OPERATIONAL EVALUATION REPORT

GULFSTREAM GVI

G650, G650ER

GRUPO DE AVALIAÇÃO DE AERONAVES – GAA

BRAZILIAN AIRCRAFT EVALUATION GROUP

AGÊNCIA NACIONAL DE AVIAÇÃO CIVIL

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1 General

1.1 Evaluation Team

1.1.1. First issue team members

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1.2 Acronyms

- AAD – Aeronave de Alto Desempenho
- ADS – Air Data System
- AFM – Airplane Flight Manual
- AGL – Above Ground Level
- ANP – Actual Navigation Performance
- AP – Autopilot
- ASC – Aircraft Service Change
- AT – Autothrottle
- BAAV – Bleed Air Augmentation System
- CCL – Compliance Checklist
- CPCS – Cabin Pressure Control System
- CPDLC – Controller Pilot Data Link Communications
- CRM – Crew Resource Management
- DU – Display Unit
- EASA – European Aviation Safety Agency
- EBHA – Electric Backup Hydraulic Actuator
- EFIS – Electronic Flight Instrument System
- EGPWS – Enhanced Ground Proximity Warning System
- EICAS – Engine Indicating and Crew Alerting System
- EVAS – Emergency Vision Assurance System
- EVS – Enhanced Vision System
- FAA – Federal Aviation Administration
- FANS – Future Air Navigation Systems
- FCS – Flight Control System
- FFS – Full Flight Simulator
- FMS – Flight Management System
- FPA – Flight Path Angle
- FPV – Flight Path Vector
- FSB – Flight Standardization Board (FAA)
- FSTD – Flight Simulator Training Device
- FTD – Flight Training Device
- HPA – High Performance Aircraft
- HUD – Head Up Guidance Display
- IFR – Instrument Flight Rules
- ISI – Independent Standby Instrument
- LIFUS - Line Flying Under Supervision
- LOFT – Line Oriented Flight Training

- LPV – Localizer Performance with Vertical guidance
- MFD – Multi-Function Display
- MDR – Master Difference Requirements
- MFF – Mixed Fleet Flying
- MMEL – Master Minimum Equipment List
- MMO – Maximum Operating Mach Number
- ND – Navigation Display
- ODR – Operational Difference Requirements
- OEB – Operational Evaluation Board (EASA)
- OSD – Operational Suitability Data
- OTD – Other Training Devices
- PBN – Performance-Based Navigation
- PF – Pilot Flying
- PFD – Primary Flight Display
- PIC – Pilot In Command
- PM – Pilot Monitoring
- POI – Principal Operations Inspector
- QRH – Quick Reference Handbook
- RAAS – Runway Awareness Advisory System
- RAT – Ram Air Turbine
- RBAC – Regulamento Brasileiro de Aviação Civil
- RBHA – Regulamento Brasileiro de Homologação Aeronáutica
- RNAV – Area Navigation
- RNP – Required Navigation Performance
- SFD – Standby Flight Display
- SIC – Second In Command
- SMC – Standby Multifunction Controller
- TASE – Training Area of Special Emphasis
- TAWS – Terrain Awareness and Warning System
- TCAS – Traffic Alert Collision Avoidance System
- TCDS – Type Certificate Data Sheet
- TRTO – Type Rating Training Organization
- UPS – Uninterruptible Power Supply
- VMO – Maximum Operating Speed

2 Introduction

2.1 Background

The Gulfstream aircraft G650 is commercially known by GVI.

The evaluation was first conducted by documentation analysis using the information provided by the manufacturer, the determinations of the Flight Standardization Board (FSB) Report Revision 3, issued by the Federal Aviation Administration (FAA) on October 10th, 2014 and of the Operational Suitability Data (OSD) – Flight Crew, issued by the European Aviation Safety Agency (EASA) on December 15th, 2014.

Thereafter, it was arranged a visit in Gulfstream Aerospace Corporation and Flight Safety International in Savannah – GA, in order to perform technical meetings and familiarization flights in G650 and its FFS level D.

The G650ER version is not yet certified in Brazil, however information about its operations are in this report and were obtained in the FSB Report. In case of the G650ER be certified the information provided herein can be revised.

In case more detailed information is required, it is recommended that the FSB Report is consulted.

2.2 Objective

This report presents ANAC collection of results obtained from the operational evaluation of Gulfstream aircraft models G650 and G650ER.

2.3 Purpose

The purpose of this report is to:

a. Define the Pilot Type Rating assigned to the Gulfstream GVI;

b. Define the requirements for training, checking and currency applicable to flight crew for the GVI and functionalities;

c. Provide the Master Differences Requirements (MDR) for crews requiring differences qualification for mixed-fleet-flying;

d. Provide an acceptable Operator Differences Requirements (ODR);

e. Provide information about Flight Simulation Training Device (FSTD) for crew training and checking; and

f. Define the areas of special emphasis during a training program.

2.4 Applicability

This report is applicable to:

a. Brazilian operators of Gulfstream GVI under RBHA 91 or RBAC 135 rules;

b. Approved Training Organizations certified under RBAC 142 (TRTO);

c. Civil Aviation Inspectors (INSPAC) related to safety oversight of Gulfstream GVI; and

d. ANAC Principal Operations Inspectors (POIs) of Gulfstream GVI operators.

2.5 Cancelation

Not applicable.

3 Aircraft Specifics

3.1 Customization of Procedures and Checklists

The manufacturer has developed procedures to be followed in case of abnormal and emergency situations. It is the manufacturer's philosophy to not identify any steps in these procedures as so-called "Memory Items". Yet pilots are expected to perform some of those initial and critical steps without reference to any documentation.

The manufacturer has advised that the following emergency procedures should be initially performed promptly without reference to a checklist:

Rejected Take-off, Engine Failure/Fire after V1, Emergency Descent, Rapid Decompression, AP or AT Uncommanded Disconnect, Engine Exceedance, Overspeed, Stall Protection / Stall Warning Activation, Flight Control Jams, Total Loss of Braking, EGPWS Alert, Windshear Alert, TCAS Alert. In addition, crews are expected to don oxygen masks promptly when appropriate – for example when smoke is detected.

The GAA recommends operators to establish, as part of their SOP's, which steps of these procedures should be initially performed immediately and without reference to a checklist. Pilots, who are to operate this aircraft without the background of an established operator, should be provided adequate guidance at the earliest possible time during their training.

3.2 Forward Observer Seat

The provision of an observer seat is an operator's responsibility.

The forward observer seat evaluated in green aircraft by GAA was a jump seat type representative of the series aircrafts and part of the type certificated design.

The GAA found the jump seat suitable to perform in-flight inspections, complying with RBAC 135.75(b).

3.3 Standby Flight Display (SFD)

The GVI contains a new concept, the Independent Standby Instrument (ISI), referred to as a Standby Flight Display (SFD), which is incorporated into a dual Standby Multifunction Controller (SMC).

Each SMC is located on the glare shield in front of each pilot. The SMC combines the ISI and a menu control system for other system displays. The crew may manually

select the SFD for display on either SMC at any time when it is operationally desirable. In addition, the following conditions will result in the automatic display of the SFD, without additional crew action:

- Loss or Reversion of a PFD
- Electrical Break Power Transfer (in-flight only)
- PFD to MFD conversion after loss of two DU's
- Cross-side SMC failure
- Attitude Miscompare (PFD-to-PFD or PFD-to-SFD or SFD-to-SFD)
- Altitude Miscompare (PFD-to-PFD or PFD-to-SFD or SFD-to-SFD)
- Heading Miscompare (PFD-to-PFD or PFD-to-SFD)
- Airspeed Miscompare (PFD-to-PFD or PFD-to-SFD)
- Unusual Attitudes (greater than ±30 degrees of pitch and/or greater than 65 degrees of roll).

4 Pilot Type Rating

The specific pilot type rating assigned to the Gulfstream GVI is designated "GVI".

Airmen who wish to pursue any specific type rating must comply with the requirements established on subparagraph 61.213(a)(1) of RBAC 61.

Gulfstream Aerospace recognized that the GVI (G650) has many similar or identical systems to related Gulfstream aircraft: the GV-SP (G550/G500) and the GIV-X (G450/G350). Then it was asked the evaluation of a “full” GVI (G650) initial training course which is designed for a pilot with no previous Gulfstream experience and a “shortened” GVI (G650) initial training course.

Enrollment in the GVI “shortened” initial training course is contingent upon the pilot meeting specific prerequisite experience requirements. The GAA evaluated both the full and the shortened courses and found that pilots may be enrolled in the shortened GVI initial course who are type rated in the GV-SP (G550/G500) or the GIV-X (G450/G350) and have at least 150 hours in the GV-SP (G550/G500) or the GIV-X (G450/G350) aircraft within the last 24 months.

The FSB also found that pilots may be enrolled in the shortened GV-SP (G550/G500) or the shortened GIV-X (G450/G350) initial courses who are type rated in the GVI and have at least 150 hours in the GVI aircraft within the last 24 months.

The minimum level of devices used to train pilots in a shortened GVI (G650), GV-SP (G550/G500) or GIV-X (G450/G350) initial course are listed in Appendix 1, “ODR”, of this report.

It is important to note that the GAA did not evaluate, and does not recommend for, any checking credits, currency credits, landing currency credits, or proving test credits between the GVI (G650) and the GV-SP (G550/G500) or between the GVI (G650) and the GIV-X (G450/G350) aircraft.

The GAA recommends the update of ANAC type rating list (Instrução Suplementar – IS 61-004) with the following information:

Table 1 - Pilot Type Rating

X – Type Rating (Aircraft) – Multi Pilot Operation, Multi Engine (all type of engines)				
Manufacturer (1)	**Aircraft (2)**		**RMK (3)**	**Type Rating (4)**
	Model	**Name**		
Gulfstream Aerospace Corporation	Gulfstream VI	G650	AAD D	**GVI**
	Gulfstream VI with PlaneView II Avionics Software Version "Block Point I" (ASC 901)	G650		

*AAD stands for HPA in Portuguese

5 Master Difference Requirements (MDR)

It is applied when there are differences between models which affect crew knowledge, skills, or abilities related to flight safety (e.g., Level A or greater differences) for training, checking and currency, respectively, according to IAC 121-1009.

The Master Difference Requirements matrixes for Gulfstream GVI are shown in tables 2 and 3 below.

5.1 Block Point I

The following MDR is related to the installation of the PlaneView II Avionics Software Version “Block Point I” (ASC 901):

Table 2 - Master Difference Requirements

		From Airplane	
		GVI	GVI with PlaneView II Avionics Software Version “Block Point I” (ASC 901)
To Airplane	GVI	N/A	Not Evaluated
	GVI with PlaneView II Avionics Software Version “Block Point I” (ASC 901)	C*/A/A	N/A

(*) Level C Differences Training refers to initial differences training (see Appendix 4 for further details)

5.2 GV-SP (G550/G500) and GIV-X (G450/G350)

The MDR for aircraft related to the GVI (GV-SP and GIV-X) is shown below. They are a summary of the ODR tables which show the highest level of devices required to train pilots in a shortened GVI (G650) initial course:

Table 3 - Master Difference Requirements

HIGHEST LEVELS OF TRAINING DEVICES REQUIRED

		From Airplane		
		GVI (G650)	GV-SP (G550/ G500)	GIV-X (G450/ G350)
To Airplane	GVI (G650)	N/A	D**	D**
	GV-SP (G550/ G500)	Not Evaluated	N/A	N/A
	GIV-X (G450/ G350)	Not Evaluated	N/A	N/A

** FTD 6 or 7 or FFS A or B

- Training elements outside area of commonality requires FFS C or D.

6 Operator Difference Requirements (ODR)

Each operator of a mixed fleet of Gulfstream GVI shall produce its own ODR, as required by IAC 121-1009.

GIV-X to GVI and GV-SP to GVI, as well as GVI to GIV-X and GVI to GV-SP ODR tables have been found acceptable by GAA for reduced type rating training. They are provided in Appendix 1 and indicate the **minimum** level of training devices that may be used to instruct a pilot in a shortened GVI (G650), GV-SP (G550/G500) or GIV-X (G450/G350) initial course.

These ODR tables may be used by the POI as a reference for approval of an operator with more than one variant in their fleet. However, special attention should be taken, since the tables are generic and therefore may not include items that are applicable to particular operators.

7 Specifications for Training, Checking and Currency

Three courses were evaluated: the Initial Type Rating Training, the Reduced Training and the differences training involving the 'Block Point I' upgrade.

Specifications for Initial and Reduced training, checking and currency are detailed on OEB and FSB Reports mentioned before.

Appendix 2 shows the footprint evaluated for the Initial Type Rating Training, including duration and training devices used.

Similarly, Appendix 3 shows the footprint evaluated for Reduced Training.

7.1 GVI Initial Type Rating Training

7.1.1 Airmen Minimum Experience for Initial Flight Training

Prior experience in multi-engine transport turbojet aircraft and prior knowledge on EFIS, FMS operation and integrated avionics is recommended for initial training on the GVI.

For airmen not having this experience, additional requirements may be appropriate as determined by ANAC Flight Standards Superintendence.

7.1.2 Pre Entry Requirements

- Private pilot license
- Instrument rating
- High altitude training, Theoretical ATPL or equivalent pilot rating.

7.2 Reduced Type Rating Training GIV-X (G450 and G350) to GVI and/or GV-SP (G550 and G500) to GVI

7.2.1 Airmen Minimum Experience for Reduced Training

The provisions for reduced type rating training apply to pilots who are current and qualified on either the GV-SP or the GIV-X and have flown at least **150 hours** in the respective GV-SP or GIV-X aircraft within the **last 24 months**.

7.2.2 Pre Entry Requirements

- Private pilot license

- Valid “GV” type rating (referring to GIV-X or GV-SP)
- Instrument rating
- High altitude training, Theoretical ATPL or equivalent pilot rating.

7.2.3 Training Devices

Training for the areas of commonality as defined in the ODR tables, requires as a minimum, the use of an FTD Level 6 or 7or an FFS Level A or B. Training for elements which are outside the area of commonality requires the use of an FFS Level C or D.

7.3 Seat Dependent Tasks Training

The GAA has found the following seat dependent tasks for the GVI:

a) Head Up Guidance Display (left seat)

b) Enhanced Vision System (left seat)

c) Passenger Oxygen System activation (right seat)

7.4 PBN Operations (Future Air Navigation Systems (FANS) / RNP / ANP / CNS / CPDLC / ADS)

Flight Crews operating aircraft equipped with FANS software should receive appropriate instruction in its general operational functions, appropriate uses for areas of operation, routes, or procedures to be flown. General training should address communications, navigation, and surveillance (CNS) functions covered by FANS, RNP, and ANP. In addition, sufficient training in use of data link communication and Automatic Dependent Surveillance (ADS) to ensure adequate knowledge, skill, and proficiency for flight crews to operate the above system(s) in typical daily operations (requiring their use) should be provided.

7.5 HEAD-UP DISPLAY (HUD)

7.5.1 HUD Training

The GVI is fitted with a HUD as standard equipment and the training in its use is integrated into the type rating course.

Pilot training for HUD must be accomplished in an FFS Level C with a daylight visual display, or an FFS Level D. Each pilot in command must receive a minimum of 3 hours ground school instruction followed by a minimum of 4 hours of FFS training in the left-hand seat of a suitably qualified FFS. An aircraft may be used for in-flight training if

an FFS is not available. In-flight training must consist of a minimum of 4 hours in the left-hand seat.

7.5.2 HUD Training Areas of Special Emphasis (TASE)

The following items must receive special emphasis as specified, during ground and flight training in all referenced training:

Ground training:

- Crew Co-ordination and CRM
- Crew briefings and callouts
- Duties of PF and PM

Flight Training:

- Use of the caged and un-caged mode, especially in crosswind conditions
- Use of the Pitch Limit Indicator (PLI) during windshear and TAWS escape maneuvers
- Approaches using the Flight Path Vector (FPV)
- Misuse of the acceleration cue as a potential Flight Path Angle (FPA)
- Relationship of glide path angle to the airport symbology
- Use of the flare cue during approach and landings
- Recovery from unusual attitude
- TCAS RA
- Take-off performance using the FPA as an aid in meeting the required climb gradient
- Steep turns
- Importance of the ‘design eye position’ indicators in acquiring the full HUD image
- HUD repeater imagery, use and CRM implications

7.5.3 Checking

To ensure pilots do not become ‘HUD dependent’, training and checking should ensure proficiency is also maintained without the use of HUD.

Steep turns are a maneuver designed to exercise pilots' instrument scan and should be performed without the use of the HUD or FPV (on the PFD).

7.6 Enhanced Vision System (EVS)

7.6.1 EVS Prerequisites

Pilots undergoing EVS training must be fully proficient in the use of the HUD.

7.6.2 EVS Training

The GVI is fitted with EVS as standard equipment.

Pilot training for EVS must be accomplished in an FFS Level C with a daylight visual display, or an FFS Level D. Each pilot in command must receive a minimum of 4 hours ground school instruction followed by a minimum of 4 hours of FFS training in the left-hand seat of a suitably qualified FFS. An aircraft may be used for in-flight training if an FFS is not available. In-flight training must consist of a minimum of 2 hours in the left-hand seat.

EVS approaches may be conducted as part of LIFUS. Pilots occupying the right-hand seat should undergo the same theory instruction and a minimum of one departure and two approaches, including one go-around from minima in the FFS or aircraft.

7.6.3 EVS Training Areas of Special Emphasis (TASE)

The following items must receive special emphasis as specified, during ground and flight training in all referenced training courses:

Ground training:

- Crew Co-ordination and CRM
- Crew briefings and callouts including annunciation of published minima and EVS minima
- Transition from EVS imagery to non-EVS imagery, visual conditions
- Use of videos of actual EVS approaches
- Visual anomalies (e.g., "blooming" and "noise")
- Importance of cross-checking HUD presentations against EVS visual scene presentation to enable pilots to recognize malfunctions of the ground-based navigation equipment and improper presentation of elements in the visual scene during an approach

- Use of barometric altitude and/or radio altitude at low heights, including temperature correction if applicable
- Possible lack of obstacle clearance following go-around below normal published minima
- Importance of calibration checks
- Limitations and failure modes
- Duties of PF and PM
- Weather limitations
- Eye level to camera level
- Taxi speed awareness especially in low visibility

Flight Training:

- Crew Co-ordination and CRM
- Crew briefings and callouts including annunciation of published minima and EVS minima
- Transition from EVS imagery to non-EVS imagery, visual conditions. Maximum use should
- be made of videos of actual EVS approaches as seen through the combiner
- Importance of “design eye position” in acquiring the correct EVS image
- Use of the yoke mounted ‘ON/OFF’ switch “clear” mode
- Precision and non-precision approaches in both day and night conditions
- Weather limitations
- Possible obscuration of symbology when EVS image is incorrectly set too bright
- Use of the caged and un-caged modes in crosswind conditions
- Runway lights
- EVS repeater imagery, use and CRM implications
- Limitations and failure modes

7.7 Training Areas of Special Emphasis (TASE)

7.7.1 Ground and Flight Training (all type rating courses)

The following items must receive special emphasis as specified, during ground and flight training in all referenced training courses:

- **Flight Control Modes:**

This aircraft utilizes fly-by-wire flight controls. It is important to thoroughly understand the operation of the aircraft in each of the flight control modes.

This item must be included in initial and recurrent ground and in initial and recurrent flight training.

- **Fan blade out:**

The vibrations caused by the loss of an N1 fan blade are the most severe when the airplane is in the approximate mid-range of the airspeed operating envelope. At normal cruise speeds and altitudes, it is not intuitive to speed up to M_{MO} / V_{MO} when the aircraft is vibrating severely.

This item must be included in initial and recurrent ground and in initial and recurrent flight training.

- **No-flap landing including the effects of wing anti-ice and de-rotation:**

When the anti-ice switches are selected ON, the angle-of-attack protection function schedule changes (due to assumptions in the flight control laws about ice formation on the wings when flaps are less than 10 degrees) and a lower approach speed is achievable. The airplane will have a higher pitch attitude on landing and the nose wheel must be positively lowered to the runway to avoid excessive landing distance. Selection of reverse thrust before nose wheel touchdown may cause a pitch-up and require more nose-down pilot input.

This item must be included in initial ground training and in initial and recurrent flight training.

- **Emergency descent procedure:**

The autopilot may disconnect due to angle-of-attack protection activation if the speed brake is rapidly deployed.

This item must be included in initial ground training and in initial flight training.

- **Overspeed protection:**

Overspeed protection provided by the FCS is designed to prevent the aircraft from exceeding V_{MO}, but not M_{MO} when operating at higher altitudes. This is particularly relevant during an Emergency Descent when the autopilot is not engaged.

This item must be included in initial and recurrent ground and in initial and recurrent flight training.

- **Delayed engine response to full power applications at various altitudes:**

In particular, high altitude stalls and any maneuvers with flaps less than 22 degrees.

This item must be included in initial ground training and in initial flight training.

- **Take-off characteristics**

The importance of not exceeding the commanded pitch attitude during rotation, especially when single-engine, and the importance of appropriate rudder input, particularly after an engine-failure, to avoid pronounced yaw-induced roll.

This item must be included in initial ground training and in initial flight training.

- **Standby Flight Display (SFD):**

The SFD pop-up should be trained during normal and non-normal operations, both in manual selection and automatic display, including in startle scenarios and various phases of flight.

This item must be included in initial and recurrent ground and in initial and recurrent flight training.

- **Flight Management System (FMS):**

Triple FMS failure is a possibility and was observed during the OEB evaluation. Pilots should be trained to handle such events in various phases of flight.

This item must be included in initial and recurrent ground and in initial and recurrent flight training.

- **Nose Wheel Steering (NWS) failure on landing**

NWS may fail upon touchdown as indicated by the amber “Steer by Wire Fail” CAS message. The accompanying aural indication will be inhibited, so the failure may not be readily detected. Tiller steering and rudder pedal controlled NWS will be inoperative. This will require the use of rudder and differential braking to maintain directional control on the runway.

Flight training in a simulator should include:

➢ prior completion of the Airplane Flight Manual (AFM) Before Landing checklist to inhibit the associated aural warning; and

➢ the fault being upon nose wheel touchdown with a 28 knot crosswind. NWS should be restored by following the AFM procedure with the aircraft straight ahead on the runway because improper use of differential braking to turn, whilst taxiing with a free-castering nose wheel could cause damage to the nose wheel if it travels beyond its limits. The simulator should be capable of triggering the malfunction automatically upon nose wheel touchdown and allow crews to clear the fault by following the AFM procedure.

This item must be included in initial and recurrent ground training and initial and recurrent flight training.

7.7.2 Specific Flight Characteristics for training

• All items listed as TASE for flight training

• The first indication of the approach to a stalling angle-of-attack is normally the activation of the stick shaker, but under some circumstances the blue “FCC AOA Limiting” CAS message may appear first.

7.8 ‘Block Point I’ upgrade

It follows the Differences Training, Checking and Currency requirements for pilots transitioning from the basic PlaneView II Avionics Software version to the ‘Block Point I’ upgrade installed with ASC 901 in the Gulfstream GVI (G650).

7.8.1 Prerequisites

Pilots transitioning from the GVI to the GVI PlaneView II Block Point I Avionics Software must be current and qualified on the GVI base aircraft.

7.8.2 Differences Training

Initial transition training requires level C differences training, recurrent training requires differences to be addressed at Level B.

Initial differences training should be performed using any of the following training media: slide / tape presentations, computer-based tutorial instruction, stand-up lectures or video tapes.

7.8.3 Checking, Recent Experience/Currency

There are no specific requirements for checking, recent experience/currency when transitioning to the PlaneView II Block Point I Avionics Software version.

7.9 Special Events Training

Special events training to improve basic crew understanding and confidence regarding aircraft handling qualities, options and procedures as these relate to design characteristics and limitations may include the following:

- recovery from unusual attitudes, including handling qualities and procedures during recovery from an upset condition (e.g., following a wake vortex encounter or loss of control incident);

- manual flight with minimum use of automation, including flight under degraded levels of automation;

- high altitude, high and low speed buffet margins and flight characteristics;

- Controlled Flight Into Terrain (CFIT), TCAS, EGPWS (emphasis on avoidance and escape maneuvers, altitude awareness, TCAS / EGPWS warnings, situational awareness and crew co-ordination, as appropriate).

7.10 Recurrent Training

Recurrent training must be compliant with the Brazilian regulations and include the Training Areas of Special Emphasis as identified in this report.

Recurrent training should incorporate special events training as described in this document on a rotational basis.

7.11 Line Flying Under Supervision (LIFUS) / Familiarization Flights

7.11.1 Purpose of LIFUS / Familiarization Flights

There are a variety of reasons why the GAA may recommend LIFUS / Familiarization Flights.

One or more of the reasons described below may apply:

a. Introduction of new aircraft types or variants;

b. Introduction of new systems (e.g., FMS, ECL, TCAS, HUD);

c. Introduction of new operation (e.g. oceanic, polar or ETOPS operations);

d. Experience for a particular crew position (e.g. PIC, SIC);

e. Post qualification skill refinement (e.g. refining alternate or multiple ways to use particular equipment to increase operating efficiency, operating flexibility, or convenience); or

f. Special characteristics (e.g. mountainous areas, unusual or adverse weather, special air traffic control procedures, non-standard runway surfaces and dimensions, etc.).

NOTE: Nowadays, LIFUS is not foreseen in Brazilian regulations. However, the GAA found technically relevant that these items should be accomplished by the pilot after the regular training, as defined by EASA.

7.11.2 LIFUS following GVI Initial Type Rating Training

In the case of pilots completing the initial type rating for the GVI, a minimum of 8 route sectors LIFUS should be performed, followed by a 2 route sector line check. Operation with and without the use of HUD / EVS in different phases of flight should be addressed.

7.11.3 LIFUS following GVI Reduced Type Rating Training

In the case of pilots completing the Reduced Type Rating Training GIV-X (G450 and G350) to GVI and/or GV-SP (G550 and G500) to GVI, a minimum of 4 route sectors LIFUS should be performed, followed by a 2 route sector line check. Operation with and without the use of HUD / EVS in different phases of flight should be addressed.

Where there is a change of operating conditions or route structure, this should be taken into account and may need additional route sectors to cover these elements.

7.12 Specifications for Checking

Checking must be conducted in accordance with IS 00-002B or revision that comes to succeed it.

The GAA recommends the use of ANAC HPA checkride profile and that the following items should be included in the skill test and proficiency check schedules:

- Precision approach using HUD and EVS;

Note: *See also paragraph 7.5 – HUD*

- LPV approach; and

- Landing from a No-Flap or Non-Standard Flap Approach

Note: *The probability of flap extension failure on the GVI is <u>not</u> extremely remote due to system design. Therefore, demonstration of a no-flap / non-standard flap approach and*

landing during the Pilot Certification or RBAC 135 proficiency check is recommended. When the practical test is conducted in an airplane, verses a simulator, touchdown from a no flap approach is not required and shall not be attempted. The approach should be flown to the point where the inspector or examiner can determine whether a touchdown at an acceptable point on the runway and a safe landing to a full-stop could be made.

7.12.1 Line checks

A line check performed on either GVI variant of PlaneView II Avionics Software is valid for both.

7.13 Specification for Operations of More Than One Type – MFF

Credits for the operation of the GVI together with other type of aircraft have not been evaluated.

7.14 Flight Training in Aircraft

For type rating and checking, full use of a qualified and approved Full Flight Simulator is considered the standard. Flight training in aircraft is considered an exception and should only be permitted according to RBAC 61, RBAC135 and RBHA 91.

7.14.1 Prerequisites

Flight training in aircraft has its limitations with respect to the level and to the extent to which more complex emergency/abnormal situations can be practiced and checked. Therefore, the GAA recommends that flight training in aircraft:

- Should be limited to trainees with previous experience on an equivalent type or category of aircraft; and
- Should be by followed by specific emergency procedures training in an FFS during recurrent type rating training within one year.

7.15 Flight training in FFS

Use of a qualified and approved Full Flight Simulator is considered the standard for GVI flight training.

Flight Simulator training offers excellent opportunities to use both skill training, where a number of maneuvers may be performed in a less time consuming sequence, as well as LOFT which is based on a realistic time-line.

It also allows a controlled, gradual increase in complexity of scenarios and the selection of a variety of conditions.

It is recommended the use of these features to their fullest extend to optimize training.

The graphical simulator is an OTD so it is not qualified by ANAC. However, it was considered suitable and essential to train G650 procedures, scan flow and crew coordination.

7.16 Other Trainings

7.16.1 G650ER

The Gulfstream model GVI with the optional Aircraft Service Change (ASC) 014 installed, which increases the airplane maximum fuel weight capability and thereby increases airplane range, is designated “G650ER”. ASC 014 installation increases the maximum ramp weight to 104,000 lb, the maximum takeoff weight to 103,600 lb and the maximum fuel weight to 48,200 lb. The increased maximum takeoff weight results in revised noise standards data.

The G650ER has an independent Airplane Flight Manual, Quick Reference Handbook, and Performance Handbook.

The G650 and G650ER are assigned the same pilot type rating – “GVI”. Pilots transitioning between the G650 and G650ER should accomplish Level A difference training, which can be accomplished through self-instruction by becoming familiar with the aircraft weight and fuel capacity limitations, and the aircraft Effective Perceived Noise Level data. There are no checking or currency requirements for transitioning between the G650 and G650ER.

8 Compliance to RBHA 91 and RBAC 135

The GAA conducted a documental analysis of the Compliance Checklist with RBHA 91 and RBAC 135 provided by Gulfstream and it was considered satisfactory.

It does not constitute an approval and the compliance with the Brazilian operational regulations must be evaluated during the initial inspections preceding the aircraft registration with Brazilian marks.

The CCL is included in Appendix 5 of this report and can be used as a reference for operations approval.

Regarding the forward observer seat and item 135.75(b), please refer to item 3.2 of this report.

9 Technical Publications

9.1 Master Minimum Equipment List - MMEL

The FAA MMEL shall be used by Brazilian operators as a basis for developing their MEL. These documents are available at FAA website, through the link http://fsims.faa.gov/PublicationForm.aspx.

9.2 Airplane Flight Manual - AFM

The GVI AFM to be approved by GGCP/SAR shall be used by Brazilian operators as a basis for developing their Operator Airplane Operation Manual (AOM).

Appendix 1 – Acceptable Operator Difference Requirements (ODR) Tables

Definitions	ODR Training Level
"**HO**" = Handout	A
"**ST**" = Slide/tape presentations "**TCBI**" = Tutorial computer based instruction "**SU**" = Stand-up Instructors "**VT**" = Video tapes	B
"**ICBI**" = Interactive computer based instruction "**CSS**" = Cockpit system simulators "**CPT**" = Cockpit procedures trainers "**PTT**" = Part task trainers "**FTD 2-5**" = Flight training devices (level 2-5)	C
"**FTD 6-7**" = Flight training devices (level 6-7) "**SIM A-B**" = Simulators (level A or B)	D
NOTES An "X" in an ODR table column indicates that any of the training methods listed for that level are acceptable. If a specific instruction method is specified in an ODR table column, it must be used.	

DIFFERENCE AIRCRAFT: GVI

BASE AIRCRAFT: GIV-X

APPROVED BY

(POI)_____

				TRAINING			
DESIGN	REMARKS	FLT CHAR	PROC CHNG	LVL A	LVL B	LVL C	LVL D
Weights	Max T.O. Weight Increased 25,000 lb	No	No	X			
Airplane Configuration	Body Extension increased 126”	No	No	X			
Airplane Configuration	Wing Tip increased 273”	No	No	X			
Overhead Panel Layout	RAT Test Switch installed	No	Minor		X		
Overhead Panel Layout	EBHA Battery Switch installed	No	Minor		X		
Overhead Panel Layout	UPS Battery Switch installed	No	Minor		X		
Overhead Panel Layout	Continuous Ignition switches combined into single switch and relocated to Overhead Panel	No	Minor	X			
Overhead Panel Layout	Four ADS Probe Heat Switches installed	No	Minor		X		
Overhead Panel Layout	Two Landing Gear Dump Switches installed	No	Minor		X		
Instrument Panel Layout	Standby Flight Instruments located in each SMC	No	Minor			X	
Pedestal Panel Layout	RAT Handle installed	No	Minor		X		
Pedestal Panel Layout	Different Parking Brake Handle	No	Minor	X			

DIFFERENCE AIRCRAFT: GVI

BASE AIRCRAFT: GIV-X

APPROVED BY

(POI)_____

				TRAINING			
DESIGN	REMARKS	FLT CHAR	PROC CHNG	LVL A	LVL B	LVL C	LVL D
Pedestal Panel Layout	RAAS Inhibit Switch installed	No	Minor			X	
Pedestal Panel Layout	FLT CTRL RESET Switch installed	No	Minor			X	
Pedestal Panel Layout	Electric FCS Trim Panel installed	No	Minor			X	
Pedestal Panel Layout	No Emergency STAB switch	No	Minor		X		
Pedestal Panel Layout	No Alternate Flap switch	No	Minor		X		
Pedestal Panel Layout	No Lateral Control switch	No	Minor		X		

Pedestal Panel Layout	No CPCS Panel	No	Minor		X		
Pedestal Panel Layout	No Weather Radar Panel	No	Minor		X		
Cockpit Side Panel	Oxygen Mask different model	No	Minor			X	
Cockpit Side Panel	Pilot and copilot 60 Hz Outlet installed	No	Minor	X			
Cockpit Side Panel	EVAS installed	No	Minor			X	
Cockpit Side Panel	Security System installed	No	Minor	X			
Limitations	Max Takeoff Weight increased from 74,600 lb to 99,600 lb.	No	No	X			
Limitations	Max Landing Weight increased from 66,000 lb to 83,500 lb.	No	No	X			
Limitations	Fuel quantity increased from 29,500 lb to 44,200 lb	No	No	X			
Limitations	Maximum Operating Altitude 51,000 vs. 45,000 feet	No	No	X			
Limitations	Mmo 0.925 vs. 0.880	No	No	X			
Limitations	Different fuel imbalance values	No	No	X			
Limitations	APU and Engine limitations differences.	No	No	X			

DIFFERENCE AIRCRAFT: GVI

BASE AIRCRAFT: GIV-X

APPROVED BY

(POI)_____

TRAINING

SYSTEM	REMARKS	FLT CHAR	PROC CHNG	LVL A	LVL B	LVL C	LVL D
21. Air Conditioning	CPCS Semi Mode on SMC	No	Minor			X	
22. Autopilot	Different interface with flight controls	No	Minor			X	
23. Communications	Minor differences in radio functions	No	Minor		X		
25. Equipment and Furnishing	Different Crew O2 Masks	No	Minor		X		
25. Equipment and Furnishing	EVAS installed	No	Minor		X		
25. Equipment and Furnishing	Security System installed	No	Minor		X		
26. Fire Protection	Minor differences in Fire Protection plumbing	No	Minor		X		
28. Fuel	Heated Fuel Return System installed	No	Minor		X		
28. Fuel	Pressurized Fuel Servicing requires DC Electric Power	No	Minor			X	
28. Fuel	Refueling Panel located on right body fairing and function incorporated into SMC	No	Minor			X	
29. Hydraulic Power	Excessive Hydraulic Fluid Temperature does activate the Engine Hot Warning EICAS	No	Minor		X		
30. Ice & Rain Protection	Ice Detector system classified primary vs. advisory	No	Minor		X		
30. Ice & Rain Protection	Anti-Ice not automatically inhibited below 1500ft	No	Minor		X		
30. Ice & Rain Protection	Closing Manifold Pressure Shutoff Valve does not block Cowl Anti-Ice	No	Minor		X		
31 Instruments	Different Locations	No	Minor		X		
33. Lights	Different locations	No	Minor		X		

DIFFERENCE AIRCRAFT: GVI

BASE AIRCRAFT: GIV-X

APPROVED BY

(POI)_____

				TRAINING			
SYSTEM	REMARKS	FLT CHAR	PROC CHNG	LVL A	LVL B	LVL C	LVL D
34. Navigation	SMC installed	No	Major				X
34. Navigation	No Standby Flight Display (SFD) and Electronic Bearing Distance Indicator (EBDI) combined into Standby Flight Instrument located in each SMC	No	Minor				X
34. Navigation	Weather Radar Control Panel located in SMC	No	Minor		X		
34. Navigation	Predictive Windshear available	No	Signif.				X
34. Navigation	Head-Up (HUD) Display Systems	No	No		X		
35. Oxygen	Different style mask and goggles	No	Minor			X	
36. Pneumatic	Different bleed pressure values	No	Minor	X			
49. APU	Different APUs installed both supplied by Honeywell.	No	Minor		X		
Limitations	Max Takeoff Weight increased from 74,600 lb to 99,600 lb.	No	No	X			
Limitations	Max Landing Weight increased from 66,000 lb to 83,500 lb.	No	No	X			

DIFFERENCE AIRCRAFT: GVI

BASE AIRCRAFT: GIV-X

APPROVED BY

(POI)_____

				TRAINING			
SYSTEM	REMARKS	FLT CHAR	PROC CHNG	LVL A	LVL B	LVL C	LVL D
Limitations	Fuel quantity increased from 29,500 lb vs. 44,200 lb	No	No	X			
Limitations	Maximum Operating Altitude is 51,000 vs. 45,000 feet.	No	No	X			
Limitations	Mmo 0.925 vs. 0 .880	No	No	X			
Limitations	Fuel Imbalance different values	No	No	X			
Limitations	APU and Engine limitations differences.	No	No		X		

DIFFERENCE AIRCRAFT: GIV-X

BASE AIRCRAFT: GVI

APPROVED BY

(POI)_____

				TRAINING			
MANEUVER	REMARKS	FLT CHAR	PROC CHNG	LVL A	LVL B	LVL C	LVL D
None	None	No	No				

DIFFERENCE AIRCRAFT: GVI

BASE AIRCRAFT: GV-SP

APPROVED BY

(POI)_____

				TRAINING			
DESIGN	REMARKS	FLT CHAR	PROC CHNG	LVL A	LVL B	LVL C	LVL D
Weights	Max T.O. Weight 91,000lb increased 8,600 lb	No	No	X			
Airplane Configuration	Body Extension increased 39”	No	No	X			
Airplane Configuration	Wing Tip increased 73”	No	No	X			
Overhead Panel Layout	RAT Test Switch installed	No	Minor		X		
Overhead Panel Layout	EBHA Battery Switch installed	No	Minor		X		
Overhead Panel Layout	UPS Battery Switch installed	No	Minor		X		
Overhead Panel Layout	Continuous Ignition Switches combined into single switch and relocated to Overhead Panel	No	Minor		X		
Overhead Panel Layout	Four ADS Probe Heat Switches installed	No	Minor		X		
Overhead Panel Layout	Two Landing Gear Dump Switches installed	No	Minor		X		
Instrument Panel Layout	Standby Flight Instruments located in each SMC	No	Minor			X	
Pedestal Panel Layout	RAT Handle installed	No	Minor		X		
Pedestal Panel Layout	Different Parking Brake Handle	No	Minor	X			

DIFFERENCE AIRCRAFT: GVI

BASE AIRCRAFT: GV-SP

APPROVED BY

(POI)_____

				TRAINING			
DESIGN	REMARKS	FLT CHAR	PROC CHNG	LVL A	LVL B	LVL C	LVL D
Pedestal Panel Layout	RAAS Inhibit Switch installed	No	Minor	X			
Pedestal Panel Layout	FLT CTRL RESET Switch installed	No	Minor			X	
Pedestal Panel Layout	Electric FCS Trim Panel installed	No	Minor			X	
Pedestal Panel Layout	No Emergency Stab Switch	No	Minor		X		
Pedestal Panel Layout	No Spoiler Control Switch	No	Minor		X		
Pedestal Panel Layout	No CPCS Panel	No	Minor		X		

Pedestal Panel Layout	No Weather Radar Panel	No	Minor		X		
Cockpit Side Panel	Oxygen Mask different model	No	Minor			X	
Cockpit Side Panel	Pilot and copilot 60 Hz Outlets installed	No	Minor	X			
Cockpit Side Panel	EVAS installed	No	Minor			X	
Cockpit Side Panel	Security System installed	No	Minor		X		
Limitations	Max Takeoff Weight increased from 91,000 lb to 99,600 lb.	No	No	X			
Limitations	Max Landing Weight increased from 75,300 lb to 83,500 lb.	No	No	X			
Limitations	Fuel quantity increased from 41,300 lb to. 44,200 lb	No	No	X			
Limitations	Mmo 0.925 vs. 0.885	No	No	X			
Limitations	APU and Engine limitations differences.	No	No	X			

DIFFERENCE AIRCRAFT: GVI

BASE AIRCRAFT: GV-SP

APPROVED BY

(POI)_____

				TRAINING			
SYSTEM	REMARKS	FLT CHAR	PROC CHNG	LVL A	LVL B	LVL C	LVL D
21. Air Conditioning	CPCS Semi mode on SMC	No	Minor			X	
22. Autopilot	Different interface with flight controls	No	Minor		X		

DIFFERENCE AIRCRAFT: GVI

BASE AIRCRAFT: GV-SP

APPROVED BY

(POI)_____

				TRAINING			
SYSTEM	REMARKS	FLT CHAR	PROC CHNG	LVL A	LVL B	LVL C	LVL D
23. Communications	Minor differences in radio functions	No	Minor			X	
25. Equipment and Furnishing	Different Crew O2 Masks	No	Minor		X		
25. Equipment and Furnishing	EVAS installed	No	Minor		X		
25. Equipment and Furnishing	Security System installed	No	Minor		X		
26. Fire Protection	Minor differenced in Fire Protection plumbing	No	Minor		X		
28. Fuel	Pressurized Fuel Servicing requires DC Electric Power	No	Minor			X	
28. Fuel	Refueling Panel located on right body fairing and function incorporated into SMC	No	Minor			X	

30. Ice & Rain Protection	Ice Detector system classified primary vs. advisory	No	Minor		X		
30. Ice & Rain Protection	Anti-ice not automatically inhibited below 1500 ft	No	Minor		X		
31. Instruments	Different locations	No	Minor		X		
33. Lights	Different locations	No	Minor		X		
34. Navigation	SMC installed	No	Major				X
34. Navigation	Standby Flight Display (SFD) and Electronic Bearing Distance Indicator (EDBI) combined into Standby Flight Instrument located in each SMC	No	Minor				X
34. Navigation	Weather Radar Control Panel located in SMC	No	Minor		X		
34. Navigation	Predictive Windshear available	No	Signif.				X
34. Navigation	Head-Up (HUD) Display Systems	No	No		X		
35. Oxygen	Different style mask and goggles	No	Minor			X	
36. Pneumatic	Different bleed pressure values	No	Minor	X			
49. APU	No BAAV installed	No	Minor		X		
Limitations	Max Takeoff Weight increased from 91,000 lb to 99,600 lb.	No	No	X			
Limitations	Max Landing Weight increased from 75,300 lb to 83,500 lb.	No	No	X			
Limitations	Fuel quantity increased from 41,300 lb vs. 44,200 lb	No	No	X			
Limitations	APU and Engine limitations differences.	No	No	X			

DIFFERENCE AIRCRAFT: GVI

BASE AIRCRAFT: GV-SP

APPROVED BY

(POI)_____

				TRAINING			
MANEUVER	REMARKS	FLT CHAR	PROC CHNG	LVL A	LVL B	LVL C	LVL D
None							

Appendix 2 – Footprint - GVI Initial Type Rating Training

Day 1	Day 2	Day 3	Day 4	Day 5
Manuals **CRM** **Systems** (7:00)	**Flight Planning** **Systems** (7:00)	**Systems** (7:00)	**Systems** (7:00)	**Pre-Flight** **Systems** (7:00)
Day 6	**Day 7**	**Day 8**	**Day 9**	**Day 10**
Systems (7:00)	**Systems** (7:00)	**Systems** (7:00)	**Systems** (7:00)	**Mass & Balance** **Performance** **Systems** (7:00)
Day 11	**Day 12**	**Day 13**	**Day 14**	**Day 15**
Systems (7:00)	**Systems** (7:00)	**Review** **TKE** (7:00)	**FFS 1** (7:00)	**FFS 2** (7:00)
Day 16	**Day 17**	**Day 18**	**Day 19**	**Day 20**
FFS 3 (7:00)	**FFS 4** (7:00)	**FFS 5** (7:00)	**FFS 6** (7:00)	**FFS 7** (7:00)
Day 21				
LST – FFS (5:50)				

Notes:

FFS: Full Flight Simulator (FFS Level C or D); FFS times INCLUDE time for briefing and de-briefing; FFS Training and the LST are performed in a multi-pilot environment

TKE: Technical Knowledge Examination

LST: Licence Skill Test

Daily training time is dependent upon the progress, and the needs, of the student and may exceed 8 hours.

Supplemental Training Modules (if required) must be completed prior to attending this course.

Appendix 3 – Footprint - GVI Reduced Type Rating Training

Day 1	Day 2	Day 3	Day 4	Day 5
Manuals **CRM** **Systems** (8:00)	**Systems** (8:00)	**Pre-Flight** **Windshear** **Systems** (8:00)	**Systems** (7:00)	**Systems** (6:00)
Day 6	**Day 7**	**Day 8**	**Day 9**	**Day 10**
Systems (8:00)	**Mass & Balance** **Performance** **Flight Planning** **Systems** **TKE** (8:00)	**FFS 1** (5:50)	**FFS 2** (5:50)	**FFS 3** (5:50)
Day 11	**Day 12**	**Day 13**		
FFS 4 (5:50)	**FFS 5** (5:50)	**LST – FFS** (6:50)		

Notes:

FFS: Full Flight Simulator (FFS Level C or D); FFS times INCLUDE time for briefing and de-briefing; FFS Training and the LST are performed in a multi-pilot environment

TKE: Technical Knowledge Examination

LST: Licence Skill Test

Daily training time is dependent upon the progress, and the needs, of the student and may exceed 8 hours.

Supplemental Training Modules (if required) must be completed prior to attending this course.

Appendix 4 – Planeview II Avionics Software version with 'Block Point I' upgrade installed with ASC 901

The PlaneView II Avionics Software version 'Block Point I' upgrade will be installed in all Gulfstream GVI (G650) airplanes from S/N 6001 to S/N 6093 via Aircraft Service Change (ASC) 901 and as standard equipment in S/N 6094 and subsequent. It includes the following functions (in alphabetical order):

- Alternate Flight Plan Performance Predictions;
- Automatic Dependent Surveillance – Broadcast, transmit only (ADS-B Out);
- Automatic Navigation Preview of ILS Approaches;
- Circling Approaches in Navigation Approach Database;
- Control of Waypoint Crossing Time during Cruise Phase of Flight;
- Delete the Flight Plan FROM Waypoint;
- EGPWS Mode 5 ("Glideslope") Alerting for LPV Approaches;
- Engine-out Drift Down Distance and Altitude Depiction;
- Flight Plan Route Depiction on Vertical Situation Display (including terrain and vertical weather radar depiction with respect to the flight plan route);
- FMS Automated Speeds for All Flight Phases and Airplane Configurations;
- FMS Crossing Points: Equal Time Point (ETP), Point of No Return (PNR);
- FMS Redundancy Management Modification;
- Increased Flight Plan Waypoint Capacity: 200 Waypoints;
- Main Entry Door Emergency Switch Access Door on DOORS Synoptic;
- Navigational RNP for each Leg Segment of Instrument Approach Retrieved from Navigation Database;
- Planned and Optimal Step Climbs;
- Polar Operations (above 89° latitude);
- Range and Time to Reserve Fuel Quantity Remaining;
- RNAV RNP 0.1 Navigation Capability[1];

- Secondary Flight Plan;
- Subsequent Flight Plan Leg Course Depiction on HSI during Waypoint Transition (‘Ghost Pointer’);
- Temperature Compensation for FMS Flight Plan Altitudes;
- Undo Direct-To Flight Plan Waypoint;
- ‘Vectors to Final’ Approach Course Intercept; and
- Vertical Direct-To Waypoint Altitude.

Notes:

[1] RNAV RNP AR approach capability authorization will be acquired separately.

Appendix 5 – Compliance Check List with RBHA 91 and RBAC 135

RBHA 91	Effective March, 2012	Project: G650	
ITEM	**TITLE**	**COMPLIANCE**	**APPLICANT REMARKS**
91.9 (b)	Flight Manual – Available on board	Operator's Responsibility	AFM is provided by Gulfstream
91.9 (c)	Aircraft identified in accordance with the standards RBHA 45	Operator's Responsibility	Gulfstream will paint to specifications
91.9 (d)	Takeoff or landing at a heliport constructed over water.	Not Applicable	
91.21	Portable electronic devices.	Operator's Responsibility	
91.107 (a)(3)	Seat or berth with a safety belt and shoulder belts.	Operator's Responsibility	Gulfstream installs seat belts in cabin as part of cabin STC
91.109 (a)	Dual Controls	Compliant	Standard equipment
91.171	VOR equipment check for IFR operations.	Operator's Responsibility	
91.189	Category II and III operations: General operating rules.	Not Applicable	G650 is not certified for Category II operations
91.191	Category II and Category III manual.	Not Applicable	G650 is not certified for Category II operations
91.193	Certificate of authorization for certain Category II operations	Not Applicable	G650 is not certified for Category II operations
91.203 (a)(2)	Flight manual and checklist;	Operator's Responsibility	
91.203 (d)	Certificate of Airworthiness for newly manufactured aircraft.	Compliant	FAA CofA is on airplane after production acceptance. ANAC CofA to be placed on airplane after ANAC validation
91.203 (f)	Operation with a fuel tank installed inside the passenger compartment.	Not Applicable	
91.203 (g)	No person may operate a civil airplane (domestic or foreign) into or out of an airport in Brazil unless it complies with the fuel venting and exhaust emissions requirements of RBAC 34.	Compliant	FAA TCDS states compliance with 14 CFR Part 334
91.205 (b)(1)	Airspeed indicator for each pilot required;	Compliant	Standard equipment
91.205 (b)(2)	Altimeter for each pilot required;	Compliant	Standard equipment
91.205 (b)(4)	A magnetic direction indicator (compass);	Compliant	Standard equipment
91.205 (b)(5)	Tachometer for each engine.	Compliant	Standard equipment
91.205 (b)(6)	Oil pressure gauge for each engine using pressure system.	Compliant	Standard equipment
91.205 (b)(7)	Temperature gauge for each liquid-cooled engine.	Not Applicable	
91.205 (b)(8)	Oil temperature gauge for each air-cooled engine.	Compliant	Standard equipment
91.205 (b)(9)	Torque gauge and gases temperature gauge for each engine and turbine as applicable;	Compliant	Standard equipment - N1, N2 and TGT are provided

91.205 (b)(10)	Rotation rotor gauge for each main engine	Compliant	Standard equipment - N1, N2 and TGT are provided
91.205 (b)(11)	Manifold pressure gauge for each altitude engine.	Not Applicable	
91.205 (b)(12)	Fuel gauge indicating the quantity of fuel in each tank.	Compliant	Standard equipment
91.205 (b)(13)	Landing gear position indicator, if the aircraft has a retractable landing gear.	Compliant	Standard equipment
91.205 (b)(15)	Approved safety belt	Compliant	Gulfstream installs seat belts in cabin as part of cabin STC
91.205 (b)(16)	Approved shoulder belts on every front seat;	Compliant	Standard equipment
91.205 (b)(17)	An emergency location transmitter, if required by that regulation 91.207;	Compliant	Standard equipment
91.205 (b)(18)	Shoulder Harness	Compliant	Standard equipment
91.205 (b)(19)	For rotorcraft built after September 16, 1992, a shoulder belt for each seat;	Not Applicable	
91.205 (b)(20)	Fire extinguisher portable accessible to the members of the crew flight;	Compliant	Standard equipment
91.205 (b)(21)	For hydroplanes and amphibious aircraft, at least one anchor and one drogue.	Not Applicable	
91.205 (b)(22)	VHF, bilateral radio-communication	Compliant	Standard equipment
91.205 (b)(23)	Anti-collision lights	Compliant	Standard equipment
91.205 (c)(1)	Instruments and equipment specified in paragraph (b) of this section being all the instruments adequately illuminated	Compliant	Standard equipment
91.205 (c)(2)	a gyroscopic attitude indicator (artificial horizon);	Compliant	Standard equipment
91.205 (c)(3)	Approved position lights	Compliant	Standard equipment
91.205 (c)(4)	Approved anti-collision light	Compliant	Standard equipment
91.205 (c)(5)	Landing lights	Compliant	Standard equipment
91.205 (c)(6)	An adequate source of electrical energy for all installed electrical and radio equipment.	Compliant	Standard equipment
91.205 (c)(7)	One spare set of fuses, or three spare fuses of each kind required, that are accessible to the pilot in flight	Not Applicable	Circuit breakers used in lieu of fuses
91.205 (c)(9)	At least one equipment of radio navigational appropriate to each ground station to be used, when flying in controlled area;	Compliant	Standard equipment
91.205 (d)(1)	Instruments and equipment specified in paragraph (b) of this section, and, for night flight, instruments and equipment specified in paragraph (c) of this section.	Compliant	Standard equipment
91.205 (d)(2)	a VHF system of radio-communication bilateral and at least one equipment of navigation appropriate to the each ground station to be used, including phones (or loudspeakers) and microphones associates;	Compliant	Standard equipment

91.205 (d)(3)	Gyroscopic rate-of-turn indicator for each pilot required	Not Applicable	3rd attitude indicator installed in lieu of turn needle
91.205 (d)(4)	Slip-skid indicator for each required pilot	Compliant	Standard equipment
91.205 (d)(5)	Sensitive altimeter adjustable for barometric pressure for each pilot required;	Compliant	Standard equipment
91.205 (d)(6)	a heating system of "pitots" of the anemometric systems;	Compliant	Standard equipment
91.205 (d)(7)	a clock displaying hours, minutes and seconds, sweep second pointer or digital presentation for each pilot required	Compliant	Standard equipment
91.205 (d)(8)	Generator of adequate capacity.	Compliant	Standard equipment
91.205 (d)(9)	Gyroscopic pitch and bank indicator (artificial horizon) for each required pilot	Compliant	Standard equipment
91.205 (d)(10)	Gyroscopic direction indicator (directional gyro or equivalent) for each required pilot	Compliant	Standard equipment
91.205 (d)(11)	a vertical speed indicator for each pilot required.	Compliant	Standard equipment
91.205 (e)	Flight at and above 24,000 ft. MSL (FL 240). DME	Compliant	Standard equipment
91.205 (f)	Category II operations. Required equipment and instruments	Not Applicable	G650 is not certified for Category II operations
91.205 (g)	Category III operations. Required equipment and instruments	Not Applicable	
91.207 (a)(1)	There is attached to the airplane an approved automatic type emergency locator transmitter…	Compliant	Standard equipment
91.207 (a)(2)	For operations other than those specified in paragraph (a)(1) of this section, there must be attached to the airplane an approved personal type or an approved automatic type	Compliant	Standard equipment
91.207 (b)	Each emergency locator transmitter required by paragraph (a) of this section must be attached to the airplane in such a manner that the probability of damage to the transmitter in the event of crash impact is minimized. Fixed and deployable automatic type transmitters must be attached to the airplane as far aft as practicable.	Compliant	Standard equipment
91.207 (f)	Paragraph (a) of this section does not apply to--	Title Only	
91.207 (h)	Each ELT on board of an aircraft registered in Brazil must meets the requirements of section 91.225 of this regulation.	Compliant	Standard equipment
91.207 (i)	From 01 of January of 2007 any new ELT to be installed in airplane registered in Brazil it must possess the frequencies of 121.5 and 406 MHz…	Compliant	Standard equipment
91.211 (b)	Pressurized cabin aircraft.	Compliant	Cockpit has oxygen and oxygen masks as standard equipment. Passenger oxygen system installed as part of cabin STC
91.213 (a)	List of minimum equipment and instruments for operation.	Operator's Responsibility	FAA approved MMEL is provided
91.215	ATC transponder and altitude reporting equipment and use.	Compliant	Standard equipment

91.217 (b)	The equipment was tested and calibrated to transmit altitude data corresponding within 125 feet of the indicated or calibrated datum of the altimeter normally used to maintain flight altitude,	Operator's Responsibility	
91.217 (c)	Unless the altimeters and digitizers in that equipment meet the standards of TSO-C10b and TSO-C88, respectively.	Compliant	Standard equipment
91.219	Altitude alerting system or device: Turbojet-powered civil airplanes.	Compliant	Standard equipment
91.221 (a)	All airspace: Brazil-registered civil aircraft. Any traffic alert and collision avoidance system installed in a Brazil - registered civil aircraft must be approved by the Administrator.	Compliant	Standard equipment
91.221 (c)	(Airspace RVSM (Reduced Vertical Separation Minimum). Notwithstanding the provide one in paragraph (b) of this section, when operating an aircraft in airspace RVSM, no person can shall have ACAS system on and operating unless this system is of type ACAS II (TCAS II, type 7.0).	Compliant	Standard equipment - Type 7.1 installed
91.221 (d)	Aircraft transport category configured with more than 30 seats, that they have received its first one Airworthiness Certified (independent of the issuer country) in or after 01 of January of 2008, must be equipped with a system ACAS II (TCAS II, type 7.0 or superior).	Not Applicable	
91.221 (e)	Aircraft transport category configured with more than 30 seats, that they have received its first one Airworthiness Certified (independent of the issuer country) in or after 01 of January of 2010, must be equipped with a system ACAS II (TCAS II, type 7.0 or superior).	Not Applicable	
91.223	Terrain awareness and warning system. (EGPWS)	Compliant	Standard equipment
91.223 (a)	Airplanes manufactured after December 31, 2003....	Compliant	Standard equipment
91.223 (b)	Airplanes manufactured on or before January 01, 2004....	Not Applicable	
91.223 (c)	Airplane Flight Manual. The Airplane Flight Manual shall contain appropriate procedures	Compliant	
91.225	All the electronic equipment on board required by this regulation and the RBHA 121 and 135 that they receive and/or they transmit radio signals of/to control systems stations of air traffic, meteorology and searchs and rescue must comply with norms and specifications established by Department of Control of Airspace (Departamento de Controle do Espaço Aéreo – DECEA).	Compliant	Standard equipment
91.409 (a)	Inspections.	Title Only	
91.409 (a)(1)	Annual Maintenance Inspection (AMI) in accordance with RBHA 43.	Operator's Responsibility	
91.409 (a)(2)	Initial survey to obtain an airworthiness certificate in accordance with RBHA 21	Operator's Responsibility	

91.409 (b)	100 hrs Inspection	Operator's Responsibility	
91.409 (c)	Paragraphs (a) and (b) of this section shall not apply to	Operator's Responsibility	
91.409 (d)	Progressive inspection.	Operator's Responsibility	
91.409 (e)	Large airplanes (to which part 125 is not applicable), turbojet multiengine airplanes, turbo-propeller-powered multiengine airplanes, and turbine-powered rotorcraft.	Operator's Responsibility	
91.409 (f)	Selection of inspection program under paragraph (e) of this section.	Operator's Responsibility	
91.409 (f)(1)	An inspection program for continued airworthiness...	Operator's Responsibility	
91.409 (f)(2)	A program of inspections.	Operator's Responsibility	
91.409 (f)(3)	A current inspection program recommended by the manufacturer.	Operator's Responsibility	Gulfstream provides MSG-3 compliant maintenance program
91.409 (f)(4)	Any other inspection program approved by DAC	Operator's Responsibility	
91.409 (g)	Inspection program approved under paragraph (e) of this section.	Operator's Responsibility	
91.409 (h)	Change an inspection program to another.	Operator's Responsibility	
91.410 (a)	Limitation on number of cycle / aircraft.	Not Applicable	
91.410 (b)	Instructions for maintenance and inspection of fuel tank system.	Not Applicable	
91.411 (a)	Testing and inspection static pressure system according to RBHA 43 appendix E.	Operator's Responsibility	
91.411 (b)	The tests required by paragraph (a) of this section must be conducted by the manufacturer	Operator's Responsibility	Airplane is delivered new compliant with 91.411(b)
91.413 (a)(2)	Use an ATC transponder	Operator's Responsibility	
91.413 (b)(3)	The tests and inspections specified in this section must be conducted by— the manufacturer of the aircraft	Operator's Responsibility	
91.503	Flying equipment and operating information	Operator's Responsibility	AFM provides required performance information and all required checklists
91.505	Familiarization with operational limitations and emergency equipments	Operator's Responsibility	
91.507	Equipment requirements: night VFR operations	Operator's Responsibility	Airplane is delivered compliant with the requirements
91.509	Survival equipment for overwater operations	Operator's Responsibility	Airplane is delivered compliant with the requirements
91.511	Radio communication equipment appropriate to the facilities	Operator's Responsibility	Airplane is delivered compliant with the requirements
91.513	Emergency equipment	Operator's Responsibility	Airplane is delivered compliant with the requirements
91.517 (a)	Passenger Information	Operator's Responsibility	Airplane is delivered compliant with the requirements

91.517 (b)(c)(d)(e)	Passenger Information	Operator's Responsibility	
91.519	Oral Instructions to Passengers	Operator's Responsibility	
91.521	Shoulder harness	Compliant	
91.523	Hand Luggage	Not Applicable	
91.525	Carriage of cargo	Operator's Responsibility	
91.527	Operating in icing conditions	Operator's Responsibility	
91.533	Flight attendant requirements	Not Applicable	
91.537	RVSM	Operator's Responsibility	
91.603	Aural speed warning device	Operator's Responsibility	Airplane is delivered compliant with the requirements
91.605	Transport category civil airplane weight limitations	Operator's Responsibility	AFM provies all required performance
91.607	Emergency exits for airplanes carrying passengers for hire	Operator's Responsibility	Airplane is delivered compliant with the requirements
91.609	Flight data recorders and cockpit voice recorders	Operator's Responsibility	

RBAC 135	Project: G650		
ITEM	**TITLE**	**COMPLIANCE**	**APPLICANT REMARKS**
135.75 (b)	Observer seat in the compartment of the pilots	Compliant	Jump Seat installation is standard equipment
135.83 (a)(2)	Emergency cockpit checklist	Operator's Responsibility	Checklists are available in AFM/QRH
135.83 (a)(5)	Performance data on one engine inoperative climb	Operator's Responsibility	Performance data available in AFM/OPM
135.83 (c)	Contents checklist of emergency:	Operator's Responsibility	Checklists are available in AFM/QRH
135.87 (a)	Carried in an approved cargo rack, bin, or compartment	Operator's Responsibility	Class B cargo compartment aft of secondary pressure bulkhead
135.87 (b)	Secured by an approved means	Operator's Responsibility	Class B cargo compartment aft of secondary pressure bulkhead
135.87 (d)	Means to prevent articles of baggage stowed under it from sliding under crash impacts	Operator's Responsibility	Class B cargo compartment aft of secondary pressure bulkhead
135.87 (e)	Cargo compartments requiring physical entry of a crew member.	Operator's Responsibility	Class B cargo compartment aft of secondary pressure bulkhead. AFM has appropriate procedures for fighting a fire.
135.89 (a)	Unpressurized aircraft.	Operator's Responsibility	Airplane may be operated unpressurized
135.89 (b)	Pressurized aircraft	Operator's Responsibility	Airplane is equipped with crew and passenger oxygen system when delivered completed to the operator
135.93	Autopilot: Minimum altitudes for use.	Operator's Responsibility	Limitations stated in the AFM
135.111	Second in command required in category II operations	Operator's Responsibility	Minimum crew is pilot and copilot
135.113	Passenger occupancy of pilot seat	Operator's Responsibility	Minimum crew is pilot and copilot
135.127(a)	The operator shall not permit anyone or flight crew member to smoke in an aircraft operated under this RBAC.	Operator's Responsibility	
135.127(b)	No smoking Illuminated sign or placard	Operator's Responsibility	
135.127(c)	Lavatory	Operator's Responsibility	
135.127(d)	Obstruct, shut down or destroy a smoke detector installed in the lavatory.	Operator's Responsibility	
135.128(a)	Approved seat or bed, with individual seat belts.	Operator's Responsibility	
135.129	Exit seating	Operator's Responsibility	

135.143(c)	ATC transponder equipment	Compliant	Standard equipment
135.145	Flights Operational Evaluation	Operator's Responsibility	
135.147	Dual controls required.	Compliant	Standard equipment
135.149(a)	Sensitive altimeter	Compliant	Standard equipment
135.149(b)	Heating or deicing equipment for each carburetor	Not Applicable	
135.149(c)	Artificial horizon - the third indicator	Compliant	Standard equipment
135.150	Public address and crewmember interphone systems.	Not Applicable	
135.151	Cockpit voice recorders.	Compliant	Standard equipment
135.152	Flight recorders.	Compliant	Standard equipment
135.152a	Recorder Digital Flight Data for Aircraft with 10-19 seats.	Compliant	Standard equipment
135.153	Ground proximity warning system.	Compliant	Standard equipment
135.154(a)(1)	Airplanes with turbine engines with 10 or more seats for passengers	Compliant	Class A TAWS is Standard Equipment
135.154(a)(2)	Airplanes with turbine engines with 6-9 passenger seats	Compliant	Class A TAWS is Standard Equipment
135.154(b)	Airplane manufactured on or before January 1, 2004	Not Applicable	G650 was manufactured after January 1, 2004
135.154(c)	Airplane Flight Manual.	Compliant	
135.155	Fire extinguishers: Passenger-carrying aircraft.	Compliant	Appropriate fire extinguishers are installed during completion process.
135.157(a)	Unpressurized aircraft.	Compliant	Crew oxygen is standard equipment. Cabin oxygen system is installled during the completion process.
135.157(b)	Pressurized aircraft.	Compliant	Crew oxygen is standard equipment. Cabin oxygen system is installled during the completion process.
135.158	Pitot heat indication systems.	Compliant	Standard equipment
135.159(a)	A gyroscopic rate-of-turn indicator	Not Applicable	3rd attitude indicator installed in lieu of turn needle
135.159 (b)	A slip skid indicator	Compliant	Standard equipment
135.159 (c)	A gyroscopic bank-and-pitch indicator.	Compliant	Standard equipment
135.159 (d)	A gyroscopic direction indicator.	Compliant	Standard equipment

135.159 (e)	A generator or generators able to supply all probable combinations of continuous in-flight electrical loads for required equipment and for recharging the battery	Compliant	Standard equipment
135.159 (f)(1)	An anti-collision light system;	Compliant	Standard equipment
135.159 (f)(2)	Instrument lights	Compliant	Standard equipment
135.159(g)	Continuous electrical load in flight	Compliant	Standard equipment
135.161(a)	Radio equipment for bilateral communications	Compliant	Standard equipment
135.161(b)	Radio navigation equipment	Compliant	Standard equipment
135.163(a)	Required a vertical speed indicator for each pilot.	Compliant	Standard equipment
135.163(b)	A free-air temperature indicator;	Compliant	Standard equipment
135.163(c)	A heated pitot tube for each airspeed indicator;	Compliant	Standard equipment
135.163(d)	A power failure warning device	Compliant	Standard equipment
135.163(e)	An alternate source of static pressure	Compliant	Standard equipment
135.163(f)	For a single-engine aircraft:	Not Applicable	
135.163(g)	For multi-engine aircraft, at least two generators or alternators each of which is on a separate engine	Compliant	Standard equipment
135.163(h)	Two independent sources of energy for gyroscopic instruments	Compliant	Standard equipment
135.165(a)	The reaction plane with 10 or more passenger seats, or engine airplane in an additional operation.	Compliant	Standard equipment
135.165(b)(1)	A transmitter;	Compliant	Standard equipment
135.165(b)(2)	Two microphones;	Compliant	Standard equipment
135.165(b)(3)	Two headphones or an earpiece and speaker;	Operator's Responsibility	Airplane is delivered with 2 headsets and 2 speakers
135.165(b)(4)	A marker beacon receiver	Compliant	Standard equipment
135.165(b)(5)	Two independent receivers for navigation;	Compliant	Standard equipment
135.165(b)(6)	Two independent receivers for communications, and	Compliant	Standard equipment
135.165(b)(7)	An additional transmitter.	Compliant	Standard equipment
135.165(b)(8)	Helicopters in offshore operations, if required, a marine VHF.	Not Applicable	
135.167(b)	Liferafts	Compliant	Required safety equipment is installed as part of the cabin STC.
135.167(c)	Emergency locator transmitter fixed to one of the boats.	Operator's Responsibility	

135.167(d)	Helicopters operating in fixed or floating platforms.	Not Applicable	
135.169(a)	Operation of a large airplane.	Operator's Responsibility	
135.169(b)	Operation of a small plane with a conventional engine or turboprop, with 10 passenger seats or more.	Not Applicable	
135.169(c)	Small plane with a passenger configuration of 10 seats or more.	Not Applicable	
135.169(d)	Cargo or baggage compartments:	Operator's Responsibility	
135.169(e)	Reports of conversions and reconfigurations (retrofit.)	Operator's Responsibility	
135.170	Materials for compartment interiors.	Compliant	Material installed per cabin STC meets requirements.
135.171(a)	The reaction plane or having 10 passenger seats or more	Compliant	Standard equipment
135.173	Airborne thunderstorm detection equipment requirements.	Compliant	Standard equipment
135.175	Airborne weather radar equipment requirements.	Compliant	Standard equipment
135.177	First Aid Kit	Not Applicable	
135.178(a) to (f)	Additional emergency equipment.	Not Applicable	
135.178(g)	Exterior exit markings. Each passenger emergency exit and the means of opening that exit from the outside must be marked on the outside of the airplane. There must be a 5 cm(2-inch) colored band outlining each passenger emergency exit on the side of the fuselage. Each outside marking, including the band, must be readily distinguishable from the surrounding fuselage area by contrast in color. The markings must comply with the following:	Compliant	Paint applied during the completion process is compliant
135.178(g)(1)	If the reflectance of the darker color is 15 percent or less, the reflectance of the lighter color must be at least 45 percent.	Compliant	Paint applied during the completion process is compliant
135.178(g)(2)	If the reflectance of the darker color is greater than 15 percent, at least a 30 percent difference between its reflectance and the reflectance of the lighter color must be provided.	Compliant	Paint applied during the completion process is compliant
135.178(g)(3)	Exits that are not in the side of the fuselage must have the external means of opening and applicable instructions marked conspicuously in red or, if red is inconspicuous against the background color, in bright chrome yellow. Additionally, when the opening means for such an exit is located on only one side of the fuselage, a conspicuous marking to that effect must be provided on the other side. “Reflectance” is the ratio of the luminous flux reflected by a body to the luminous flux it receives.	Not Applicable	

135.180	Traffic Alert and Collision Avoidance System.	Compliant	Standard equipment
135.183(a)	Operating at an altitude required to achieve land in case of engine failure;	Operator's Responsibility	AFM provides all required data for compliance
135.183(c)	Multi-engined aircraft - maximum weight	Operator's Responsibility	AFM provides all required data for compliance
135.183(d)	Helicopter equipped with flotation device	Not Applicable	
135.361 to 135.399	Applicability	Operator's Responsibility	AFM provides all required data for compliance
135.421(a)	Type certificated aircraft with a configuration of 9 seats for passengers or less	Operator's Responsibility	Gulfstream provides MSG-3 compliant maintenance program
135.421(b)	Manufacturer's maintenance program		Gulfstream provides MSG-3 compliant maintenance program
135.421(c)	Single-engine airplane used in operations under IFR passenger transport	Not Applicable	
135.421(d)	Single-engine airplane used in operations under IFR, carrying passengers...	Not Applicable	
135.421(e)	Single-engine airplane carrying passengers in IFR conditions	Not Applicable	