
Type Acceptance Report

TAR 98/07

Beech 1900C and 1900D

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Introduction

This report details the basis on which Type Acceptance Certificate No.98/07 was granted in the Standard Category 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: A24CE

Issued by: DoT, Federal Aviation Administration

Manufacturer: Raytheon Aircraft Company

Model: 1900C Airliner
1900D Airliner

Engines: Pratt & Whitney Canada PT6A-65B (1900C)
Pratt & Whitney Canada PT6A-67D (1900D)

Propellers: Hartzell HC B4MP-3A/M10877K (1900C)
Hartzell HC E4A-3A/E10950k (1900D)

MCTOW 16,600 lb (1900C)
16,950 lb (1900D)

Noise Category: FAR Part 36 up to Amendment 36-10 (1900C) and 36-18 (1900D)

Certification Basis: (1900C)

The certification basis of the 1900/1900C is SFAR 41C, effective September 13, 1982; FAR Part 23 effective February 1, 1965, through Amendment 23-9, 23-11 and 23-14, plus some further paragraphs at a later still Amendment date as listed on the TCDS; Special Conditions No.23-47-CE-5 including Amendments 1 through 4; plus some paragraphs of FAR 25; and SFAR 27 through Amendment 27-4.

This is an acceptable certification basis in accordance with NZCAR Part 21B Para §21.41, as SFAR 41 is an acceptable equivalent standard for FAR Part 23 certificated aircraft with a MTOW greater than 12,500 lb. as listed in Advisory Circular AC21-1A, subject to certain conditions noted below:

- *Airworthiness certificates have been issued to the aircraft by the FAA - Complies*
- *for weights above 12 500 pounds, the additional requirements of SFAR 41 section 4(c) are complied with.* (These include: FAR Part 25 performance requirements for take-off, climb, and approach performance; gust load standards; smoke evacuation design; and engine rotation, restarting, and cooling design.)

In respect of aircraft performance for the Beech 1900C additional modifications are required to achieve this. Note 8 on the TCDS lists the drawings required to meet ICAO Annex 8. Beech advise that Dwg 118-005003 applies to aircraft for NZ. This drawing advises the user to remove the FAA Approved POH/AFM and replace it with the ICAO FAA Approved POH/AFM. The aircraft complies, as this is the manual accepted in NZ. (Otherwise the airworthiness certificate must be endorsed that above 5700 kg. the aircraft does not meet the airworthiness requirements of ICAO Annex 8.) Raytheon in letter reference 940-98-07-023 dated July 6, 1998, confirmed the 1900C complies with requirements of SFAR 41.4(c) including smoke evacuation design, engine rotation and cooling design.

- *the exception of SFAR 41 section 5(b)(1) is not applied* - Complies - The Beech 1900C is eligible for FAR Part 135 Air Transport operations in the U.S.

- *for weights above 12 500 pounds, the applicant provides evidence that FAR 25.853(a) (compartment interior requirements) in force on 6 March 1995 is complied with, (per FAR 135.170.)* - Complies - See Beech Report 1900E212 which shows that all 1900 Series environmental and cockpit components within the occupied portion of the fuselage are constructed of materials which meet the requirements of FAR 25.853 or are of a size which will not contribute significantly to the propagation of a fire.

There are no non-compliances and no special conditions have been prescribed by the Director under 21.23.

Certification Basis: (1900D)

The certification basis of the Model 1900D has been expanded over that of the Model 1900 to include FAR 23 up to Amendment 34, introduction of the Commuter Category. (Which replaces SFAR 41.) Compliance was also shown with FAR Part 34 (which supersedes SFAR 27) effective September 10, 1990. Two Exemptions, No.s 5078 and 5216, were granted by the FAA against stall characteristics and airspeed indicator marking requirements, and three Equivalent Safety Findings were made.

This is an acceptable certification basis in accordance with NZCAR Part 21B Para 21.41, as FAR 23 at Amendment 34 is the basic standard for Commuter 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.

Type Acceptance Application

The application for New Zealand type acceptance was from the manufacturer Raytheon Aircraft Company dated 20 November 1997. There is no NZ operator at present although an enquiry has been received from Coral Pacific Airlines.

Type Acceptance Certificate No.98/07 was granted on 2 September 1998.

Development of the Beech 1900 19-seat pressurised commuter aircraft started in 1979, based on a stretch of the B200, and certification was achieved in 1983. The 1900C model indicates a cargo door. From serial number UC-1 on the aircraft has a “wet wing” with increased fuel capacity of 2593 litres. The 1900D is a further evolution with a “stand-up” cabin through a 14” deeper fuselage, and other incidental changes to engine variant and weights, which has been certificated to the latest FAR 23 commuter category standards.

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: FAA Aircraft Type Certificate Number A24CE
 - Reissued to Raytheon Aircraft Company April 15, 1996
 - Models 1900 and 1900C Approved November 22, 1983
 - Model 1900D Approved March 19, 1991
 - FAA TCDS A24CE at Revision 64 dated January 15, 1996
- (2) Airworthiness design requirements: Already held by the CAA.
- (3) Certification compliance listing:
 - Beech Engineering Report No.1900E149 Model 1900/1900C FAR Requirements Compliance - at Revision B dated 23 June 1986
 - Special Conditions No.23-47-CE-5 (Beech 300/1900): Specifies the certification basis of the Beech 200, further extended by amendment to the 300/1900 Series. Amendment 4 covers requirements for the installation of EFIS instrumentation. (Basically covers failure modes and warnings, and legibility requirements.)
 - Beech Engineering Report 1900E888 - Model 1900D Certification Compliance Checklist - January 18, 1991

Exemption No.5078 - Against §23.207(c) - To allow the stall warning margin to be less than 5 kts when the pitch control reaches the stop before aerodynamic stall and the stall warning to be greater than 10 kts or 10% of Vs with 75% max. continuous power. Alternative requirements were proposed appropriate to aircraft with a high power-to-weight ratio.

Exemption No.5216 - Against §23.201(e),(f)(4) & (5); §23.203(c)(4) & (5); and §23.1545(b)(5) & (6) - Exemption granted on basis the stall and ASI marking requirements are inappropriate to this type of high performance aircraft which requires a pilot to be type rated and to operate to FAR 25 type scheduled performance. The aircraft should never be operated near the stall and if so the pitch attitude would clearly indicate an impending stall.

Equivalent Safety Findings for Beech 1900D:

- §23.781(b) - Propeller control knob shape - based on similarity with the model B300 – The shape of the knob complied, except it is a full cylinder shape instead of a segment, but was accepted as giving a similar tactile signal to the pilot.
- §23.1305(g) - Use of fuel low pressure warning annunciators were accepted in lieu of the required fuel pressure indicators.
- §23.1321(d) - Basic T instrument panel arrangement – Accepted because the ASI and altimeter deviated less than 10° above and 15° below the attitude instrument centreline.

Beech Engineering Report No.1900E212 Model 1900/1900C/1900C-1 (C-12J)/1900D Material Burn Test - Oct 5, 1983 - at Revision A dated 31 August 1994

- (1) Flight Manual: Beech 1900C Airliner ICAO Pilot's Operating Handbook and FAA Approved Airplane Flight Manual UC-1 and after P/N 114-590021-81B4 - CAA Accepted as AIR 2598
 - Beech 1900D FAA Approved Airplane Flight Manual UE-1 and after Part Number 129-590000-3D16 - CAA Accepted as AIR 2599
 - Beech 1900D Airliner Pilot's Operating Manual P/N 129-590000-5C9 (Serials UE-1 thru UE-249, UE-251 thru UE-258, and UE-260 thru EU-262)
- (2) Illustrated Parts Catalogue:

1900C Airliner UC-1 and after - Parts Catalog AF114-0021-59A12

1900D Airliner UE-1 and after - Parts Catalog AF129-0000-11A12

(3) Maintenance manual and service data for aircraft, engine and propeller:

1900/1900C Airliner Maintenance Manual AF114-0021-7B

Beech 1900/1900C Structural Inspection Manual P/N 98-30937D March 28, 1997

1900C Airliner UC-1 and after - Wiring Diagram Manual AF114-0021-61C

1900D Airliner Maintenance Manual AF129-0000-15A17

Beech 1900D Airliner Structural Repair Manual P/N 129-590000-65B1

1900D Airliner UE-2 and after - Wiring Diagram Manual AF129-0000-13B3

1900 Airliner Series Structural Repair Manual AF114-0021-9B6

Service Bulletins - Master Index and Complete Set AFSERBUL97B

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

CAA 2171 form from Group Manager, Product design Assurance dated 20-11-97.

(5) Other information:

Master MEL Beech Model 1900/1900C Series - Rev.9e

FAA Master MEL BE-1900D Revision 0I dated 18/03/97

Beechcraft Model 1900C - Model Specification BS 24067 - Revision A - 7/9/90

Beechcraft Model 1900D - Model Specification BS 24360 - Revision B - 14/3/94

Memorandum Report 1900E366 - Model 1900C Electrical Load Analysis 21/8/83

Memorandum Report 1900E1266 - Electrical Load and Power Supply Capacity
Report for Model 1900D Aircraft - Serial Number UE-273 - April 21, 1997

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:

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	Placards - See Flight Manual Section II Limitations

Appendix C - Air Transport Aircraft - More than 9 Pax

PARA:	REQUIREMENT:	MEANS OF COMPLIANCE:
C.1	Doors and Exits	See letter from Beech ref. 940-98-03-259 dated Mar 5, 1998.
C.2.1	Additional Emergency Exits - per FAR 23.807(b) @ 10.5.93	"The 1900C and 1900D meet the requirements of CAR 26
C.2.2	Emergency Exit Evacuation Equipment - Descent means	Appendix C, with the exception of C.2.3." This comment
C.2.3	Emergency Exit Interior Marking - Size/self-illuminating	Was later clarified in Beech letter 940-98-07-023 dated July 6.
C.3.1	Landing Gear Aural Warning - Automatic Flap Linking	Complies via SFAR §41.5(e)(i) [C] and FAR §23.807(d) [D]

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	Shoulder harness & Inertia reel fitted as standard - See BS 24067 Appendix A and BS 24360 Section 3.11.1
91.507	Pax Information Signs – Smoking, safety belts fastened	SFAR 41.7(a) [1900C]
91.509	(1) ASI	(8) Coolant Temp N/A - Turbine engined
Min.	(2) Machmeter	(9) Oil Temperature FAR 23.1305(c)
VFR	(3) Altimeter	(10) Manifold Pressure N/A - Turbine engined
	(4) Magnetic Compass	(11) Cylinder Head Temp. N/A - Turbine engined
	(5) Fuel Contents	(12) Flap Position FAR 23.699(a)(2)
	(6) Engine RPM	(13) U/c Position FAR 23.729(e)
	(7) Oil Pressure	(14) Ammeter/Voltmeter FAR 23.1351(d)
91511	(1) Turn and Slip	(3) Anti-collision Lights FAR 23.1401
Night	(2) Position Lights	(4) Instrument Lighting FAR 23.1381
91.517	(1) Gyroscopic AH	See BS 24067 Appendix A (1900C) See BS 24360 Appendix A (1900D)
IFR	(2) Gyroscopic DI	See BS 24067 Appendix A (1900C) See BS 24360 Appendix A (1900D)
	(3) Gyro Power Supply	See POH Annunciator Panel -1900C and 1900D
	(4) Sensitive Altimeter	KEA-346 Encoding Altimeter KEA-356 Encoding Altimeter
	(5) OAT	See BS 24067 Appendix A (1900C) See BS 24360 Appendix A (1900D)
	(6) Time in hr/min/sec	See BS 24067 Appendix A (1900C) See BS 24360 Appendix A (1900D)
	(7) ASI/Heated Pitot	See POH Page 7-57 (1900C) See POH Page 3-48 (1900D)
	(8) Rate of Climb	VSI Fitted as Standard See BS 24067 Appendix A (1900C) See BS 24360 Appendix A (1900D)
91.517	(a) More Than 10 pax - First Aid Kits per Table 7	To be determined on an individual aircraft basis
	- Fire Extinguishers per Table 8	To be determined on an individual aircraft basis
	(b) More than 20 pax - Axe readily acceptable to crew	N/A
	(c) More than 61 pax - Portable Megaphones per Table 9	N/A
91.529	ELT - TSO C91a after 1/4/97 (or replacement)	To be determined on an individual aircraft basis (1900C) Artex 110-4 Fitted as Standard See POH p3-63 (1900D)
91.531	Oxygen Indicators - Volume/Pressure/Delivery	Oxygen pressure gauges in cockpit 1900C - Does not comply - Altitude warning comes on when cabin altitude exceeds 12-12,500 ft. 1900D - Complies - warning comes on at 9500-10,000 ft. 1900C - Complies with installation of kit 118-5000 1900D complies post s/n UE-300 or with kit 129-5032
91.535	(1) Flight Crew Member On-Demand Mask; 15 min PBE	PBE - To be determined on an individual aircraft basis
Press.	(2) 1 Set of Portable 15 min PBE	To be determined on an individual aircraft basis
A/c	(3) Crew Member -Pax Oxygen Mask; Portable PBE 1201	Oxygen quantities - Complies - See statement on informal Part 91.531/535 compliance checklist from Beech
	(4) Spare Oxygen Masks/PBE	N/A
	(5) Min Quantity Supplement Oxygen	N/A - Maximum Operating Pressure-Altitude Limit for normal operation is 25,000 ft. - See AFM Section 2
	(6) Required Supplemental/Therapeutic Oxygen	Collins TDR-90 (1900C) and TDR-94 (1900D) fitted as standard
	Above FL250 - Quick-Donning Crew On-Demand Mask	
	- Supplemental O ₂ Masks for all Pax/Crew	
	- Supplemental Mask in Washroom/Toilet	
91.541	Transponder and altitude reporting equipment	To be determined on an individual aircraft basis
91.545	Assigned Altitude Indicator	

Civil Aviation Rules Part 135

Subpart F - Instrument and Equipment Requirements

PARA:	REQUIREMENT:	MEANS OF COMPLIANCE:
135.355	Seating and Restraints	Superseded by CAR §91.505
135.357	Additional Instruments (Powerplant and Propeller)	FAR 23.1305
135.359	Night Flight	Landing light, Pax compart. Fitted as Standard See POH Lighting Section
135.363	Emergency Equipment	N/A - Covered by §91.517
135.367	CVR	CVR optional equipment for 1900C 1900D - Fairchild A100A Optional Fit
135.371	Add. Attitude Indicator	N/A - Turbojet aircraft only

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:

Civil Aviation Rules Part 91

Subpart F - Instrument and Equipment Requirements

PARA:	REQUIREMENT:	MEANS OF COMPLIANCE:
91.517	(a) More Than 10 pax - First Aid Kits per Table 7 - Fire Extinguishers per Table 8	To be determined on an individual aircraft basis To be determined on an individual aircraft basis
91.529	ELT - TSO C91a after 1/4/97 (or replacement)	To be determined on an individual aircraft basis (1900C)
91.531	Oxygen Indicators - Volume/Pressure/Delivery	1900C - Does not comply - Altitude warning comes on when cabin altitude exceeds 12-12,500 ft.
91.535	(1) Flight Crew Member On-Demand Mask; 15 min PBE Press. (2) 1 Set of Portable 15 min PBE	1900C - Complies with installation of kit 118-5000 1900D complies post s/n UE-300 or with kit 129-5032
A/c	(3) Crew Member -Pax Oxygen Mask; Portable PBE 120l	PBE - To be determined on an individual aircraft basis
91.545	Assigned Altitude Indicator	To be determined on an individual aircraft basis

Civil Aviation Rules Part 135

Subpart F - Instrument and Equipment Requirements

PARA:	REQUIREMENT:	MEANS OF COMPLIANCE:
135.361	IFR Operations	Speed, Alt, spare bulbs/fuses
135.365	Passenger Address and Crew-Member Intercom Systems	To be determined on an individual aircraft basis
135.367	Cockpit Voice Recorder	CVR optional equipment for 1900C
135.369	Flight Data Recorder	FDR optional equipment for 1900C
135.373	Weather Radar	Required for IFR
135.375	Ground Proximity Warning System	Required after 1 January 1999
		To be determined on an individual aircraft basis 1900D - Fairchild A100A Optional Fit 1900D - Fairchild F1000 17-channel Optional Fit To be determined on an individual aircraft basis To be determined on an individual aircraft basis (1900C) Allied Signal Mk-IV available as option (1900D)

Summary

Type Acceptance Certificate No 98/07 has been granted to the Beech Models 1900C and 1900D. Serial numbers UC-1 and up and UE-1 and up, respectively, are now eligible for the issue of a New Zealand Airworthiness Certificate in the Standard Category in accordance with NZCAR §21.177, subject to any outstanding operational requirements as noted above being met.

Attachments

The following documents form attachments to this report:

- Three-view drawings Beech Models 1900C and 1900D
- Extracts from FAA Type Certificate Data Sheet A24CE

Sign off

David Gill
Airworthiness Engineer

Date: 2 September 1998