
Type Acceptance Report

TAR 95/12

SAAB 2000

TABLE OF CONTENTS

INTRODUCTION	1
FOREIGN TYPE CERTIFICATE DETAILS	1
TYPE ACCEPTANCE APPLICATION	2
GENERAL	2
TYPE DATA	2
ADDITIONAL NEW ZEALAND CERTIFICATION REQUIREMENTS	4
OUTSTANDING REQUIREMENTS	5
SUMMARY	5
ATTACHMENTS	5

Introduction

This report details the basis on which Type Acceptance Certificate No.95/12 was issued in accordance with NZCAR Part 21 Subpart B.

Specifically the report aims to:

- (a) Record the airworthiness certification standard used for type acceptance of the applicable model(s) in New Zealand;
- (b) Summarise any outstanding requirements which must be complied with for the issue of a NZ Airworthiness Certificate to any models covered by the Type Acceptance Certificate.

Foreign Type Certificate Details

Type Certificate: No. A1/94

Issued by: LUFTFARTSVERKET - Swedish Civil Aviation Administration

Manufacturer: **SAAB AIRCRAFT AB**

Model: **2000**

Engines: Allison Model AE2100A (4150 shp)

Propellers: Dowty Aerospace R.381/6-123-F/5

MCTOW 49,600 lb (50,260 lb with Mod.5144)

Noise Category: ICAO Annex 16, Vol.1 Chapter 3.

The certification basis of the 2000 is JAR 25 at Change 25 including JAR 25.1419 Ice Protection and JAR 25.801 Ditching (excluding JAR 25.1411(d)(e)(f) and 25.1415) and FAR 25, Amendment 25-1 through 25-71, parts of Amdt 72, and Amdt 25-73 thru 76.

This is an acceptable certification basis in NZCAR Part 21B para 21.41 and Appendix C. No special conditions have been prescribed by the Director under CAR 21.23.

A series of JAA Special Conditions related to both novel or unusual design features, unconventional usages or general experience were applied during certification, as noted in the TCDS. Some special conditions were also elected by the manufacturer.

Two exemptions were granted :

- Head Injury Criterion - (FAA Exemption No.5623 also issued) - Showing the probability of head injuries are sufficiently low using the HIC as defined in FAR 25.562(c)(5) has proven to be very difficult, especially near forward bulkheads, and the JAA/FAA agreed to a temporary exemption until the end of 1994.
- Application of national operational regulations regarding oxygen for TC - Certification Review Item (CRI) F 10 - It was agreed it was impractical to certify compliance with all national operational regulations regarding oxygen. Compliance was shown for Sweden & Switzerland, the manufacturer and first operator states, respectively. In addition the requirements of FAR Part 121 are included, which are called up by several JAA countries.

JAA (*and FAA) equivalent safety findings were made with respect to the following :

- *Stall and stall warning speeds and manoeuvre capability - An FAA/JAA position was agreed to use 1-g stall speeds instead of minimum speed in the stall to ensure consistent reference Vs which were not unrealistically low.
- Fire Protection of engine and APU mounts - The engine & APU mounts contain elastomere elements which are not made of fireproof material. However the mounts contain metal parts which will take the loads after a fire.
- Emergency lights “not armed” warning - The emergency lighting system requires an engine to be running at 56% Ng before a warning will be given to the crew if the emergency lighting switch is not armed with the airplane powered.
- *APU instruments - The APU installation does not include all JAR 25B1305 parameters available before APU start on the ground. (They are on EICAS) However the APU control system is designed for unattended operation on the ground.

An FAA equivalent safety finding was made with respect to the following :

- Powerplant valve indication - The fuel system design and the indications provided by the EICAS were accepted as providing an equivalent level of safety to the powerplant valve position indication per 25.1141.

FAA Special Conditions were issued for :

- No.25-ANM-82 - Interaction of Systems and Structures - The use of fully hydraulically powered electronically controlled flight control systems (initially rudder only, and later elevator) was considered novel and unusual and special conditions were issued as system failures could lead to design load conditions not envisioned by FAR 25.
- No.25-ANM-66 - Lightning and High Intensity Radiated Fields (HIRF) - Because the SAAB 2000 has electrical and electronic systems which perform critical and essential functions additional requirements were specified for protection from both the direct and indirect effects of lightning and HIRF.
- FAA Issue Paper G-5 - Powered Elevator Control System - ANM-82 above was written for the rudder, as the powered elevator was not installed for initial certification. Additional conditions were imposed for the PECS in the areas of: operation without normal electrical power; command signal integrity; and design manoeuvre requirements .

Type Acceptance Application

The applicant for New Zealand type acceptance was from SAAB Aircraft AB by letter dated 26 September 1995 and CAA Form 24021/02. (At present there is no announced customer for the type in NZ)

Type Acceptance Certificate No.95/12 was granted on 12 February 1996.

General

The SAAB 2000 has been developed from the 340B but the changes were so extensive that it was treated as a new model for certification. The aircraft is certificated for a basic layout of 50 passengers, although evacuation has been demonstrated for up to 58. Cruise speed is $M_{MO} = .62$ at max. altitude of 31,000 ft. (Fuselage pressure differential = 7 psi.)

Type Data

The type data requirements of NZCAR Part 21B Para 21.43 have been satisfied by supply of the following documents:

(1) Type certificate - SAAB 2000:

LFV Type Certificate No.A1/94 dated 31-03-1994

LFV TCDS No.A1/94 at Issue 3 dated 1 March 1995.

LFV Noise Certificate No.1/94 at dated March 31, 1994.

FAA Type Certificate No.A47NM issued April 29, 1994.

FAA TCDS No.A47NM dated May 13, 1995.

- (2) Type certificate - Allison AE 2100A:
FAA Type Certificate No. TE1CH reissued August 5, 1994.
FAA TCDS No. TE1CH at Revision 4 dated August 11, 1994.
 - (3) Type Certificate - Dowty Aerospace Propellers (c)R381/6-123-F/5
UK CAA Propeller Type Certificate Serial No.114 dated 7 March 1994.
UK CAA Propeller TCDS No.114 at Issue 3 dated 9 November 1994.
FAA Type Certificate No.P6BO issued April 29, 1994.
 - (4) TSO 77a - Sundstrand T-62T-46C7 (APS 1000) Gas Turbine APU
 - (5) Airworthiness design requirements: See TCDS
 - (6) Certification compliance listing:
SAAB 2000 List of Compliance Documents - Doc. No.73CCS0752 dated 26-09-1995
JAA SAAB 2000 Joint Type Certification Final Report - Issue 3 dated 22-03-94
 - (7) Flight manual: SAAB 2000 AFM Doc.73CK5 042 at Rev.15 - 6 September 1995
SAAB 2000 AOM Doc.73LKS3089 Sep 01/95 at Rev.13 Jun 30/95
 - (8) Illustrated Parts Catalogue: SAAB 2000 CD-ROM - Master at Rev.8 Dec 01/95
Contains: Aircraft Maintenance Manual
Illustrated Parts Catalogue
Wiring Diagram Manual
Systems Schematic Manual
 - (9) Maintenance manual and service data for aircraft, engine and propeller:
Maintenance Review Board Report Document No.73LKS 0035 Issued Jan 31/95
and including Temporary Revision 3 dated Sep 05/95
Service Bulletins (3 Volumes) - SB Index dated 95-09-01
Service Newsletters (1 Volume) - Latest Letter of Transmittal dated 95-03-02
- NOTE: Engine and propeller manuals were not requested, to save storage, as no SAAB 2000 aircraft are in NZ. However SAAB has undertaken to provide copies prior to delivery of an aircraft to an operator in NZ. (See letter dated 3 Jan 1996.) Copies of the MMEL/MELPG and Service Newsletters will also be provided.
- (10) Agreement from manufacturer to supply updates of data in (4), (5) and (6):
Letter from SAAB Director Airworthiness dated 26 September 1995.

Other information: SAAB 2000 Regional Jetprop brochure
SAAB 2000 Type Specification Doc.73VPS0010 at Rev.E1 1994
SAAB 2000 Functional Description of Oxygen System - Doc. 7335039-001
Document 73CCS0425 Rev.G dated 1 Jan 1996 - SAAB 2000. Additional
Requirements for issue of C of A and Operational Approval.
Appendix 10 to 73CCS0425 - dated 2 Jan 1996 - New Zealand Additional
Requirements SAAB 2000.

Additional New Zealand Certification requirements

Compliance with the following additional NZ requirements has been reviewed and were found to be covered by either the original certification requirements or the basic build standard of the aircraft, as noted:

NZCAR Section C4

PARA:	REQUIREMENT:	MEANS OF COMPLIANCE:
2.13(a)	ASI shall be marked in knots	See letter from SAAB dated 2 Nov 1995 and AOM Section 4
2.1.3(b)	Altimeter main scale to be calibrated in feet	See letter from SAAB dated 2 Nov 1995 and AOM Section 4
2.1.3(c)	Altimeter barometric scale in millibars or hectopascals	See letter from SAAB dated 2 Nov 1995 and AOM Section 4
2.1.4(a)	Counter/pointer altimeters	Covered by basic JAR 25 certification (JAR 25.1303(b)(2))
2.2	Flight data recorder	See 73VPS0010 Section 31.3 (JAR 25.1459) - Loral F1000
2.3	Additional attitude indicator	See 73VPS0010 Section 34.2 Navigation - Basic System
2.4	Weather Radar	See 73VPS0010 Section 34.1 Collins WXR-840/TWR-850
3.1	Seats, Safety Belts and Harnesses	Covered by basic JAR 25 certification (JAR 25.1785)
3.2	Axe	SAAB 200 fitted with same type of axe as SF340A
3.3.4	Fire extinguisher operating instructions and types	Superseded by DCA/GEN/16
3.3.5	Fire extinguisher approved types	Superseded by DCA/GEN/16
3.3.6	Fire extinguisher specifications	Superseded by DCA/GEN/16
4.1	Independent radio antenna	See 73VPS0010 Figure 34.1 Antenna Arrangement
4.2	Emergency locator beacon	See 73VPS0010
6(d)	Red anti-collision light	See 73VPS0010 Section 33.1.2 Anticollision Lights
7.1	Flight manual container	See 73VPS0010 Section 25-1 Flight Compartment
8.3	Passenger smoking notices	Covered by basic FAR 25 certification (FAR 25.791)

NZCAR Volume 2

GEN AD:	TITLE:	REQUIREMENT:	MEANS OF COMPLIANCE:
DCA/GEN/7	Lavatory fire protection	Smoke Detectors etc.	JAR 25.853(e) and (f) at Amendment 86/1
DCA/GEN/13A	Installation of GPWS	Turbo jet aircraft in NZ	See 73VPS0010 Sect. 34.2 Nav- Basic System
DCA/GEN/15	Seat cushion flammability	FAR 25.853(c) Amendment 25-59	FAR 25.853(c) at amendment 25-59
DCA/GEN/16	Fire protection mods	FAR 121.308, FAR 121.309(c) Amendment 121-185	TCDS notes certification basis changed for 25.851 and 25.854 amended by Amdt 25-74
DCA/GEN/17	Installation of PBE	FAR 121.337 Amendment 121-193 - PBE fitted meets TSO C99 (cockpit) and C116 (cabin)	The SAAB 2000 oxygen system complies with FAR 121 as part of the certified type design. (See 73CCS0425 and CRI F10.)
DCA/GEN/20	Additional emergency	FAR 121.310 Amendment 121-183	FAR 25.812(e) at amendment 25-58
DCA/GEN/21	Cabin interior materials	FAR 121.312 Amendment 121-198	FAR 25.853 at amendment 25-66
DCA/GEN/22	Cargo compartment liners	FAR 121.314 Amendment 121-202	FAR 25.853(a-1) at amendment 25-61
DCA/GEN/24	PA & crew interphone	FAR 121.318 and FAR 121.319 Amendment 121-309	FAR 25.1411(a)(2) at amendment 25-70

CASO 4

The SAAB 2000 is classified as a Group A aeroplane under CASO 4. Therefore no supplemental performance information in the Flight Manual is required.

CASO 11

Compliance with CASO 11 has been evaluated by SAAB. (see letter dated 3 Jan 1996). The SAAB 200 fully complies with CASO 11 Amdt 2 in all applicable points but two:

- 6.2.4.3(c) - The quantity of supplemental oxygen is enough for 11.5 minutes, where the requirement is for 12 minutes. This was accepted by the CAA .
- 6.2.4.3(d) - The quantity of therapeutic oxygen in the standard aircraft is only enough for 30 minutes, where the requirement is for 45 min. A NZ additional requirement was added to 73CCS0425 for the therapeutic supply to be increased to 45 minutes.

Outstanding Requirements

The following additional NZ requirements are not covered by the original certification requirements or the basic build standard of the aircraft and require compliance with before issue of an airworthiness certificate:

NZCAR Section C4

PARA:	REQUIREMENT:	MEANS OF COMPLIANCE:
2.1.6	Magnetic compass residual deviation as per NZCAR F.8	* Compliance to be determined for each individual aircraft
3.4	First aid kits as prescribed in Appendix A	* Compliance to be determined for each individual aircraft
8.2	Fireproof ID plate	* Compliance to be determined for each individual aircraft
8.9	Nationality and registration marks	* Compliance to be determined for each individual aircraft

Swedish Export C of A Requirements

The Swedish LFV should check compliance with National Requirements Document 73CCS0425 (Appendix 10) prior to issue of an Export C of A to New Zealand.

Supply of Technical Publications

A full set of service information for the Allison engines and Dowty Rotol propellers will need to be supplied prior to issue of an initial NZ airworthiness certificate.

CAA Technical Training

SAAB were advised that for introduction of a major new type of aircraft with significant new technical features the first operator would be required to provide training for CAA personnel comprising, as a minimum, a type rating course for a Flight Operations Inspector and a general introductory course for an airworthiness engineer.

Summary

The SAAB 2000 has been issued with NZ Type Acceptance Certificate No.95/12 and is eligible for an airworthiness certificate in the standard category in accordance with CAR 21.177, subject to the outstanding and deferred requirements noted above being met.

Attachments

The following documents form attachments to this report:

- Manufacturer's Photographs - SAAB 2000
- Data Sheet/Three-view drawing SAAB 2000
- Copy of Type Certificate/ Type Certificate Data Sheet

Sign off

D G Gill
Airworthiness Engineer

Date: 12 February 1996