Type Acceptance Report

TAR 5/21B/33 – Revision 2

Cessna 350/400 (LC) Series

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Executive Summary

New Zealand Type Acceptance has been granted to the LC41/42 Series based on validation of FAA Type Certificate number A00003SE. There are no special requirements for import.

Applicability is currently limited to the Models and/or serial numbers 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.5/21B/33 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. ICAO Type Certificate Details

Manufacturer:	Pacific Aviation Composites, USA LLC The Lancair Company (from May 18, 2000) Columbia Aircraft Manufacturing Company (from Oct 31, 2005) Cessna Aircraft Company (from December 5, 2007)
Model:	LC42-550FG (Cessna 350)
Type Certificate: Issued by:	A00003SE Federal Aviation Administration
MCTOW	3400 lb.
Max. No. of Seats:	4
Noise Standard:	FAR Part 36 as amended on the date of certification.
Engine:	Continental IO-550-N
	Type Certificate: E3SO Issued by: Federal Aviation Administration

Propeller: Hartzell PHC-J3YF-1RF/F7691D-1 or F7691DK-1

Type Certificate: P36EA
Issued by: Federal Aviation Administration

McCauley D3A34C444/78MLA-0 (Fitted under STC SA1390WI)

Type Certificate: P47GL
Issued by: Federal Aviation Administration

Model: LC41-550FG (Cessna 400)

Type Certificate: A00003SE
Issued by: Federal Aviation Administration

MCTOW 3600 lb.

Max. No. of Seats: 4

Noise Standard: FAR Part 36 as amended on the date of certification.

Engine: Continental TSIO-550-C

Type Certificate: E5SO
Issued by: Federal Aviation Administration

Propeller: Hartzell HC-H3YF-1RF/F7693DF or F7693DFK

Type Certificate: P35EA
Issued by: Federal Aviation Administration

3. Type Acceptance Certificate

The application for New Zealand type acceptance was from the manufacturer, dated April 7, 2005. There are currently no scheduled deliveries to a local customer. The Columbia is a semi-monocoque pre-moulded all-composite four-seat low-wing utility aeroplane with fixed tricycle landing gear and a 310 hp six-cylinder air-cooled piston engine.

Type Acceptance Certificate No. 5/21B/33 was granted on 10 June 2005 to the Lancair Models LC41-550FG and LC42-550FG based on validation of FAA Type Certificate A00003SE, and includes the respective engine and propeller models listed under that type certificate. There are no special requirements for import into New Zealand.

The Lancair company was originally founded by Mr Lance Neibauer in 1984 to produce the Lancair 235/320 two-seat kit aircraft, and later the Lancair-IV four-seat homebuilt. It then developed the Columbia as an all-new certified design with such design features as honeycomb sandwich construction and side-stick controllers. The Columbia 350 was a development of the original Model LC40-550FG Columbia 300 as an all-electric aeroplane without any vacuum system. It has two independent bus with cross tie capability, and dual alternators and battery electrical systems with separate wire routings. The second alternator is not certified as part of the engine, but as part of the airframe. The 350 also introduced a new Garmin radio package and the Avidyne Flightmax Entegra avionic system comprising a Primary Flight Display (PFD) and Multi-Function Display (MFD). The Columbia 400 is essentially similar except for the twin-turbocharged engine and higher MAUW.

This report was raised to Revision 1 on 2 October 2006 to add the Columbia 350/400 versions certificated with the Garmin G1000 integrated avionics system. These versions, which are identified only as having the Garmin avionics option, use different Flight Manuals but the same Maintenance Manuals. The G1000 avionics system consists of two displays, one dedicated as a primary flight display (PFD) and the other as a multi-function display (MFD). Functions provided by the system include display of attitude, heading (via single AHRS), navigation, traffic, data link weather, air data (single), engine and airframe status, situational awareness of a moving map display with position derived by GPS, and an automatic flight control system (AFCS). In addition to display functions, GPS navigation, VHF Com, VOR/ILS and transponder functions are provided by the system and controlled by knobs and buttons located on the PFD bezel, MFD bezel or centre console mounted remote keypad.

This report was raised to Revision 2 under CAA Work Request number 9/21B/1 to record the transfer of type certificate holder responsibility and company ownership to the Cessna Aircraft Company. This change is applicable to serial numbers 411001 and 421001 onwards. There is no change to the type design of the aircraft. The application included acceptance of the McCauley D3A34C444 propeller, which is an option for the Cessna 350 under STC No. SA01390WI. Type Acceptance was granted on 7 October 2008.

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 Number A00003SE

FAA Type Certificate Data Sheet no. A00003SE at Revision 22 dated Jan 11, 2008
– Model LC42-550FG approved March 30, 2003
– Model LC41-550FG approved April 8, 2004

FAA Type Certificate No. E3SO – Model IO-550-N approved August 16, 1996
FAA TCDS Number E3SO at Revision 10 dated March 16, 2007

FAA Type Certificate No. E5SO – Model TSIO-550-C approved February 4, 1994
FAA TCDS Number E5SO at Revision 3 dated December 20, 2006

FAA Type Certificate Number P35EA – Model () HC-H3Y
FAA TCDS Number P35EA at Revision 14 dated February 2, 2007

FAA Type Certificate Number P36EA – Model () HC-J3Y
FAA TCDS Number P36EA at Revision 18 dated September 10, 2008

FAA Type Certificate No. P47GL – Model 3A34C(4--) approved August 2, 1991
FAA TCDS Number P47GL at Revision 12 dated June 22, 2007

(2) Airworthiness design requirements:

(i) Airworthiness Design Standards:

The certification basis of the LC40/41/42 Series is FAR Part 23 effective February 1, 1965, as amended by 23-1 through 23-46, except §23.1305 and §23.1359 were updated for the 350/400 to 23-52 and 23-49 respectively. Three ELOS findings were made by the FAA for the 350, with one being carried over to the 400. These have been reviewed and accepted by the CAA. For aircraft equipped with the G1000 system the certification basis was updated for individual paragraphs up to Amendment 23-52, as detailed on the TCDS. This is an acceptable certification basis in accordance with NZCAR Part 21B Para §21.41, as FAR 23 is the basic standard for Normal Category Airplanes called up under Part 21 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 IO-550-N is FAR 33 as amended through 33-14 dated August 10, 1990, while for the TSIO-550-C it is at amendment 33-13 effective August 18, 1990. FAR 33 is the basic standard for aircraft engines under Part 21 Appendix C.

The certification basis of the HC-J3YF-()/()7691 and PHC-H3YF-1/7693 propellers is FAR 35 with amendments 35-1 through 35-6 effective August 18, 1990. FAR Part 35 is the basic standard for propellers called up under Part 21 Appendix C.

The certification basis of the D3A34C444 propeller is FAR Part 35 including amendments 35-1 through 35-4 (May 2, 1977). FAR Part 35 is the basic standard for propellers called up under Part 21 Appendix C.

(ii) Special Conditions:

23-160-SC Protection Against HIRF – Applicable to all aircraft, regardless of which avionics package is installed.

(iii) Equivalent Level of Safety Findings:

LC42-550FG:

ELOS ACE-98-1 – FAR 23.201, 203 and 221 Stalls and Spins – Because the aircraft was not capable of completely meeting the spin resistant requirements of §23.221(a)(2) Lancair proposed to show that the aircraft has excellent low speed handling characteristics and an unusual tolerance to abused control inputs so that it has the ability to fly away from an imminent stall. This was accepted as equivalent to the one turn spin recovery option allowed under §23.221(a)(1).

ELOS ACE-98-2 – Addendum to ACE-98-1 with additional compensating features based on spin resistant characteristics found during flight test.

LC42-550FG and LC41-550FG:

ELOS ACE-99-02 – FAR 23.807 Emergency Exits – The Columbia has dual gull-wing doors with a hinge release mechanism for access when inverted (on the ground) which cannot be used inside the cabin. Therefore a crash axe is provided as part of the type design and the window designated an emergency exit. However the window does not strictly meet the §23.807(b) ellipse size requirements, but was accepted as meeting the intent of the Rule. The overall area is much greater and tests showed the window can be easily removed with the axe and access is satisfactory.

(iv) Airworthiness Limitations:

See Maintenance Manual

(3) Aircraft Noise and Engine Emission Standards:

(i) Environmental Standard:

The Models LC41/42 have been certificated under FAR Part 36, including Amendments 36-1 through 36-20 for the LC42, and 36-24 for the LC41.

(ii) Compliance Listing:

Document AA1365 – FAR 36 Appendix G Noise Certification for the Lancair Columbia 300 – FAA Project TC1616SE-A – Aero Acoustics Inc.

Lancair Report AC900005, Rev C – FAR 36 Noise Certification Flight Test Plan and Compliance Report: Lancair Columbia 400 – FAA Project: AT5220SE-A

(4) Certification Compliance Listing:

PAC USA Certification Report Document Number AA012000G – IFR Type Certificate Compliance Checklist – LC40-550FG – Project Number TC1616SE-A

PAC USA Certification Report AA900005E-1 Inspection Compliance Checklist

Lancair Certification Report Document Number: AB012000 Rev.D – All-Electric Aircraft Compliance Checklist – Project Number AT6428SE-A

Lancair Certification Report Document Number: AC012001 Rev E – Turbocharged Engine Installation Compliance Checklist – Project Number AT5220SE-A

Compliance Check List – TC program ()HC-J3YF-()/()7691() dated June 8, 1993
Compliance Check List – TC program (P)HC-H3YF-1/7693 dated August 25, 2003

Project Specific Certification Plan – For the G1000 System in the Lancair Models LC41 & LC42 Aircraft – FAA Project No. TD9703SE-A – Dwg.No. 005-00310-00

TC System Accomplishment Summary – For the G1000 System in CAM Models LC41 & LC42 Aircraft – FAA TC Project TD9703SE-A – Dwg.No. 005-00310-01

(5) Flight Manual:

Pilot's Operating Handbook and FAA Approved Airplane Flight Manual Lancair Columbia 350 (LC42-550FG) – Doc. No.RB050000 – CAA Accepted as AIR 2919

Pilot's Operating Handbook and FAA Approved Airplane Flight Manual Lancair Columbia 400 (LC41-550FG) [s/n 41042 and on, or if modified in accordance with Service Letter SL-04-010] – Doc. No. RC050002 – CAA Accepted as AIR 2920

Pilot's Operating Handbook and FAA Approved Airplane Flight Manual Columbia 350 (LC42-550FG) – Doc. No.RB050005 – CAA Accepted as AIR 2957

Pilot's Operating Handbook and FAA Approved Airplane Flight Manual Columbia 400 (LC41-550FG) – Doc. No.RC050005 – CAA Accepted as AIR 2958

(6) Operating Data for Aircraft, Engine and Propeller:

(i) Maintenance Manual:
Airplane MM Lancair Columbia 350 (Model LC42-550FG) – Pub. RB050002F
Airplane MM Lancair Columbia 400 (Model LC41-550FG) – Pub. RC050001A

Continental Permold Series Maintenance Manual – Models I0-550-A/B/C/G/N/P/R – Form No. X30634A dated April 2001
Continental Permold Series Overhaul Manual – Models I0-550-A/B/C/G/N/P/R – Form No. X30568A dated October 2000
Continental Motors – Operation and Installation Manual – Permold Series Engines – Models I0-550-A/B/C/G/N/P/R – Form No. X30565 dated March 2001

Continental – Maintenance and Overhaul Manual Model TSI0-550-B/C/E – Form No. X30616A dated January 1998
Continental – Operation and Installation Manual – Model TSI0-550-B/C/E – Form No. X30614 dated April 1996

McCauley Publication BOM100R04 – Blade Overhaul Manual
McCauley Publication MPC400-02 – C400 Series Propeller Overhaul Manual
McCauley Publication SPM100 – Standard Practices Manual

(ii) Current service Information:
Lancair Service Bulletins, Service Instructions, Service Letters

Service Bulletins for TCM are available on their website at www.TCMLink.com

Hartzell Service Information is on the "Technical Documents Library" CD-ROM

(iii) Illustrated Parts Catalogue:
No IPC is produced for the Lancair Columbia Series

Parts Catalogs for TCM are available on their website at www.TCMLink.com

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

CAA 2171 from Lancair Certification Engineer dated April 7, 2005
CAA 2171 from Lancair Certification Engineer dated July 27, 2006

(8) Other information:

Lancair Document No.: AB240000 Rev.A – LC42-550FG Electrical Load Analysis
Lancair Document No.: AC240000 – LC41-550FG Electrical Load Analysis

Detailed Model Specification – TCM Model IO-550-N 310 hp @ 2700 RPM
Teledyne Continental Drawing 652180 – IO550G/N – Installation Drawing

Detailed Model Specification – TCM Model TSIO-550-C 310 hp @ 2600 RPM
Teledyne Continental P/N 646613 – TSIO-520-BE/-550C,E – Installation Drawing

Hartzell Drawing D-4245 – Propeller Assembly ()HC-()3Y()-1RF

Electrical Load Analysis Garmin G1000 – Columbia 350/400 – P/N 005-00310-04

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	***To be determined on an individual aircraft basis***
B.2	Crew Protection Requirements – CAM 8 Appdx. B # .35	Not Applicable – Agricultural Aircraft only

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

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		§FAR 23.785 (Required under §23.562) – *B #25-14	
91.507	Pax Information Signs - Smoking, safety belts fastened		Not Applicable – Less than 10 passenger seats	
91.509 Min. VFR	(1) ASI (2) Machmeter (3) Altimeter (4) Magnetic Compass (5) Fuel Contents (6) Engine RPM (7) Oil Pressure (8) Coolant Temp	FAR §23.1303(a) – *B #34-17 N/A – *No Mach-No. limitations* FAR §23.1303(b) – *B # 34-18 FAR §23.1303(c) – *B # 34-19 FAR §23.1305(a)(1) – *B # 34-20 FAR §23.1305(b)(2) – *B # 34-21 FAR §23.1305(a)(2) *B # 77-02 *N/A – Air-cooled engine*	(9) Oil Temperature (10) Manifold Pressure (11) Cylinder Head Temp. (12) Flap Position (13) U/C Position (14) Ammeter/Voltmeter	FAR §23.1305(a)(3) *B #77-02 FAR§23.1305(b)(5) *B #77-03 FAR §23.1305(b)(3) *B #77-04 FAR §23.699(a)(2) – Selector lever position – See A900005E *N/A – Fixed undercarriage* FAR §23.1351(d) – *B #24-09 (MD-158 Dual Ammeter)
91.511 Night	(1)Turn and Slip (2) Position Lights	Fitted as standard – *B #34-11 Fitted as standard – See AFM §7	(3) Anti-collision Lights (4) Instrument Lighting	Fitted as standard – See AFM §7 Integral with PFD and MFD
91.517 IFR	(1) Gyroscopic AH (2) Gyroscopic DI (3) Gyro Power Supply (4) Sensitive Altimeter	Fitted as standard – *B #34-16 Part of Entegra PFD display Part of Entegra PFD display Fitted as standard – *B #34-18	(5) OAT (6) Time in hr/min/sec (7) ASI/Heated Pitot (8) Rate of Climb/Descent	Fitted as standard – *B #34-29 Part of Entegra MFD display Fitted as standard – *B #34-24 Part of Entegra PFD display
	* B = Basic Equipment installed on all airplanes – See Equipment for Types of Operation – AFM Section 6 Appendix A			
91.519	IFR Communication and Navigation Equipment		***Operating Requirement – Compliance as applicable***	
91.523	Emergency Equipment: (a) More Than 9 pax – First Aid Kits per Table 7 – Fire Extinguishers per Table 8 (b) More than 20 pax – Axe readily accessible to crew (c) More than 61 pax – Portable Megaphones per Table 9		 Not Applicable – Less than 9 passenger seats Fire Extinguisher fitted as standard - *B #26-01 Crash axe required equipment under ELOS ACE-99-02 Not Applicable – Less than 61 passenger seats	
91.529	ELT - TSO C91a or C126 after 1/4/97 (or replacement)		Artex ELT-200 fitted as standard – *B #25-01	
91.531	Oxygen Indicators - Volume/Pressure/Delivery		Optional oxygen system has flowmeters and cockpit display (See AFM Fig. 7-62) showing outlet pressure and quantity	
91.533	Oxygen for Non-Pressurised Aircraft: >30 min above FL100 - Supplemental for crew, 10% Pax - Therapeutic for 3% of Pax Above FL100 - Supplemental for all Crew, Pax - Therapeutic for 1% of Pax - 120l PBE for each crew member		Maximum flight altitude is either FL180 or FL250 with an FAA Approved oxygen system installed, or FL140 without. Optional Precise Flight fixed oxygen system consists of three 14 cu.ft. bottles, regulator, filler, display controller and associated fittings. Four A4 Flowmetrers and either cannulas or masks can be connected.	
91.541	SSR Transponder and Altitude Reporting Equipment		***Operating Requirement – Compliance as applicable*** GTX327 Mode C or GTX330 Mode S available as options	
91.543	Altitude Alerting Device - Turbojet or Turbofan		Not Applicable – Not turbo jet or turbofan powered	
91.545	Assigned Altitude Indicator		***Operating Requirement – Compliance as applicable***	
A.15	ELT Installation Requirements		***To be determined on an individual aircraft basis***	

Note: The compliance table above was based on the standard instrumentation package. The Garmin G1000 system contains the same capability and functionality.

Civil Aviation Rules Part 135

Subpart F - Instrument and Equipment Requirements

PARA:	REQUIREMENT:		MEANS OF COMPLIANCE:
135.355	Seating and Restraints – Shoulder harness flight-crew seats		§FAR 23.785 (Required under §23.562)
135.357	Additional Instruments (Powerplant and Propeller)		Certificated to FAR Part 23, including §23.1305
135.359	Night Flight	Landing light, Pax compartment	***Operating Requirement – Compliance as applicable***
135.361	IFR Operations	Speed, Alt, spare bulbs/fuses	***Operating Requirement – Compliance as applicable***
135.363	Emergency Equipment (Part 91.523 (a) and (b))		***Operating Requirement – Compliance as applicable***
135.367	Cockpit Voice Recorder		N/A – Only for 2-crew helicopters with more than 10 pax
135.369	Flight Data Recorder		Not Applicable – Less than 10 passenger seats
135.371	Additional Attitude Indicator		Not Applicable – Not turbo jet or turbofan powered

Attachments

The following documents form attachments to this report:

Lancair Dwg. No. LB06000000 – LC42-550FG Reference Drawing
Lancair Dwg. No. LC06000000 – LC41-550FG Reference Drawing
Copy of FAA Type Certificate Data Sheet Number A00003SE

Sign off

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David Gill — Checked – Peter Gill
Team Leader Airworthiness — Airworthiness Engineer

Appendix 1

List of Type Accepted Variants:

Model:	*Applicant:*	*CAA Work Request:*	*Date Granted:*
LC42-550FG	The Lancair Company	5/21B/33	10 June 2005
LC41-550FG (s/n 41042 on)	The Lancair Company	5/21B/33	10 June 2005
LC41/42 with Garmin G1000	Columbia Aircraft Manu. Co.	7/21B/6	2 October 2006
Cessna 350/400	Cessna Aircraft Company	9/21B/1	7 October 2008