
Type Acceptance Report

TAR 2/21B/3 – Revision 1

G-164 Ag-Cat Series

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Executive Summary

New Zealand Type Acceptance has been granted to the G-164 Series based on validation of FAA Type Certificate number 1A16. 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 Restricted Category in accordance with NZCAR §21.191, 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(c).

1. Introduction

This report details the basis on which Type Acceptance Certificate Number 2/21B/3 was granted in the Restricted 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.

The report also notes the status of all models included under the foreign type certificate which have been granted type acceptance in New Zealand. Models covered by the type acceptance certificate issued under Part 21B are listed in Section 2 of this report. Models which were accepted prior to that under NZCAR Section B.9 are listed in Appendix 1.

2. ICAO Type Certificate Details

Type Certificate holder: Grumman Aircraft Engineering Corporation

Grumman American Aviation Corp (since 14 May 1980)

Schweizer Aircraft Corporation (since 12 March, 1981)

Ag-Cat Corporation (since 4 April 1995)

Allied Ag Cat Productions, Inc. (since 22 February 2001)

Type Certificate: 1A16

Issued by: Federal Aviation Administration

Model(s): G-164B

MCTOW 4500 lb. [2041 kg.] (up to serial number 708B)
5200 lb. [2433 kg.] (with 73" wing gap, S/N 709B and up, or
with STC 15/21E/12 embodied)

Max. No. of Seats: One

Noise Standard: Not Applicable

Engine: Pratt & Whitney R-985-AN-xx/Wasp Jr T1Bx
Type Certificate: 5E1
Issued by: Federal Aviation Administration

Pratt & Whitney R-1340-AN-1/SxH1
Type Certificate: 5E2
Issued by: Federal Aviation Administration

Walter M601E-11 (with STC SA01353CH embodied)
Type Certificate: E00048EN
Issued by: Federal Aviation Administration

Propeller: Hamilton Standard 2D30 or 2D40
Type Certificate: P-206
Issued by: Federal Aviation Administration

Avia VJ8.510/AG (with STC SA01353CH embodied)
Type Certificate: P2BO
Issued by: Federal Aviation Administration

Avia V508E (with Modification AAE114 embodied)
Type Certificate: P.028
Issued by: European Aviation Safety Agency

3. Type Acceptance Details

The application for New Zealand type acceptance of the G-164B was from Griffin Ag-Air dated 5 October 2001. The G-164B was originally type accepted in NZ in 1984, but there were no examples on the register as at 1 July 1995, so it was not covered by the transitional arrangements of Part 21 Appendix A. In addition the first-of-type example, serial number 039B registered as ZK-WTA, embodied a number of major modifications including a new FAA-Approved variant Walter turbine engine and Avia propeller, which themselves required type acceptance. The G-164 is a biplane aircraft with tailwheel undercarriage and steel-tube fuselage intended solely for agricultural dispersal operations, powered by either a radial engine or a turboprop in some later variants.

Type Acceptance Certificate No.2/21B/3 was granted on 24 October 2001 to the G-164B based on validation of FAA Type Certificate 1A16, and includes the M601E Series engine based on FAA Type Certificate E00048EN and the Avia VJ8.510 propeller based on FAA Type Certificate P2BO, as installed under FAA STC Number SA01353CH. Specific applicability is limited to the coverage provided by the operating documentation supplied. There are no special requirements for import into New Zealand.

This report was raised to Revision 1 to add the later serial number range 709B and up, which has a different flight manual. This was required due to New Zealand STC number 15/21E/12 being approved to permit earlier serial numbers converted to the 73" wing gap configuration to operate at the higher gross weight and limitations of the later aircraft.

The G-164 was designed by Grumman but was always manufactured by the Schweizer Aircraft Corporation under sub-contract. The G-164 was the first specifically-designed agricultural aircraft in the US and came with a factory fitted spray system. The first G-164 and the later G-164A versions were progressively developed with higher engine power and hopper size, along with an increase in operating weight. The original engine was 225 hp with 215 gallon hopper and 3750 lb MAUW, but from s/n 301 this was increased to 300 hp and 245 gallons. In 1966 from s/n 401 the Super Ag-Cat G-164A was introduced with 450 hp R985 Pratt and Whitney Wasp Junior engine and 300 gallon hopper with 4500 lb MAUW. Later options included the 600 hp R1340 engine.

The G-164B version introduced in 1973 had increased span wings and greater vertical stabilizer area, plus some other minor changes. Subsequent developments included a new spray system from s/n 549B, and a 400 gallon hopper from s/n 660B. A major upgrade in 1983 from s/n 709B was the Super Ag-Cat "G164B+" which had a 73" wing gap, achieved by raising the top wing 8". Other modifications included the vertical fin being fitted on the centreline and made 6" taller, the tailplane angle of incidence was increased, new brakes were fitted along with heavy struts and wires, stronger landing gear axles and attachments. MAUW was increased to 5200 lb. The 73" wing gap gave improved pilot visibility and increased the c.g. range. This configuration could be retrofitted to earlier serial numbers, but the MAUW was not changed. (An STC has been approved in NZ to approve the 5200 lb MAUW for earlier serial numbers converted to the full G-164B+ status.)

The first G-164B in NZ was ZK-KAL, s/n 010B, operated by Kairanga Aviation Ltd from 1984 till 1990. The second was ZK-SJA, s/n 770B, which was converted into a Schweizer G-164B-20T model. (See TAR 4/92.) It was destroyed after a wire-strike accident in 2001.

4. NZCAR §21.43 Data Requirements

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) ICAO Type certificate:

FAA Type Certificate Number 1A16

FAA Type Certificate Data Sheet number 1A16 at Revision 24 dated Feb 22, 2001

– Model G-164A approved March 4, 1966

– Model G-164B approved November 18, 1975

– Model G-164B (with 73" wing gap) approved November 18, 1982

– Model G-164B-20T approved April 1991

FAA Type Certificate Data Sheet no.E00048EN at Revision 11 dated 22 April 2014

– Model M601E approved January 6, 1995

FAA Type Certificate Data Sheet number P2BO at Revision 8 dated March 1, 2012

– Model V510AG approved March 30, 1998

(2) Airworthiness design requirements:

(i) *Airworthiness Design Standards:*

The certification basis of the G-164 Series is CAR 8.10(a)(1) effective October 11, 1950 and CAM 8, Appendix B, as amended March 19, 1957. This has not been recognised as an acceptable design standard in NZ. However the G-164B was type accepted in 1984 on the basis of compliance with CAR 3, with some exceptions appropriate to the Restricted Category, and additionally that service experience had shown the type had no unsafe features or characteristics. (See CAE Memo dated 27 June 1984 on file 61/19/1.) For the later factory Schweizer turbine conversions the certification basis was changed to “and applicable FAR paragraphs”.

The current Rule provision is NZCAR Part 21B Appendix C para (b)(2) for the Restricted Category. Advisory Circular 21-1A states CAM 8 can be accepted where the aircraft has been shown to meet the structural requirements of FAR 23, or equivalent, and the overall level of non-compliance with a Part 21 Appendix C(a)(1) standard has been assessed. The review by CAE was made against those same standards and is therefore still valid. The only special condition arising, which would be equivalent to prescription by the Director under §21.23, was fitting of the P/N A1650-601 landing wire attachment lugs to ensure –2.05g capability. (CAM 8 App B only requires –1.0g.) These must be fitted per DCA/G164/6.

The certification basis of the military R985 and R1340 Series engines are not specified on the CAA Specification. They have been accepted on the basis of FAA approval by their inclusion under the Type Certificate for the G-164 airframe.

The certification basis of the Walter M601E-11 engine is FAR Part 33 dated February 1, 1965, including amendments 33-1 through 33-12, inclusive and Special FAR 27-5. This is the basic airworthiness design standard for aircraft engines called up under Part 21 Appendix C.

The certification basis of the Avia 510 Series propellers is FAR 35, effective February 1, 1965, Amendment 35-1 to 35-6 inclusive. This is the basic airworthiness design standard for aircraft propellers called up under Part 21 Appendix C.

(ii) *Special Conditions:*

Nil

(iii) *Equivalent Level of Safety Findings:*

Nil

(iv) *Airworthiness Limitations:*

Nil

(3) Aircraft Noise and Engine Emission Standards:

(i) *Environmental Standard:*

Not Applicable – Compliance not required under FAR §36.1(2) for agricultural use.

(4) Certification Compliance Listing:

Report GA164B-31 – G-164B Compliance Check List

GA164B-36 – Comparison of Strength of G164B with the Requirements of CAM 3

GA164B-53 – Comparison of Strength of G164B at a GW of 5200# with CAM 3

Report GA164B-1 – Applied Loads – 4500# Gross Weight

Report GA164B-2 – Loads and Stress Analysis of Wing Structure

Report G164B-13 – Vn Diagram for 6075 lbs.

Report GA164B-17 – Flight Test of the G-164B (S/N 1B)

(5) Flight Manual:

Pilot's Handbook G164A/450, G164A/600, G164B/450, G164B/525

Publication No. ASP-PH-1 dated 1-4-77 – CAA Approved as AIR 2440

Pilot's Operating Handbook G-164B (SN 660B and up)

– CAA Accepted as AIR 3296

Pilot's Operating Handbook G-164B AgCat (Effective on S/N 709B and subsequent) Publication No. ASP-PH-3A – CAA Accepted as AIR 3297

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

(i) *Maintenance Manual:*

G-164A, B, C Maintenance Manual – Issued 1978 – Publication No. ASP-M-2

Walter M601E-11 Operation Manual – P/N 0982406 2nd Revised Edition Jan 1997

Walter M601E-11 Maintenance Manual – P/N 0982302 Issued October 1, 1995

Maintenance Manual V510AG Propeller – Avia-Hamilton Standard, 1995

Operator's, Installation and Maintenance Manual – V508E, V508E-AG Propeller

P/N 076/77-8912.7 Avia propeller Ltd, Edition March 31, 2000

(ii) *Current service Information:*

Ag-Cat Service Notes and Bulletins (Up to SB #79 dated 15 August 1984)

(iii) Illustrated Parts Catalogue:

G-164, A, B Spare Parts Catalogue – Issued 1982

V510 Series Parts Catalogue – P/N 068-8922.7, Issued September 1997

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

The Type Certificate holder advises that all G-164 aircraft manuals are now current with no revisions being issued.

(8) Other information:

Publications List for Model G-164 Series AgCat – Allied Ag Cat Productions, Inc. listing dated 12 March 2014

5. Additional New Zealand Requirements

Compliance with the retrospective airworthiness requirements of NZCAR Part 26 has been assessed as they are a prerequisite for the grant of an airworthiness certificate.

CAR 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 - Agricultural Aircraft	G-164B is type certificated to CAM 8 Appendix. B Section .35

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	CAM 8 para .52(c)
91.507	Pax Information Signs - Smoking, safety belts fastened	N/A – Less than ten passenger seats
91.509 Min. VFR	(1) ASI (2) Machmeter (3) Altimeter (4) Magnetic Compass (5) Fuel Contents (6) Engine RPM (7) Oil Pressure	CAM 8 para .51(a) N/A - No Mach no. limits CAM 8 para .51(b) CAM 8 para .51(c) Fitted as Std – See MM 7.24 Fitted as Std – See MM 8.15 Fitted as Std – See MM 8.17
91.511	Night VFR Instruments and Equipment	<i>Operational Requirement – Compliance as applicable</i>
91.517	IFR Instruments and Equipment	N/A – Not Instrument Flight Rules approved
91.519	IFR Communication and Navigation Equipment	N/A – Not Instrument Flight Rules approved
91.523 Emergency Eqpmt.	(a) More Than 10 pax - First Aid Kits per Table 7 - Fire Extinguishers per Table 8 (b) > 20 pax - Axe (c) > 61 pax - Portable Megaphone	N/A – Less than 10 passenger seats N/A – Less than 10 passenger seats N/A – Less than 20 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	Not fitted as standard
91.533	Oxygen for Non-Pressurised Aircraft	Not required for agricultural operations
91.541	SSR Transponder and Altitude Reporting Equipment	<i>Operational Requirement – Compliance as applicable</i>
91.543	Altitude Alerting Device - Turbojet or Turbofan	N/A – piston-powered aircraft
91.545	Assigned Altitude Indicator	N/A – Not Instrument Flight Rules approved
A.15	ELT Installation Requirements	<i>To be determined on an individual aircraft basis</i>

Civil Aviation Rules Part 137 - Subpart F - Instrument and Equipment

PARA:	REQUIREMENT:	MEANS OF COMPLIANCE:
137.255	Seating and Restraints – Shoulder harness required	CAM 8 paragraph .52(c)
137.257	Additional Instruments – Slip indicator required	<i>To be determined on an individual aircraft basis</i>
137.259	Additional equipment	See Appendix D compliance statements
	Appendix B – Overload Weight Determination (See Grumman American Report G164B-13)	G-164B design load factor is 4.2 – Max Recommended Weight Increase per Appendix B Fig.2 is 135% ➤ For MCTOW of 4500 lb, Ag Operating Weight = 6075 lb. ➤ For MCTOW of 5200 lb, Ag Operating Weight = 7020 lb.
	Appendix D – Instruments and Equipment Airworthiness Design Standards	
D.1	Seating and Restraints – Ultimate fwd inertia load of 12g	G-164B already accepted as meeting equivalent NZCAR C.3 para 2.2.1 requirement. 3000 lb. Hooker harness fitted to ZK-WTA
D.2	Hopper permitted maximum load	Established by Advanced Aero Engineering at 1930 lb.
D.3	Hoppers and spray tanks – 12g fwd/1.5 rear/1.0 sideways	Substantiated by Approval DER – See fax dated 18 October 2001
D.4	Hopper upper level contents – Indication, density allowance	Hopper has viewing port visible in the cockpit
D.5	Jettison gear – 80% of maximum load in 5 seconds – simple to operate, single action required	Statement provided by D.Riddell that liquid spray hopper dump time for 80% of contents was 5 seconds or less
D.6	Markings/Placards – hopper or tank maximum loadings – representative jettison times – pax location, flight limitations	See fax certification from AAE Ltd dated 23-10-01 for hopper load and jettison time placarding – N/A single seat – Per TCDS

Modifications

G-164B s/n 039B was fitted with a number of STCs. Because the CAM 8 approval standard is different to the type acceptance basis they are not acceptable technical data in accordance with Part 21 Appendix D. Following a review of the approval standards used the following STCs were approved by the issue of the airworthiness certificate in accordance with CAR §21.79:

STC SA3645SW – S & R Aircraft Inc – Widened Fuselage Hopper (“Fat-Cat”)

FAA 8110-3 provided indicated this modification was only substantiated to CAM 8. However the DER provided a statement that at the CAM 8 weight of 6075 lb. the aircraft certified under the STC meets the aftward 1.5g and sideward 1.0g requirements of CAR Part 137 Appendix D.3(b).

STC SA001353CH – Turbine Conversions Ltd – Install M601E-11/Avia VJ8.510 (“Tiger Pack”)

Accepted on the basis of an FAA 8110-3 provided by STC holder certifying compliance by a Structures and Powerplant DER that the conversion met specified FAR 23 paragraphs.

They also provided a statement that the engine mount and lug have an infinite fatigue life.

STC SA5923SW – Hershey Flying Service Inc – Centre Line Vertical Fin Mod. (G164B+ std)

STC SA2226CE – Hershey Flying Service Inc – Tall Tail Modification (G164B+ standard)

STC SA431CH – Hershey Flying Service Inc – Replacement (HFS) Gear Legs (G164B+ standard)

STC SA00711CH – Hershey Flying Service Inc – Heavier (5480) Tail Spring (G164B+ standard)

The above four STCs have been accepted on the basis they are an upgrade to an FAA-approved configuration. However the applicant was advised the MTOW could not be increased to the G164B+ standard except with a specific approval.

STC SA2254CE – Hershey Flying Service Inc – Replacement Airfoil Wing Tips

STC SA1754GL – Hershey Flying Service Inc – Aileron Servo Tabs

STC SA3077WE – Hershey Flying Service Inc – Elevator Servo Tabs

STC SA00881CH – Hershey Flying Service Inc – Rudder Servo Tab

STC SA2271CE – Hershey Flying Service Inc – 115 Gallon Fuel Kit

STC SA1427CE – Compro Aviation Inc – Drift Finder Smoke Generator

All other mod.s accepted on basis of FAA approval and flight test per CAM 8-10-3(e) with a special purpose load of 2875 lb. (See statement from D. Riddell dated 26-2-2001.)

Attachments

The following documents form attachments to this report:

Photographs First-of-Type example s/n 039B “Fat-Cat” with STC SA001353CH

Three-view drawing Grumman American Model G-164B Ag-Cat

Copy of FAA Type Certificate Data Sheet Number 1A16

Sign off

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David Gill
Team Leader Airworthiness

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Checked – Andrea Wadsworth
Airworthiness Engineer

Appendix 1

List of Type Accepted Variants:

<i>Model:</i>	<i>Applicant:</i>	<i>CAA Work Request:</i>	<i>Date Granted:</i>
G-164A	AC 21-1.2/NZCAR Part 21 Appendix A(c)		
G-164B-20T	AC 21-1.2/NZCAR Part 21 Appendix A(c)		
G-164B (up to s/n 549B)	Griffin Ag-Air Limited	2/21B/3	21 October 2001
G-164B (s/n 0660B up)	Kairanga Aviation Limited	15/21B/12	28 November 2014