transponders would require modification of the existing ACAS II units on transport aircraft to enable

⁵ The power consumption of ADS-B equipment may be higher than Mode A and C transponders as ADS-B transmits data at regular intervals where Mode A and C transponders only do so when interrogated.

ADS-B equipped aircraft to be detected and avoided. In the CAA's view such modifications will be far more costly than glider transponders and altitude encoders.

ACAS II has been the ICAO standard for airborne collision avoidance since 1996 and as a result there is now a very large number of transport aircraft worldwide equipped with ACAS II.

The FAA in October 2001 released an NPRM on collision avoidance. This NPRM discussed possible application of ADS-B for collision avoidance and firmly placed responsibility for addressing collision avoidance co-ordination with ACAS equipped aircraft on the developers of ADS-B technology.

The CAA is of the view that new technology airborne collision avoidance equipment that is capable of co-ordinating responses with ACAS II is many years away and is unlikely to be cheaper for gliders to install for collision avoidance purposes than existing Mode A and C transponders.

If and when the issues relating to ADS-B as collision avoidance technology have been resolved and ICAO have adopted the system in whole or part CAA considers the New Zealand ACAS rules can be revised accordingly.

For these reasons the final rule does not provide for ADS-B as future collision avoidance technology.

Airwork and GNZ submitted that SSR radar cover should be extended as an alternative to ACAS.

Airwork commented that the introduction of ACAS to Part 121 aircraft will do nothing to prevent mid air collisions in the group of aircraft that historically has had mid air collisions and that extending SSR cover would provide safety benefits to all aircraft operating in NZ rather than confine the benefits to Part 121 aircraft.

GNZ commented similarly and added that to rely on ACAS to provide the last line of defence is denying the fact that a layered defence utilising SSR would provide a greatly enhanced degree of safety for the turbojet operations. GNZ noted that the benefit to the nation identified in the

NPRM from avoiding a mid-air involving a 40 seat aircraft is \$40m and commented that the cost of an SSR installation would be considerably less than \$40m.

CAA comment: Previous mid air collisions in NZ have involved small aircraft, however there have been a number of near mid-air collisions involving medium and large air transport aeroplanes.

The need for collision avoidance rules is based on an assessment of the risk and consequences of a collision. While past history may suggest the risk of mid-air collision is higher between light aircraft than large aircraft, the consequences of a collision between light aircraft are substantially less.

The purpose of the proposed Part 121 ACAS rules is to reduce the risk of mid-air collisions for the group of aeroplanes where the consequences of a collision would be the most severe.

Analysis of airspace occurrence reports in the CAA database indicates that approximately 50% of near mid-air collisions occurred in areas of SSR radar cover.

Extension of SSR cover will not provide the level of protection that is available with ACAS. ACAS operates totally independently of ground-based systems and provides advisory information directly to the pilot. SSR short-term conflict alert (STCA), which the NPRM explains is a supplementary collision avoidance system to ACAS and not an alternative system, only functions in radar controlled airspace (RCA) and relies on rapid and precise voice communication by a radar controller with the pilots concerned.

Outside RCA there is no monitoring of STCA alerts and no sure means of alerting pilots to possible conflict. To provide an STCA based alerting service to within 2000 ft AGL of existing non-radar airports that are used by IFR air transport aeroplanes would require an investment of over \$10m in radar equipment and major extensions to radar controlled airspace. This would have very high ongoing costs to be spread over all airspace users.

CAA believes recreational airspace users would certainly oppose a large extension to radar controlled airspace on ease of access as well as cost grounds.

ACAS also has the benefit of providing MAC protection in oceanic areas where SSR coverage is not possible.

For these reasons CAA does not consider extension of SSR cover is an alternative to ACAS.

Transponder Specifications

GNZ submitted that operation in “Mode A only” be required in TM airspace and requested that Part 91.247 be rewritten to provide for “Mode A only”. GNZ commented that, considering the technical issues and the “right of way rule” it is appropriate to require airships, gliders and balloons to operate Mode A only in TM airspace.

CAA Comment: The ACAS rule does not change transponder equipment requirements for general aviation aircraft including gliders. Access to TM airspace has, since TM airspace was introduced, required Mode A and C (or Mode S) transponders with automatic pressure altitude reporting capability, although gliders and manned free balloons were excluded from the latter requirement until 1998.

Rule Part 91 A.22 requires each transponder (other than a Mode S transponder) to meet TSO C74c. TSO C74c requires the transponder to have Mode A and C capability with automatic pressure altitude reporting. This is also an ICAO standard.

Notwithstanding this rule requirement the CAA understands there may be a very small number of transponders fitted to recreational aircraft that have no Mode C capability at all. ACAS II requires Mode C replies (with or without encoded altitude data) to its interrogations to detect proximate transponders. As a transponder that has no Mode C capability cannot reply in Mode C it will be invisible to the ACAS II equipped aircraft.

The more prevalent situation is that recreational aircraft, particularly gliders, have Mode A and Mode C capable transponders that lack

automatic pressure altitude reporting capability because altitude encoders have not been fitted.

These transponders will operate in Mode A and Mode C when switched to the “ON” position, and will be detectable by an ACAS II equipped aircraft. However because no altitude data is transmitted resolution advisory data (RA) will not be available from ACAS. Traffic advisory data (TA) only will be available.

As very few transponders are truly “Mode A only”, the issue is not “Mode A only” but whether or not automatic pressure altitude reporting is included in the transponder system fitted to the aircraft.

Transponder installations without an altitude encoder are much less effective for both ATC surveillance and ACAS collision avoidance. The ICAO Air Navigation Council has also emphasised the particular importance of pressure-altitude reporting transponders for ACAS and ATS⁶.

CAA research indicates that suitable encoders are available at relatively low cost to suit gliders.

For these reasons the CAA does not agree with GNZ that access to TM airspace with “Mode A only” (i.e. no automatic pressure altitude reporting capability) should be available “as of right” to non-powered aircraft. The CAA does agree that such aircraft should be able to request access to TM airspace and the air traffic control authority should give reasonable consideration to these requests. The Airways Corporation has agreed to do this.

The Airways Corporation submitted that the proposed re-writing of the Part 91.541 transponder requirements, while technically correct, could be misinterpreted. Specifically the Airways Corporation considered that proposed rule 91.541(a) and its reference to 91.237(c) may be interpreted as meaning that Mode C automatic pressure altitude reporting capability is not required for operation in TM airspace.

⁶ ICAO State Letter AN 11/1.3.12-98/22

The Airways Corporation requested that this aspect of the transponder rule be carefully explained in an associated advisory circular.

CAA comment: The CAA agrees with the Airways Corporation that 91.541(a) when read in conjunction with 91.247(c)(2) could be interpreted to mean automatic pressure altitude reporting is not required when in fact it is required by the transponder specifications in Part 91.

For this reason the final rule removes the reference to automatic pressure altitude reporting capability in 91.247(c)(2) of the NPRM as an exception from transponder requirements contained in 91.541(a).

The final rule also changes rule 91.247(c) to clarify that the requirement to obtain specific authorisation for operation without an operable transponder only applies in TM airspace that is controlled airspace.

This is done to provide for future TM airspace that may be outside controlled airspace. The possible future designation of TM airspace outside controlled airspace has been extensively discussed with airspace users during the airspace review consultations held by CAA in late 2001 and 2002.

The Part 91 transponder rule changes will not exclude gliders or other aircraft unable to comply with the requirement for automatic pressure altitude reporting from TM that is within controlled airspace, but will require the pilots of such aircraft to follow transponder inoperative procedures when seeking access to TM airspace that is within controlled airspace.

The Airways Corporation has provided assurances to the CAA that as much flexibility as possible will be provided to accommodate non-powered aircraft without Mode C pressure-altitude reporting capability, particularly in control zones and in the lower portions of TMA's. However in higher controlled airspace and around busy aerodromes Mode A and C with pressure-altitude reporting capability, whether by "squawk on request" or continuous, will be required.

The CAA considers that procedures in relation to transponder operation are best addressed in the NZ Aeronautical Information Publication rather than a CAA Advisory Circular.

J Pierson commented on the lack of consideration of position reporting and collision avoidance based on GPS/Mode S squitter position reports (ADS-B) in the NPRM. The commenter suggested that the Part 91.541 transponder and altitude reporting equipment requirements include a requirement that the transponder be capable of broadcasting 3-D position reports via Mode S squitter and that the requirement for a unique Mode S ID be deleted to allow “anonymous” position reporting.

CAA Comment: These proposals would require an upgrade of transponders fitted to the majority of NZ and foreign aeroplanes operating in New Zealand TM airspace and in many instances fitment of a GPS able to provide position-reporting data to a Mode S transponder.

Such changes are inappropriate ahead of the development of ICAO ADS-B standards that would require the use of Mode S squitter position report capability. Although it is keeping a watching brief on ADS-B technology, ICAO currently has no plans to publish SARPS and technical specifications for ADS-B based collision avoidance systems.

Before ADS-B becomes acceptable as an airborne collision avoidance technology there are major issues to be addressed, particularly the ability to co-ordinate collision avoidance with ACAS II equipped aircraft. Currently there is no international acceptance that transmission of ADS-B data will be via Mode S transponder.

The requirement for a unique Mode S address code for a Mode S equipped aircraft is fundamental to the functioning of radar surveillance and ACAS itself and CAA considers it would be most unwise to vary from the internationally accepted practice of unique Mode S aircraft addresses.

For the above reasons this proposed change was not included in the final rule.

Airspace and other ACAS Related Changes

GNZ submitted that a fragmented approach had been taken by the CAA to ACAS rule making, TM airspace changes and transponder requirements. GNZ commented that the overall package of changes clearly includes:

- Equipment requirements for ACAS on Part 121 aeroplanes,
- Equipment requirements for ACAS on Part 125 aeroplanes,
- Redefinition of TM airspace, and
- Consequentially, equipment and operation requirements for all other aircraft if they operate in redefined TM airspace.

GNZ submitted that it is of real concern that the package of changes seems to involve a fundamental change in policies or principles regarding controlled airspace and that the proposals involving a fundamental change to existing policies regarding airspace have not been adequately presented and addressed in the appropriate forums.

GNZ added that, in its view, the approach of segmenting these elements and addressing them outside of the overall context of the proposed changes is flawed and consequentially the “rights” and operational requirements of all airspace users had not been appropriately or adequately considered or consulted on.

CAA comment: The CAA does not agree that a fragmented approach has been taken to these changes. Consultation has been proceeding in parallel on TM airspace changes and both TM airspace and transponder requirements were extensively discussed at the four TSG meetings preceding the release of the NPRM.

Both airspace changes and the rule making in relation to ACAS are following established procedures for industry consultation.

The extension of TM airspace to areas outside radar control and outside controlled airspace are not part of the ACAS rule although it is clearly beneficial to ACAS effectiveness if a greater number of aircraft are equipped with transponders. The NPRM identified the costs of equipping aeroplanes with ACAS and the benefits of avoiding one MAC involving a 40 seat Part 121 aeroplanes. This analysis is quite independent of any consideration of extensions to TM airspace.

The CAA estimates that Part 121 domestic aeroplanes currently operate approximately 80% of their total flight time in TM airspace and

considers that this is sufficient to justify the ACAS rule without it being necessary to increase TM airspace for Part 121 aeroplanes alone.

Any extension of TM airspace into uncontrolled airspace will require an amendment to Part 71 and justification through the airspace review process⁷.

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.

The CAA acknowledges that although under Article 37 of the Convention States are not obliged to implement ICAO SARPS, differences may be filed, but in filing a difference States are required to advise when full compliance will be achieved.

However, as a signatory to the 1944 Chicago Convention, which provides for 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. 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 ACAS rule identified by industry relates almost entirely to the retrofit requirements for existing aeroplanes. The final rule provides significant relief by delaying ACAS compliance dates up to four years beyond that required under ICAO standards and also

⁷ Extension of TM airspace within controlled airspace would not require an amendment to Part 71 but would still require justification through the airspace review process and would be confined to areas of radar cover.

provides a basis on which the seven existing freighters may be excluded. These will be notified as differences to ICAO.

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

Comments on proposed Civil Aviation (Offences) Regulations

The NPRM contained proposed offences regulations relating to non-compliance with Part 121 and 129 ACAS requirements and Part 91 transponder requirements.

No comment was received on these proposals.

Since the issue of the NPRM, the 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.