



OPERATIONAL EVALUATION REPORT

GULFSTREAM AEROSPACE CORPORATION

GVII-G500

GVII-G600

ORIGINAL – MAY 09, 2022

OPERATIONAL EVALUATION REPORT

GVII-G500

GVII-G600

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Revision Record

Revision Nº.	Content	Date
Original	Initial GVII operational evaluation	09 MAY 2022

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Acronyms

14 CFR.....	Title 14 of the Code of Federal Regulations
AC	Advisory Circular
AFCS.....	Automatic Flight Control System
AFM	Airplane Flight Manual
AIC	Aeronautical Information Circular
ANAC	<i>Agência Nacional de Aviação Civil</i> , Brazilian Civil Aviation Authority
ANSP.....	Air Navigation Service Provider
APU.....	Auxiliary Power Unit
AT	Autothrottle
CAS	Crew Alert System
CDL	Configuration Deviation List
DCN	Data Concentration Network
DECEA.....	<i>Departamento de Controle do Espaço Aéreo</i> , Brazilian ANSP
ECL.....	Electronic Checklist
EDM.....	Automatic Emergency Descent Mode
EFB.....	Electronic Flight Bag
EFVS.....	Enhanced Flight Vision System
EGPWS.....	Enhanced Ground Proximity Warning System
EVM	Engine Vibration Monitor
FAA	Federal Aviation Administration
FADEC.....	Full Authority Digital Electronic Control
FBW	Fly-By-Wire
FD	Flight Director
FDOS.....	Flight Deck Observer Seat
FFS	Full Flight Simulator
FIKI.....	Flight Into Known Icing
FMS.....	Flight Management System

FPV	Flight Path Vector
FSB.....	Flight Standardization Board
FSTD.....	Flight Simulation Training Device
FTD	Flight Training Device
HUD	Head-Up Display
ICS.....	Intercom System
IFIS.....	Integrated Flight Information System
LPV.....	Localizer Performance with Vertical Guidance
MDR.....	Master Differences Requirements
MMEL.....	Master Minimum Equipment List
NDZ.....	No Dwell Zone
NM.....	Nautical Mile
NWSS.....	Nose Wheel Steering System
OHPTS.....	Overhead Panel Touch Screen
PF.....	Pilot Flying
RAT	Ram Air Turbine
RBAC.....	<i>Regulamento Brasileiro de Aviação Civil</i> , Brazilian civil aviation regulation
RNP AR	Required Navigation Performance Authorization Required
STC.....	Supplemental Type Certificate
TCAS	Traffic Alert and Collision Avoidance System
TCDS	Type Certificate Data Sheet
V ₁	Takeoff Decision Speed
V _{MCA}	Flaps 20 Minimum Control Speed Air
V _{MCL}	Minimum Control Speed Landing
V _{MO} /M _{MO}	Maximum Operating Limit Speed
WAI.....	Wing Anti-Ice

1. INTRODUCTION

1.1. Background

ANAC operational evaluation of Gulfstream GVII-G500 and GVII-G600 aircraft was conducted by documental analysis using the information provided by the Original Equipment Manufacturer (OEM) and the determinations of the FAA Flight Standardization Board (FSB) Report, revision 2 dated August 27th, 2019. Consultation of the EASA Operational Suitability Data (OSD) – Flight Crew Revision I dated September 25th, 2019 was made for specific subjects.

Additionally, the ANAC Aircraft Evaluation Group took credit of the results of the test flights conducted by ANAC flight test team with the OEM in Savannah, GA – USA from January 31st to February 4th, 2022.

In case more detailed information is required, refer to the FAA FSB Report mentioned above.

1.2. Objective

The objective of this report is to present the results of the ANAC operational evaluation of Gulfstream GVII aircraft.

The content of this report is applicable to operations under the framework of ANAC.

1.3. Purpose

The purpose of this report is to:

- Determine the Pilot Type Rating assigned for the Gulfstream GVII aircraft;
- Recommend the requirements for training, checking and currency applicable to flight crew for the Gulfstream GVII aircraft; and
- Determine operational suitability of Gulfstream GVII aircraft.

1.4. Applicability

This report is applicable to:

- ANAC employees who approve training programs;
- ANAC employees and designees who certify airmen; and
- Aircraft operators and training providers certified/ approved under Brazilian requirements to assist them in developing their flightcrew member training, checking, and currency.

1.5. Cancellation

Not Applicable.

2. PILOT TYPE RATING

The same pilot type rating is assigned to the GVII-G500 and the GVII-G600 and is designated “GVII”.

Table 1 – Gulfstream GVII pilot type rating

Fabricante (Manufacturer)	Aeronave (Aircraft)		Observações (Remarks)	Designativo (Designative)
	Modelo (Model)	Nome (Name)		
GULFSTREAM AEROSPACE CORPORATION	GVII-G500	G500	Relatório de Avaliação Operacional Gulfstream GVII (G500/G600) <i>ANAC Operational Evaluation Report Gulfstream GVII (G500/G600)</i>	GVII
	GVII-G600	G600		

3. RELATED AIRCRAFT

3.1. Related aircraft on same TCDS.

The GVII-G500 has been evaluated as related to the GVII-G600.

3.2. Related Aircraft on Different TCDS.

Not applicable.

4. SPECIFICATIONS FOR PILOT TRAINING

4.1. Airman Experience

Airmen receiving initial GVII training will benefit from prior experience operating multiengine transport turbojet aircraft in accordance with part 91 or 135. Additionally, a working knowledge of systems, such as Automatic Flight Control System (AFCS), autothrottle (AT), flight management system (FMS), Integrated Flight Information System (IFIS), ECL, Electronic Flight Bags (EFB), HUD, highly integrated avionics systems with electronic flight displays, high altitude operations, military, and FMS experience may be necessary to complete the training in a timely manner. Pilots without this experience may require additional training.

4.2. Training Areas of Special Emphasis (TASE)

4.2.1. Pilots must receive special emphasis on the following areas during initial ground training:

- a) Abnormal/emergency guidance. Gulfstream’s philosophy is to not identify any steps in the GVII abnormal or emergency procedures as so-called “memory items.” Pilots are expected to perform some initial and critical steps without reference to any documentation. In addition, pilots are expected to don oxygen masks promptly when appropriate (e.g., when smoke is detected). Operators and training providers should ensure pilots are trained accordingly during initial, transition, upgrade, and recurrent training. The following are examples of procedures that the initial/critical steps should be performed promptly without reference to a checklist:
 - Engine fire/auxiliary power unit (APU) fire.
 - Engine failure after takeoff decision speed (V_1).
 - Cabin pressure low/emergency descent.
 - Engine exceedance.
 - Enhanced ground proximity warning system (EGPWS)/windshear/Traffic Alert and Collision Avoidance System (TCAS) alerts.
 - Sidestick fail.
 - Ground spoilers armed.
 - Brake-by-wire fail (U) (ground procedures).
- b) Crew Alert System (CAS) message philosophy. Must be trained in initial, transition, upgrade, and recurrent training.
- c) Data Concentration Network (DCN). This should include instruction on the system architecture, crew actions, and checklist. This should include training on AFM DCN dispatch limitations that take precedence over Master Minimum Equipment List (MMEL) relief. This item must be included in initial, transition, upgrade, and recurrent training.
- d) Flight control modes. This aircraft utilizes FBW 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, transition, upgrade, and recurrent training.
- e) Zero-flap landing, including the effects of the wing anti-ice on stall protection and approach speeds, high idle thrust, the need to positively fly the nose gear to the runway after main gear touchdown, and the eventual need for seat adjustments due to the unusual pitch up attitude. This item must be included in initial, transition, upgrade, and recurrent training.

- f) Location and proper donning of the smoke goggles. Pilots should demonstrate the proper donning of the oxygen mask and smoke goggles in the classroom, flight simulation training device (FSTD), or aircraft during initial, transition, upgrade, and recurrent training.
- g) Automatic Emergency Descent Mode (EDM). The speedbrakes deploy automatically during EDM and should be allowed to do so. When speedbrakes autodeploy, they do so only after established in the descent when near maximum operating limit speed (V_{MO}/M_{MO}). This item must be included in initial, transition, upgrade, and recurrent training.
- h) Engine operations in icing. Training should include classroom instruction of vibrations, associated odors, and energy management operations with increased idle thrust. This training must be included in initial, transition, upgrade, and recurrent training.
- i) Engine WAI Idle Schedule. This training should include instruction on the flight into known icing (FIKI) idle floor, Full Authority Digital Electronic Control (FADEC) No Dwell Zone (NDZ), thrust balancing logic and NDZ elevated Engine Vibration Monitor (EVM) logic. This training must be included in initial, transition, upgrade, and recurrent training.

4.2.2. Pilots must receive special emphasis on and perform the following areas during flight training:

- a) HUD systems. Relationship between boresight, Flight Path Vector (FPV), flight director (FD), and V-speed awareness band during all engine and single-engine takeoff operations. This item must be included in initial, transition, upgrade, and recurrent training.
- b) Proper takeoff and rotation technique during all HUD and non-HUD operations. This item must be included in initial, transition, upgrade, and recurrent training.
- c) Flight control modes. This aircraft utilizes FBW 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, transition, upgrade, and recurrent training.
- d) EDM. The speedbrakes deploy automatically during EDM and should be allowed to do so. When speedbrakes autodeploy, they do so only after established in the descent when near V_{MO}/M_{MO} . This item must be included in initial, transition, and upgrade training.
- e) Location and proper donning of the smoke goggles. Pilots will demonstrate to an instructor in the FSTD or aircraft, the ability to don their oxygen mask and smoke goggles and establish communication with the other pilot over the Intercom System (ICS). Pilots must don their oxygen masks within 5 seconds. Pilots must don the smoke goggles and establish communication within a reasonable time, such that they can maintain aircraft control and accomplish any necessary smoke removal tasks. Pilots will accomplish this demonstration while wearing any required glasses, as well as a headset. Pilots should be encouraged to practice with or use their personal headset as special techniques may be required to use some headsets with the oxygen mask. This must be accomplished during initial, transition, upgrade, and recurrent training.
- f) Engine operations in icing. Training should include full flight simulator (FFS) demonstration of vibrations, energy management operations with increased idle thrust, and discussion of possible odor. It is not recommended that this training be conducted in an airplane during flight. This training must be included in initial, transition, upgrade, and recurrent training.

- g) Glare shield panels. Glare shield panels must be in place for takeoff and landing at night. Refer to the Configuration Deviation List (CDL). Training in stowing and deploying glare shield panels must be included in initial, transition, and upgrade training.
- h) Nose Wheel Steering System (NWSS). The NWSS is to include rudder pedal authority for both left and right seat. This training must be included in initial, transition, and upgrade training.
- i) Engine WAI Idle Schedule. This training should include instruction on the FIKI idle floor, FAEC NDZ, NDZ thrust balancing logic and NDZ elevated EVM logic. This training must be included in initial, transition, upgrade, and recurrent training. This training must be conducted in a Level 4 flight training device (FTD) or a FFS.
- j) Overhead Panel Touch Screen (OHPTS). Flightcrew members should be exposed to the OHPTS operation in turbulence atmospheric conditions. This item must be accomplished during initial, upgrade, and recurrent training.
- k) Electrical malfunctions leading to the deployment of the RAT. This training must be included in initial, transition, and recurrent training.
- l) EFVS operation. It is recommended that the pilot flying (PF) disables the EFVS system through the dedicated button located on the sidestick as soon as natural visual references with the runway/ approaching lights are achieved. This training must be included in initial, upgrade, and recurrent training.

4.3. Seat Dependent Tasks

- a) HUD (left seat). Initial, upgrade, and recurrent training.
- b) Enhanced flight vision system (EFVS) (left seat). Initial, upgrade, and recurrent training.
- c) Passenger oxygen system activation (right seat). Initial, transition, upgrade, and recurrent training.
- d) NWSS (left seat). Initial, transition, upgrade, and recurrent training.

4.4. Flight Simulation Training Devices (FSTD)

There are no specific systems, procedures, or maneuvers that are unique to the GVII that require a specific FSTD for training.

4.5. Training Equipment

There are no specific systems or procedures that are unique to the GVII that require specific training equipment.

4.6. Differences Training between Related Aircraft

Pilots must receive differences training between the GVII-G500 and GVII-G600.

The levels for differences training are specified in Appendix 2.

5. SPECIFICATIONS FOR CHECKING

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

The probability of flap extension failure on the GVII is not extremely remote due to system design. Therefore, demonstration of a no flap approach and landing is required.

5.2. Seat Dependent Tasks

There are no seat dependent tasks.

5.3. Other Checking Items

- a) Precision approach using HUD and EFVS. Initial and recurrent checking.
- b) Localizer performance with vertical guidance (LPV) approach. Initial checking.

5.4. Flight Simulation Training Devices (FSTD)

There are no specific systems, procedures, or maneuvers that are unique to the GVII that require a specific FSTD for checking.

5.5. Training Equipment

There are no specific systems or procedures that are unique to the GVII that require specific equipment.

5.6. Differences Checking between Related Aircraft.

There are no checking differences between the GVII-G500 and the GVII-G600.

6. SPECIFICATIONS FOR CURRENCY

There are no additional currency requirements for the GVII-G500 or the GVII-G600 other than those already specified in RBAC 61, 91 and 135.

6.1. Differences Currency Between Related Aircraft.

There are no differences currency requirements between the GVII-G500 and the GVII-G600.

7. OPERATIONAL SUITABILITY

The GVII was determined operationally suitable for operations under 14 CFR Parts 91, 125, and 135 by the FAA. No flight was conducted by the ANAC to determine operational suitability of the GVII for operations under the RBAC 91 and 135.

8. MISCELLANEOUS

8.1. Flightcrew Sleeping Facilities (Part 135).

Flight Crew Sleeping Facilities were not evaluated by the ANAC.

The GVII-G600 forward cabin Flightcrew Sleeping Facilities installed by Supplemental Type Certificate (STC) ST-05-2015-0061, has been evaluated and determined by the FAA to meet requirements through the current editions of AC 121-31, Flightcrew Sleeping Quarters and Rest Facilities, respectively and § 135.269(b)(5).

8.2. Flight Deck Observer Seat (FDOS)

FDOS was not evaluated by the ANAC.

The FDOS in the GVII as installed by TCDS T00021AT is part of the type certificated design. The FDOS was evaluated and determined by the FAA to meet the requirements of §§ 125.317(b) and 135.75(b) and the current edition of AC 120-83, Flight Deck Observer Seat and Associated Equipment.

8.3. Aircraft Approach Category

All operators should comply with DECEA publication AIC N07/09 dated 12 Mar 2009 and use an approach category appropriate to the speed of VREF. Air carriers may be further restricted by their operations specifications for circling approaches.

The GVII is considered Category C aircraft for the purposes of determining “straight-in landing weather minima”.

8.4. Normal Landing Flaps

The GVII normal “final flap setting” is flaps 39.

Appendix 1 – MASTER DIFFERENCE REQUIREMENTS (MDR) TABLE

These are the minimum levels of training, checking and currency required, derived from the highest level in the Operator Difference Requirements (ODR) tables in Appendix 2. Differences levels are arranged as training/checking/currency as per ANAC IS 00-007:

		FROM AIRPLANE	
		GVII-G500	GVII-G600
TO AIRPLANE	GVII-G500	---	Not Evaluated
	GVII-G600	A/A/A	---

Differences levels legend:

Level A differences training can adequately be addressed through self-instruction with the use of such methods as issuance of operating manual page revisions, dissemination of operating bulletins, or differences handouts.

Level A differences checking indicates that no check is required at the time of training.

Level A differences currency is common to each aircraft and does not require separate tracking.

Appendix 2 – OPERATOR DIFFERENCE REQUIREMENTS (ODR) TABLES

This Design Differences table, from the GVII-G500 to the GVII-G600, was proposed by Gulfstream and validated by the FAA, with subsequent acceptance by ANAC. It lists the minimum differences levels operators must use to conduct differences training, checking and currency of flightcrew members.

FROM BASE AIRCRAFT: GVII-G500 TO RELATED AIRCRAFT: GVII-G600	DESIGN	REMARKS	FLT CHAR	PROC CHNG	TRAINING	CHECKING	CURRENCY
	Weights	Max zero fuel weight increased from 52,100 lb to 57,440 lb	No	No	A	A	A
	Weights	Max ramp weight increased from 80,000 lb to 95,000 lb	No	No	A	A	A
	Weights	Maximum Takeoff weight increased from 79,600 lb to 94,600 lb	No	No	A	A	A
	Weights	Max landing weight increased from 64,350 lb to 76,800 lb	No	No	A	A	A
	Airplane Configuration	Airplane length increased from 91.13 ft to 96.11 ft	No	No	A	A	A
	Airplane Configuration	Airplane wing span increased from 87.11 ft to 95.00 ft	No	No	A	A	A
	Airplane Configuration	Airplane Height decreased from 25.52 ft to 25.29 ft	No	No	A	A	A
	Limitations	Maximum range at 0.85 Mach increased from 5,200 nautical mile (NM) to 6,500 NM	No	No	A	A	A
	Fuel	Maximum fuel capacity increased from 30,250 lb to 41,500 lb	No	No	A	A	A
	Limitations	Flaps 20 Minimum Control Speed Air (VMCA) changed from 112 to 104	No	No	A	A	A
	Limitations	Flaps 10 VMCA changed from 120 to 108	No	No	A	A	A
	Limitations	Minimum Control Speed Landing (VMCL) changed from 109 to 101	No	No	A	A	A

Appendix 3 – REQUIRED NAVIGATION PERFORMANCE AUTHORIZATION REQUIRED (RNP AR)

RNP AR was not evaluated by the ANAC.

The RNP AR training is defined in ANAC IS 91-001, appendix K. Training must be accomplished during initial, recurrent, transition, or upgrade training prior to conducting RNP AR approaches.

The FAA has determined that RNP AR approach capability installed in the GVII-G500 aircraft is operationally suitable under Title 14 of the Code of Federal Regulations (14 CFR) parts 91, 125, and 135, indicating that it would be also operationally suitable under RBAC 91 and 135.

An operational suitability determination and completion of RNP AR training and checking does not constitute an operational authorization. Operators should reference the current edition of IS 91-001 for RNP AR application preparation and processing.

Appendix 4 – ENHANCED FLIGHT VISION SYSTEM (EFVS) OPERATIONS

EFVS was not evaluated by the ANAC.

Refer to RBAC 91, sections 91.1717 and 91.1719 for EFVS operations requirements. Refer to the current edition of IS 91-011 for: (1) training, recent flight experience, and proficiency requirements for EFVS operations, and (2) EFVS operational authorization application preparation and processing.