Type Acceptance Report

TAR 7/21B/12

GULFSTREAM 200

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Executive Summary

New Zealand Type Acceptance has been granted to the Gulfstream 200 Series based on validation of CAAI Type Certificate A6IL. 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(b).

1. Introduction

This report details the basis on which Type Acceptance Certificate No.7/21B/12 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:	Israel Aerospace Industries Limited (from Dec 3, 2006) Israel Aircraft Industries Limited
TC Holder:	Gulfstream Aerospace L. P. (from March 26, 2002)
Type Certificate:	A6IL
Issued by:	Israel Ministry of Transport – Civil Aviation Administration
Model:	Galaxy (up to serial number 56) Gulfstream 200 (serial number 57 and on)
MCTOW:	34850 lb. 35450 lb. (Increased weight Mod. 7166) 35650 lb. (Increased weight Mod. 10082)
Max. No. of Seats:	21 (19 passengers and 2 crew)
Noise Standard:	FAR Part 36, including Amendments 36-1 through 36-21

Engine: Pratt & Whitney Canada PW306A

Type Certificate: E-22
Issued by: Transport Canada

3. Type Acceptance Details

The application for New Zealand type acceptance of the G200 was from the type certificate holder, GALP, dated 6 October 2006. The first-of-type example will be serial number 158, to be registered ZK-RGB. The G200 is a twin turbofan medium-size-cabin mid-range (4000 mile) business jet approved to carry up to 19 passengers, although it is normally configured with 8-10 seats typically in a double club arrangement. The G200 is certified for Cat.II landings and RVSM. As part of the validation exercise the CAA sent a certification specialist to visit GALP in Tel Aviv. Based on a typical completed weight of 19,239 and MZFW of 24,000 lb, (payload = 2160 kg) the aircraft operates under NZCAR Part 125 for Air Transport operations. The G200 has an APU, which has been certified as non-essential.

Type Acceptance Certificate Number 7/21B/12 was granted on 17 August 2007 to the Galaxy/Gulfstream 200 based on validation of Israel CAA Type Certificate number A6IL. (The PW306A engine is covered separately under Type acceptance Certificate number 7/21B/35). Specific applicability is limited to the coverage provided by the operating documentation supplied. There are no special requirements for import into New Zealand.

The Galaxy was a development of the Astra SPX using effectively the same wing, with a two-feet span increase at the root and the addition of winglets, mated to an all-new large section (90” diameter) fuselage. Up to serial number 56 was produced by IAI Ltd. The type certificate was purchased by Gulfstream Aerospace in 2002, who set up a company called Gulfstream Aerospace Limited Partnership to hold and manage the type certificate. It was renamed the G200, and continues to be manufactured in Israel under license by IAI. GALP is the Design Authority and has responsibility for configuration control, although IAI provide engineering support. The aircraft is unusual in that the type certificate only defines a particular configuration, which does not include exterior painting of the aircraft and its interior furnishing and passenger provisions. “Green” production aircraft are flown to the US where the interior installation is carried out under individual STC approvals.

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) ICAO Type certificate:

State of Israel MoT/CAA Type Certificate Number A6IL

Israeli CAA Type Certificate Data Sheet A6IL at Revision 10 dated October, 2004
– Model Galaxy approved December 15, 1998
– Model Gulfstream 200 approved December 31, 2001

(2) Airworthiness design requirements:

(i) Airworthiness Design Standards:

The certification basis of the G200 is FAR Part 25 effective Feb 1, 1965, including Amendments 25-1 through 25-82. This is an acceptable certification basis in accordance with NZCAR Part 21B Para §21.41 and Advisory Circular 21-1A, as FAR 25 is the basic standard for Transport Category Airplanes called up under Part 21 Appendix C. Two special conditions were imposed, and six findings of equivalent safety made. (One ESF and an Exemption were granted related to the cabin interior installed under an STC.) These have been reviewed and accepted by the CAA. There are no non-compliances and no additional special conditions have been prescribed by the Director under §21.23. The G200 has been shown to meet the certification requirements of §25.801 for ditching and §25.1419 for icing.

(ii) Special Conditions:

FAA Special Condition 25-ANM-106 High Altitude Operations – For operations up to 45,000 feet the FAA imposes special conditions where the certificated altitude exceeds human physiological limits. These included requirements for cabin structural integrity, ventilation, air conditioning, pressurisation and oxygen system equipment and supply.

FAA Special Condition 25-ANM-112 High Intensity Radiated Fields – Electrical and electronic systems which perform critical functions must be designed and installed to ensure their operation and capability is not adversely affected when the aircraft is subjected to external HIRF.

(iii) Equivalent Level of Safety Findings:

Equivalent Safety Finding §FAR 25.1203(a) Turbine Tailpipe Fire Detection – FAA issue Paper P-1 – The hydraulically-operated thrust reverser assembly on the Galaxy also acts as the turbine tailpipe, and does not incorporate the required fire detection. IAI had to show compensating design features which minimised the number of potential ignition sources and limited the amount of flammable fluid (hydraulic) which could leak into the tailpipe.

Equivalent Safety Finding §FAR 25.1305 & 1501(b) APU Instrumentation and Monitoring Requirements – FAA Issue Paper P-6 – The need for some of the required instrument displays can be obviated if the automatic fault detection/shutdown features of the APU duplicate the actions that would be taken by crew in the event of an APU fault or limit exceedance.

Equivalent Safety Finding §FAR 25.901 etc Digital Display of N2 – FAA Issue Paper P-8 – For a digital-only display IAI had to show the visibility, relative location, criticality and functionality of the design does not require any of the benefits of a traditional display. (Gives better indication of rapid transients, closeness to limit and parameter level, rate of change and direction.) This was aided by the automatic functions of the engine FADEC system.

Equivalent Safety Finding FAR Part 25 Use of 1g Stall Speed – FAA Issue Paper F-1 – IAI elected to use 1-g stall speeds rather than the "traditional" V_{MIN} stall speeds, as reference datum for regulatory compliance. This was to avoid problems with pilot identification of the stall, especially where deterrent buffet or excessively low load factors are developed during stalls to V_{MIN}.

Equivalent Safety Finding FAR Part 25 Rejected Takeoff and Landing Performance Criteria – FAA Issue paper F-4 – IAI used the accelerate-stop distance requirements in NPRM 93-8 in lieu of the current Part 25 sections. These included a 2-second delay time distance margin at the takeoff decision speed and use of brakes at the ultimate wear limit. (The time delay is less stringent, but the wet runway and worn brakes criteria are more stringent.)

Equivalent Safety Finding §FAR 25.933(a)(1)(ii) Thrust Reversers Operation – FAA Issue paper P-9 – Rather than show continued safe flight with the thrust reverser in any possible position IAI showed the design of the system protects against in-flight deployment. As well as a probability-based Systems Safety Analysis IAI had to apply lessons learned from collective Air Transport aircraft fleet experience to take account of maintenance omissions, wear and any other factors which could not be completely accounted for in the original design.

Equivalent Safety Finding §FAR.811/812 Emergency Exit Marker, Locater and Bulkhead/Divider Signs – FAA Issue paper C-1 – The Rules require both exit locator and marker signs, and specific features for more than 10 pax. Smaller signs and combined marker/locater function were accepted by the FAA after evaluation, based on the relatively small G200 cabin size.

Exemption No. 7296A – FAR §25.785(b) Seats & Berths – This was granted in respect of the three-place side-facing divan installed under STC ST09848SC, against the general occupant protection requirements. This was because at the time acceptable means of compliance had not been developed. The exemption specified a set of technical tests and criteria which must be satisfied.

(iv) Airworthiness Limitations:
See Airworthiness Limitations Section of the ICA Publication G200-1001-9

(3) Environmental Certification:

Acoustical Analysis Associates inc Report 1222 – Noise Certification Compliance Report: Galaxy – Revision A released 04-May-1999
AAAI Report 1222 – NCCR: Galaxy – Volume IV, Appendix K (35,450 lb)
AAAI Report 1222 – NCCR: G200 – Volume V, Appendix L (35,650 lb)

IAI was also required to show compliance with FAR Part 34, because this was not part of the original engine certification basis. (See CAAI Issue paper G-3.)

(4) Certification Compliance Listing:

IAI Report 4AS/000/981192 – GALAXY Compliance Check List (CCL)
IAI Report 4AS/090/951608 – GALAXY Basis of Certification

IAI Report 4AS/033/940034 – Galaxy – Certification Loads
Rpt. 4AS/090/950289 – Galaxy Structural Strength Substantiation for Static Loads
IAI Report 4AS/090/950290 – Galaxy Full Scale Static Test Results Evaluation
Rpt. 4AS/032/941775 – Galaxy Damage Tolerance Substantiation Summary Report

(5) Flight manual: CAAI-Approved Gulfstream 200 Airplane Flight Manual
Publication G200-1001-1 – CAA Accepted as AIR 2974

(6) Operating Data for Aircraft:

(i) Maintenance Manual:
Gulfstream G200 Maintenance Library (CD-ROM)
Gulfstream G200 Maintenance Manual P/N G200-1001-06; Cold Weather Operations Manual – Models 1125 Astra, Astra SPX, Galaxy; G200 Fault Isolation Manual; G200 FQMS Troubleshooting; Gulfstream Non-destructive Testing Procedures Manual; G200 Wiring Diagram Manual; Technicians Pocket Guide

(ii) Current service Information:
Service Bulletins; Service Information Letters; Maintenance and Operations Letters

(iii) Illustrated Parts Catalogue:
Gulfstream G200 IPC (on ML CD-ROM)

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

CAA 2171 from Baruch Marom, GALP Airworthiness and Certification Manager

(8) Other information:

Gulfstream G200 Flight Crew Reference Library (CD-ROM)
Volume 1 – AFM; Operational Planning Manual – Publication G200-1001-2
Volume 2 – Pilot's Checklist; Quick Reference Handbook – GAC Document No. GAC-AC-G200-OPS-0003; Maintenance/Operational Placarding Procedures – GAC Document No. G200-1; FAA Master Minimum Equipment List; G200 Performance Handbook – GAC Document No. GAC-AC-G200-OPS-0004

FAA Maintenance Review Board (MRB) Report – Gulfstream G200

Gulfstream Drawing GA228560003 – Emergency Equipment Installation

Gulfstream G200 Product Specification – S/N applicablility:140-149 – Feb 2006

IAI Report 4AS830/016028 – G-200 Electrical Load Analysis for A/C: 143-999
IAI Report 4AS874/020855 – G200 Equipment and Software Configuration
IAI Report 4AS/041/981237 – Safety Assessment Report for Galaxy PW306A Thrust Reverser System Reliability Approach

Gulfstream Report 30-1180017 – Structural Substantiation – Installation of Side Facing Divan Certified for take-off and Landing Use (STC Number ST09848SC)

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	Standard markings confirmed compliant by Gulfstream
B.2	Crew Protection Requirements – CAM 8 Appdx. B # .35	Not Applicable – Agricultural Aircraft only

Appendix C - Air Transport Aircraft - More than 9 Pax

PARA:	REQUIREMENT:	MEANS OF COMPLIANCE:
C.1	Doors and Exits	FAR Part 25 §25.809(b)
C.2.1	Additional Emergency Exits – per FAR 23.807(b) @ 10.5.93	Meets FAR Part 25 Certification requirements
C.2.2	Emergency Exit Evacuation Equipment – Descent means	N/A – Emergency exit is over wing and 2m< from ground
C.2.3	Emergency Exit Interior Marking - Size/self-illuminating	FAR Part 25 §25.811(e), and FAR Part 25 §25.812(b)
C.3.1	Landing Gear Aural Warning - Automatic Flap Linking	FAR Part 25 §25.729(e)

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	Seating and Restraints – Safety belt/Shoulder Harness		FAR Part 25 §25.785	
91.507	Pax Information Signs - Smoking, safety belts fastened		Fitted as Standard – See Product Specification §14.38.3.1	
91.509 Min. VFR	(1) ASI (2) Machmeter (3) Altimeter (4) Magnetic Compass (5) Fuel Contents (6) Engine RPM (7) Oil Pressure	FAR §25.1303(b)(1) FAR §25.1303(c)(2) FAR §25.1303(b)(2) FAR §25.1303(a)(3)) FAR §25.1305(a)(2) FAR §25.1305(c)(3) FAR §25.1305(a)(4)	(8) Coolant Temp (9) Oil Temperature (10) Manifold Pressure (11) Cylinder Head Temp. (12) Flap Position (13) U/C Position (14) Ammeter/Voltmeter	Not Applicable – Turbojet FAR §25.1305(a)(6) Not Applicable – Turbojet Not Applicable – Turbojet FAR §25.699 FAR §25.729(e) FAR §25.1351 (b)(6)
91.511	Night VFR Instruments and Equipment		All fitted as Standard Equipment – See Product Specification	
91.517	IFR Instruments and Equipment		The Collins Pro-Line avionics system includes as standard: Dual: Honeywell KHF-953; Collins VIR-432; GPS-4000A; VHF-422/4000E; DME-442 – Single Collins`ADF-462	
91.519	IFR Communication and Navigation Equipment			
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		P/N 70002-00 First Aid Kit fitted – See Dwg GA228560003 Emergency Equipment Instl. A352 Halon 1211 FE fitted in cockpit, 100-9750 FE fitted in cabin One D56 crash Axe fitted as standard Not Applicable – Less than 61 passengers	
91.529	ELT - TSO C91a or C126 after 1/4/97 (or replacement)		Artex 110-406 fitted as standard – Meets TSO C91a & C126	
91.531	Oxygen Indicators - Volume/Pressure/Delivery		Fitted as standard	
91.535	Supplemental 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 Above FL250 - Quick-Donning Crew On-Demand Mask - Supplemental O_2 Masks for all Pax/Crew - Supplemental Mask in Washroom/Toilet Above FL300 - Total Outlets Exceed Pax by 10% - Extra Units Uniformly Distributed - Automatically Presented Above FL140 - Manual Means of Deploying Pax Masks		The maximum certificated operating altitude is 45,000 feet. Standard passenger continuous flow oxygen system consists of one Scott 77 cu.ft or 115 cu. ft. cylinder (s/n 68 on) with Pacific Precision Products gauge, plus 5 triple-mask and 2 double-mask oxygen boxes (lavatory and jump seat). One O2 Corp. therapeutic oxygen mask is fitted in the cabin. The pilot's equipment consists of 2x EROS MC10-13-150 oxygen masks and MXP-210-02 smoke goggles. One Essex portable PBE Model MR-10035 is also fitted as standard. The passenger auto-drop mask system operates when cabin altitude exceeds 13,500 ± 500 ft. Can be manually activated. See Product Spec. §14.35 and STC Number ST10025SC-D. System complies with 91.535 (See IAI email dated 21 June from Aharon Yarkoni, Oxygen & Pitot-Static Engineer)	

91.541	SSR Transponder and Altitude Reporting Equipment	Dual Collins TDR-94D Mode S fitted as standard
91.543	Altitude Alerting Device – Turbojet or Turbofan	Fitted as Standard in Collins Proline system
91.545	Assigned Altitude Indicator	N/A – Altitude alerting device fitted
A.15	ELT Installation Requirements	***To be determined on an individual aircraft basis***

Civil Aviation Rules Part 125

Subpart F – Instrument and Equipment Requirements

PARA:	REQUIREMENT:		MEANS OF COMPLIANCE:
125.355	Seating and Restraints		FAR Part 25 §25.785
125.357	Additional Instruments (Powerplant and Propeller)		FAR Part 25 §25.1305
125.359	Night Flight	Landing light, Pax compartment	***Operating Rule – Compliance to be determined by Operator***
125.361	IFR Operations	Speed, Alt, spare bulbs/fuses	***Operating Rule – Compliance to be determined by Operator***
125.361	SE IFR Requirements – If Applicable		Not Applicable – Not a single-engined aeroplane
125.363	Emergency Equipment (Part 91.523 (a) and (b))		***Operating Rule – Compliance to be determined by Operator***
125.365	Public Address and Crew Member Intercom System		Crew Intercom fitted as Standard – Cabin paging system fitted under Cabin Interior STC (ST10301SC-D for s/n 158)
125.367	Cockpit Voice Recorder Appendix B.3 requires TSO C84/C123		Fitted as standard (Universal CVR-30B fitted per Mod.7005 up to s/n 67, CVR-120 fitted per Mod.7252 from s/n 68 on)
125.369	Flight Data Recorder Appendix B.4 requires TSO C124		Honeywell P/N 980-4710-003 meets EUROCAE ED-55, FAR §135.152/ TSO C124a (57 parameters with Mod. 7156 on s/n 36-62, 88 parameters with Mod.7157 on s/n 63 on)
125.371	Additional Attitude Indicator		Fitted as standard – see Product Spec. Illustration 12.6
125.373	Weather Radar – Appendix B.6 requires TSO C63		Collins TWR-840/850 Fitted as Standard
125.375	Ground Proximity Warning System - Appdx B.7 TSO C92		N/A – Superseded by 125.379
125.377	HUMS		Not Applicable – Not a single-engined aeroplane
125.379	Terrain Awareness and Warning System (TAWS) Appendix B.9 requires TSO C151a or b		Honeywell Mk.V EGPWS Class A fitted as standard – Meets JAR OPS.1.1665 and FAR 135.154
125.381	Airborne Collision Avoidance System (ACAS II) Appendix B.10 requires TSO C118/119a or C119b		TCAS II fitted as standard – Meets JAR OPS.1.1668 – Collins TTR-920 fitted on s/n 4-29, TTR-4000 on s/n 30 on

Attachments

The following documents form attachments to this report:

Photographs first-of-type example Gulfstream 200 s/n 158 ZK-RGB
Three-view drawing Gulfstream Aerospace Model Gulfstream 200
Copy of CAAI Type Certificate Data Sheet Number A6IL

Sign off

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David Gill — Checked – Peter Gill AWE3

Team Leader Airworthiness — Date: 17 August 2007

Appendix 1

List of Type Accepted Variants:

Model:	*Applicant:*	*CAA Work Request:*	*Date Granted:*
Galaxy/Gulfstream 200	Gulfstream Aerospace LP	7/21B/12	17 August 2007