
Type Acceptance Report

TAR 0/21B/7 – Revision 1

Turbo Commander 690 Series

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Executive Summary

New Zealand Type Acceptance has been granted to the Twin Commander 680/690 Series based on validation of FAA Type Certificate number 2A4. There are no special requirements for import.

Applicability is currently limited to the Models detailed in Appendix 1, which are now eligible for the issue of an Airworthiness Certificate in the Standard Category in accordance with NZCAR §21.177, subject to any outstanding New Zealand operational requirements being met. (See Section 5 of this report for a review of compliance of the basic type design with the operating Rules.) Additional variants or serial numbers approved under the foreign type certificate can become type accepted after supply of the applicable documentation, in accordance with the provisions of NZCAR §21.43(2).

1. Introduction

This report details the basis on which Type Acceptance Certificate No.0/21B/7 was granted in the Standard Category in accordance with NZCAR Part 21 Subpart B.

Specifically the report aims to:

- (a) Specify the foreign type certificate and associated airworthiness design standard used for type acceptance of the model(s) in New Zealand; and
- (b) Identify any special conditions for import applicable to any model(s) covered by the Type Acceptance Certificate; and
- (c) Identify any additional requirements which must be complied with prior to the issue of a NZ Airworthiness Certificate or for any subsequent operations.

2. Foreign Type Certificate Details

Manufacturer:	North American Rockwell (22-9-1967 to 16-2-73) Rockwell International Corporation (16-2-73 to 3-2-81) Gulfstream American Corporation (3-2-81 to 29-11-81) Gulfstream Aerospace Corporation (29-11-81 to 4-12-89)
TC Holder:	Twin Commander Aircraft Corporation (Since 4-12-1989)
Model:	690, 690A, 690B
Type Certificate:	2A4
Issued by:	Federal Aviation Administration
MCTOW	10,250 lb. [4649 kg.] – Models 690, 690A 10,325 lb. [4683 kg.] – Model 690B
Max. No. of Seats:	11 – Models 690, 690A 10 – Model 690B

Noise Category: N/A

Engines: AiResearch Model TPE-331-5-251K or -252K

Type Certificate: E4WE
Issued by: Federal Aviation Administration

Propellers: Hartzell HC-B3TN-5xL/LT10282xx+4

Type Certificate: P15EA
Issued by: Federal Aviation Administration

3. Type Acceptance Certificate

The application for type acceptance of the 690A dated 29 November 1999 was from Fieldair Engineering Ltd acting as agent for the importer, NZ Aerial Mapping Ltd. The first-of-type example was serial number 11321 registered as ZK-PVB. The Aero Commander is a twin turboprop pressurised high-wing all-metal executive aircraft. There have been three Model 690B aircraft previously in New Zealand. NZAM operated serial number 11476 ZK-PVA for over twenty years, while serial numbers 11380 ZK-PIP and 11475 ZK-WLH were registered briefly for corporate use in 1984 and 1985 respectively.

New Zealand Type Acceptance Certificate No.0/21B/7 was granted on 18 February 2000 to the Model 690A based on validation of FAA Type Certificate number 2A4, and includes the Garrett TPE-331-5 Series engine based on FAA Type Certificate number E18NE. There are no special requirements for import into New Zealand.

This report was raised to Revision 1 to include the 690 variant, after application from NZ Aerial Mapping Ltd dated 4 February 2005. The first-of-type example was serial number 11106 registered as ZK-MOH. Type Acceptance was granted on 8 March 2005.

The 690A was a development of the Model 690, which was derived from the original Model 680T Turbo Commander by fitting a new wing section in which more powerful engines were mounted further outboard. 690A improvements included an increase in cabin pressure to 5.2 psi., better cockpit lighting, new interior décor, better on-ground cooling capability and certification for flight in known icing conditions. The prototype Model 690A first flew in June 1972 and type certification was achieved on 25 April 1973. The Model 690B had a total of 15 changes from the 690A including a 125 lb. increase in takeoff and landing weights; lower noise levels in the cabin and reduced vibration from the use of tuned dampers; interior moisture control; a weight reduction program and styling changes.

4. Type Data

The type data requirements of NZCAR Part 21B Para §21.43 have been satisfied by supply of the following documents, or were already held by the CAA:

- (1) Type certificate: FAA Type Certificate No. 2A4 – Model 690 approved 19-7-71
 - Model 690A approved 25-4-73
 - Model 690B approved 5-10-76FAA TCDS No. 2A4 at Revision 46 dated April 3, 2000

- (2) Airworthiness design requirements:

The certification basis of the Turbo Commander Model 690/A/B is CAR 3 dated May 15, 1956, including some paragraphs at Amendment up to 3-6 dated Sept. 13, 1961, plus some FAR 23 paragraphs as detailed in the FAA TCDS and two Special Conditions:

FAA Special Conditions – Aero Commander Model 680T – Dated April 1, 1965:
Issued due to the absence of appropriate rules for type certification of turbo-propeller aircraft in CAR 3. Includes engine torque effects, unsymmetrical loads, gyroscopic loads, oxygen system, flutter, engine controls, propeller reversing controls, fuel system requirements, lightning strike protection, anti-icing provisions, fire protection, powerplant instruments, flight testing, stability, and use of V_{MO} .

FAA Special Condition No. 23-28-SW-3 – Aero Commander Model 690 – Dated 12 August 1970: These were imposed because of the use of more powerful engines. They added requirements for turbine engine bleed air, fuel pumps (to meet FAR23), and engine control devices.

This is an acceptable certification basis in accordance with NZCAR Part 21B Para §21.41, as CAR 3 was the predecessor to FAR Part 23 which is the basic standard for Normal Category Airplanes called up under Appendix C. There are no non-compliances and no special conditions have been prescribed by the Director under §21.23.

The certification basis of the TPE-331-5 is FAR Part 33 dated 1 February 1965, including Amendments 1, 2 and 3. This is an acceptable certification basis in accordance with NZCAR Part 21B Para §21.41, as FAR Part 33 is the basic standard for Aircraft Engines called up under Appendix C.

- (3) Certification compliance listing:

Commander Aircraft Div. – Report No. S30-039 Model 690A Fuselage Fatigue Test
Aero Commander Report S60-132 – Engine Mount Static Test Model 690
Aero Cdr. Report APP60-150 – Substantiation of Model 690A/690B Engine Installation
Rockwell International Report No. S12-081 – Basic Loads Criteria for Model 690B
General Aviation Division, Rockwell International – Report No. S12-087 Flutter Analysis of Reduced Inboard Wing Stiffness – Models 690, 690A, 690B
Rockwell International – Report No. S16-046 Fatigue Evaluation of Bent Spar Cap
Type Inspection Report Part 1 Aircraft Ground Inspection – TIA No. 2A4-75-4
Type Inspection Report Model 690B Part II – Flight Inspection
Report EE 80-203 Electrical Load Analysis Model 690A & 690B

(4) Environmental Certification:

Not Applicable (Model 690 pre-dates requirements)

(5) Flight manual: Model 690B Airplane Flight Manual – P/N M690003-1
CAA Approved as AIR 2062

Model 690A Airplane Flight Manual – P/N M690002-1
CAA Accepted as AIR 2677

Model 690 Airplane Flight Manual – P/N M690001-1
CAA Accepted as AIR 2906

(6) Illustrated Parts Catalogue:

Twin Commander 690 Illustrated Parts Catalog P/N M690001-4

Gulfstream Commander 690A/B IPC P/N M690002-4 – Revised 22 July 1994

(7) Maintenance manual and service data for aircraft and engine: (prop data already held)

Twin Commander 690 Maintenance Manual P/N M690001-2

Gulfstream Commander 690A/B Maintenance Manual P/N M690002-2

Twin Commander Service Publications CP-3 (SB, SLs, Service Information)
Publication MSCP003-5 – Effectivity 680T/V/W, 681, 690/A/B

Garrett TPE331-5/6 Maintenance Manual – Report No. 72-00-05

Garrett TPE331-5/6 Illustrated Parts Catalog – Report No. 72-00-94

(8) Agreement from manufacturer to supply updates of data in (4), (5) and (6):

CAA 2171 from Twin Commander General Manager dated 24 January 2000

CAA 2171 from Twin Commander Admin Staff Support dated 19 January 2005

5. Additional New Zealand Requirements

Compliance with the retrospective airworthiness requirements of NZCAR Part 26 is a prerequisite for the grant of a type acceptance certificate.

Civil Aviation Rules Part 26

Subpart B - Additional Airworthiness Requirements

Appendix B - All Aircraft

PARA:	REQUIREMENT:	MEANS OF COMPLIANCE:
B.1	Marking of Doors and Emergency Exits	<i>To be determined on an individual aircraft basis</i>
B.2	Crew Protection Requirements – CAM 8 Appdx. B # .35	Agricultural Aircraft – <i>Not Applicable</i>

Appendix C - Air Transport Aircraft - More than 9 Pax

PARA:	REQUIREMENT:	MEANS OF COMPLIANCE:
C.1	Doors and Exits – operable from inside and outside; be unobstructed; have a means to indicate if not closed/locked	CAR 3 paragraph §3.387(a); A warning light illuminates if the door lock is not fully engaged
C.2.1	Additional Emergency Exits - per FAR 23.807(b) @ 10.5.93	CAR 3 paragraph §3.387(a) and (b)(1)
C.2.2	Emergency Exit Evacuation Equipment – Descent means	Not Applicable – Low-wing aircraft
C.2.3	Emergency Exit Interior Marking - Size/self-illuminating	<i>To be determined if used for Air Transport operations</i>
C.3.1	Landing Gear Aural Warning - Automatic Flap Linking	CAR 3 paragraph §3.359

Civil Aviation Rules Part 91

Subpart F - Instrument and Equipment Requirements

PARA:	REQUIREMENT:	MEANS OF COMPLIANCE:
91.505	Shoulder Harness if Aerobatic; >10 pax; Flight Training	<i>To be determined if configured for ten passenger seats</i>
91.507	Pax Information Signs - Smoking, safety belts fastened	N/A – No separation from direct communication with cockpit
91.509 Min. VFR	(1) ASI CAR 3 paragraph §3.655(a)(1) - See MM Figure 8-3 Item #1 N/A (2) Machmeter CAR 3 paragraph §3.655(a)(2) - See MM Figure 8-3 Item #3 (4) Magnetic Compass CAR 3 paragraph §3.655(a)(3) (5) Fuel Contents CAR 3 paragraph §3.655(b)(1)(i) - See MM Figure 8-3 Item #20 (6) Engine RPM CAR 3 paragraph §3.655(b)(1)(iv) - See MM Figure 8-3 Item #15	(7) Oil Pressure CAR 3 paragraph §3.655(b)(1)(ii) (8) Coolant Temp N/A – Turbine powered (9) Oil Temperature CAR 3 paragraph §3.655(b)(1)(iii) (10) Manifold Pressure N/A – Turbine powered (11) Cylinder Head Temp. N/A – Turbine powered (12) Flap Position CAR 3 paragraph §3.338-1 - See MM Figure 8-3 Item #11 (13) U/C Position CAR 3 paragraph §3.359 - See MM Figure 8-3 Item #25 (14) Ammeter/Voltmeter CAR 3 paragraph §3.687
91511 Night	(1) Turn and Slip Fitted as Standard - See MM Figure 8-3 Item #4 (2) Position Lights CAR 3 paragraph §3.700	(3) Anti-collision Lights CAR 3 paragraph §3.705 (4) Instrument Lighting CAR 3 paragraph §3.696
91.517 IFR	(1) Gyroscopic AH - See MM Figure 8-3 Item #2 (2) Gyroscopic DI - See MM Figure 8-3 Item #5 (3) Gyro Power Supply - See MM Figure 8-3 Item #21 (4) Sensitive Altimeter Fitted as Standard	(5) OAT Fitted as Standard (6) Time in hr/min/sec - See MM Figure 8-3 Item #7 (7) ASI/Heated Pitot Fitted as Standard – See FM §IV (8) Rate of Climb/Descent - See MM Figure 8-3 Item #6
91.519	IFR Communication and Navigation Equipment	<i>Operating Rule – Compliance as applicable</i>
91.523	Emergency Equipment (a) More Than 10 pax – First Aid Kits per Table 7 – Fire Extinguishers per Table 8 (b) More than 20 pax – Axe readily acceptable to crew (c) More than 61 pax – Portable Megaphones per Table 9	<i>To be determined if configured for ten passenger seats</i> <i>To be determined if configured for ten passenger seats</i> Not Applicable – Less than 20 passenger seats. Not Applicable – Less than 61 passenger seats.
91.529	ELT - TSO C91a after 1/4/97 (or replacement)	<i>To be determined on an individual aircraft basis</i>
91.531	Oxygen Indicators - Volume/Pressure/Delivery	Crew oxygen is supplied from the manual regulator to masks with diluter demand regulators and integral microphones. The mask supply hose incorporates a pressure indicating device.
91.535	Oxygen for Pressurised Aircraft: (1) Flight Crew Member On-Demand Mask; 15 min PBE (2) 1 Set of Portable 15 min PBE (3) Crew Member - Pax Oxygen Mask; Portable PBE 120l (4) Spare Oxygen Masks/PBE (5) Min Quantity Supplement Oxygen (6) Required Supplemental/Therapeutic Oxygen (d) Above FL250 - Quick-Donning Crew On-Demand Mask - Supplemental O ₂ Masks for all Pax/Crew - Supplemental Mask in Washroom/Toilet	SCOTT P/N80602-1 Mask to TSO C78 fitted as standard on pilot's side, Puritan Bennett mask on co-pilot's side <i>To be determined on an individual aircraft basis</i> N/A – No other crew N/A – only flight crew <i>To be determined on an individual aircraft basis</i> <i>To be determined on an individual aircraft basis</i> Quick-donning mask only for the co-pilot Oxygen outlets for 6 pax only distributed throughout cabin

	(e) Above FL300 - Total Outlets Exceed Pax by 10% - Extra Units Uniformly Distributed - Automatically Presented Above FL140 - Manual Means of Deploying Pax Masks	Maximum Operating Altitude 31,000 ft (with JET A/A-1 fuel) Only 6 pax outlets fitted - No extra units fitted as standard Does not comply Does not comply
91.541	SSR Transponder and Altitude Reporting Equipment	<i>Operating Rule – Compliance as applicable</i>
91.543	Altitude Alerting Device - Turbojet or Turbofan	Not Applicable – Turboprop powered
91.545	Assigned Altitude Indicator	<i>Operating Rule – Compliance as applicable</i>
A.15	ELT Installation Requirements	<i>To be determined on an individual aircraft basis</i>

Civil Aviation Rules Part 135

Subpart F - Instrument and Equipment Requirements

Note: The Model 690A is type certificated for up to 10 passenger seats, but the Aerial Mapping aircraft is configured with less than that in its role as a photographic survey aircraft.

PARA:	REQUIREMENT:	MEANS OF COMPLIANCE:
135.355	Seating and Restraints	<i>To be determined on an individual aircraft basis</i>
135.357	(1)Additional Instruments (Powerplant and Propeller) (2)A means of showing prop beta range or reverse pitch	Model 690A has the instruments required by FAR 23.1305 Reversible prop blade angle indicated by control lever position
135.359	Night Flight	Landing light, Pax compartment <i>Operating Rule – Compliance as applicable</i>
135.361	IFR Operations	Speed, Alt, spare bulbs/fuses <i>Operating Rule – Compliance as applicable</i>
135.363	Emergency Equipment (Part 91.523 (a) and (b))	<i>Operating Rule – Compliance as applicable</i>
135.367	Cockpit Voice Recorder	Not Applicable – Helicopter only
135.369	Flight Data Recorder	Not Applicable – Helicopter only
135.371	Additional Attitude Indicator	Not Applicable – Not turbo jet or turbofan powered

Attachments

The following documents form attachments to this report:

- Photographs first-of-type example 690A serial number 11321 ZK-PVB
- Three-view drawing Rockwell International Model 690A
- Copy of FAA Type Certificate/Type Certificate Data Sheet Number 2A4

Sign off

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David Gill
Team Leader Airworthiness

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Checked – AWE3
Date: 8 March 2005

Appendix 1

List of Type Accepted Variants:

<i>Model:</i>	<i>Applicant:</i>	<i>CAA Work Request:</i>	<i>Date Granted:</i>
680-F	AC 21-1.2/NZCAR Part 21 Appendix A(c)		
690B	AC 21-1.2/NZCAR Part 21 Appendix A(c)		
690A	Fieldair Engineering Limited	0/21B/7	18 February 2000
690	NZ Aerial Mapping Limited	5/21B/25	8 March 2005