

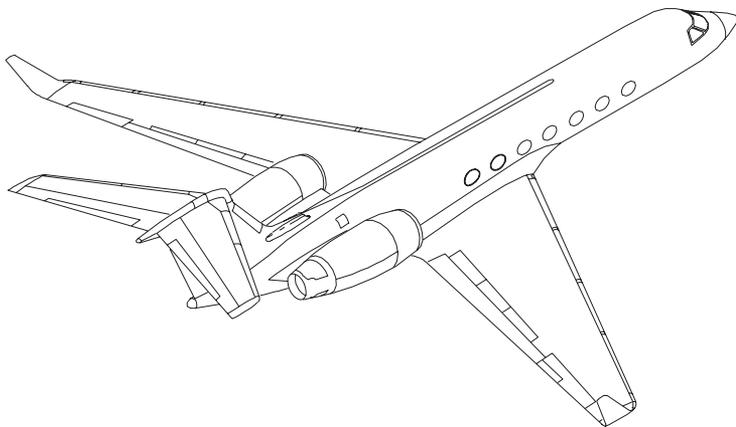
# FLIGHT OPERATIONS

## **JAA Operating Manual Supplement** For GIV, GIV-SP, G400, G300, G350, G450, GV, G500, and G550 Airplanes

**Supplement Number GAC-OMS-02:**  
**Noise Abatement Departure Procedures for**  
**JAA / EASA Operators**

**Basic Issue**  
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**Type: Normal Procedures**



This Operational Information Supplement provides additional procedures, techniques, or information recommended for the operations of the airplanes listed above under normal conditions.

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**Gulfstream**  
**NOISE ABATEMENT DEPARTURE PROCEDURES**  
**FOR JAA / EASA OPERATORS**

**LOG OF REVISIONS**

<b>Rev. No.</b>	<b>Pages Revised</b>	<b>Description of Revision</b>	<b>Date</b>

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## NOISE ABATEMENT DEPARTURE PROCEDURES FOR JAA / EASA OPERATORS

### BACKGROUND

EU-OPS 1.235 requires that operators establish operating procedures for noise abatement during instrument flight operations in compliance with ICAO PAN OPS Volume 1 (Doc 8168-Ops/611). Additionally, the takeoff climb procedures for noise abatement specified for any one airplane type should be the same for all airports. This Supplement applies to all GIV (G300/400), GV, G350/450, and G500/550 airplanes operated under EU-OPS 1.

### INTRODUCTION

This supplement provides operating procedures for noise abatement takeoff and climb procedures. Two noise abatement climb procedures are presented along with considerations for engine failure occurring during takeoff or while in the climb segment. The first procedure which alleviates noise close to the departure airport is referred to as Noise Abatement Departure Procedure 1 (NADP 1). The second procedure which alleviates noise more distant from the departure airport is referred to as Noise Abatement Departure Procedure 2 (NADP 2). Finally, Standard Departure Procedure guidance is offered as an alternative procedure that was demonstrated during certification of the airplanes to which this Supplement applies.

It is the Operator's responsibility to be aware that certain airports require specific noise abatement procedures to be followed which differ slightly from the NADP 1 profile. These airports include but are not limited to LFPO, LFPB, LSGG, LSZH, and URRR. Operators should refer to the appropriate Noise Abatement or Airport Briefing pages in the air navigation manuals for these special procedures.

### OPERATIONAL LIMITATIONS

#### General

- a. Noise abatement procedures based on this Supplement should not be flown if noise benefits cannot be expected.
- b. The pilot-in-command has the authority to decide not to execute a noise abatement departure procedure if conditions preclude the safe execution of the procedure.

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### Takeoff

Noise abatement procedures in the form of FLEX power takeoff should not be required in adverse operating conditions including when the following conditions exist:

- a. Contaminated runway surface conditions including snow, slush, ice, or standing water, or by mud, rubber, oil or other substances.
- b. Surface visibility is less than 1.9 km (1 NM)
- c. Crosswind component, including gusts, exceeds 28 km/h (15 kt)
- d. Tail wind component, including gusts, exceeds 9 km/h (5 kt), and
- e. Windshear conditions have been reported or forecast or when thunderstorms are expected to affect the approach or departure.

**Note:** The use of FLEX (reduced) power for takeoff is permitted with cowl anti-ice selected on for takeoff.

### Departure Climb

The standard airplane operating procedures ensure that safety of flight operations is maintained while minimizing exposure to noise of the ground. The following requirements need to be satisfied:

- a. Noise abatement procedures shall not be executed below a height of 240 m (800 ft) above aerodrome elevation;
- b. The noise abatement procedure specified by an Operator for any one airplane type should be the same for all airports;
- c. To minimize the impact on training while maintaining some flexibility to address variations in the location of noise sensitive areas, sufficient commonality shall exist between the departure procedures specified by the Operator. There will be no more than two departure procedures to be used by one Operator for an airplane type, one of which should be identified as the normal departure procedure, and the other as the noise abatement departure procedure;
- d. Normal departure procedures typically include general noise reduction measures which encompass one of the two examples shown under Noise Abatement Departure Climb Guidance;

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- e. Conduct of noise abatement climb procedures is secondary to the satisfaction of obstacle requirements;
- f. All necessary obstacle data shall be made available to the operator and the Procedure Design Gradient shall be observed;
- g. The power settings to be used subsequent to the failure or shut-down of an engine, or any other apparent loss of performance, at any stage in the take-off or noise abatement climb are at the discretion of the pilot-in-command and noise abatement considerations no longer apply.
- h. The minimum level of thrust for the flap configuration, after power reduction, is defined as the lesser of the maximum climb power and that level necessary to maintain the specified engine inoperative minimum net climb gradient for the flaps configuration of the airplane, in the event of loss of an engine, without a throttle position increase by the pilot in command. The minimum thrust level varies as a function of flap setting, altitude, and airplane weight, therefore, this information must be provided in the aircraft operating manual or airplane flight manual;
- i. The power settings specified in the aircraft operating manual are to take account of the need for engine anti-icing when applicable;
- j. Noise abatement climb procedures are not to be used in conditions where windshear warnings are extant or the presence of windshear or downburst activity is suspected; and
- k. The maximum acceptable body angle specified for an airplane type shall not be exceeded.

**Note:** The flight director system will limit maximum pitch angle to 17 degrees at light weight. (The flight director pitch angle limiting feature does not apply to GIVs equipped with the SPZ-8000 avionics suite. The SPZ-8000 flight director is fixed pitch and can be adjusted to sync to the current pitch angle by using the TCS button on the yoke.) The automatic speed target for takeoff will set the speed at  $V_2$  to  $V_2+10$ . Generally, when normal rotation rates are maintained during takeoff, the speed target will be  $V_2+10$  kt. The flight director will generate pitch targets to maintain the speed target. At light weights, the aircraft will exceed  $V_2+10$  when the flight director limits the pitch target to 17 degrees. It is permissible to exceed the  $V_2+10$  target during the initial climb phase when using this procedure.

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### NOISE ABATEMENT DEPARTURE CLIMB GUIDANCE

#### General

Airplane operating procedures for the take-off climb shall ensure that the necessary safety of flight operations is maintained while minimizing exposure to noise on the ground. The following two examples of operating procedures for the climb have been developed as guidance and are considered safe when the criteria listed above are satisfied. The first procedure (NADP 1) is intended to provide noise reduction for noise sensitive areas in close proximity to the departure end of the runway. The second procedure (NADP 2) provides noise reduction to areas more distant from the runway end.

The two procedures differ by whether the acceleration segment for flap retraction is initiated prior to reaching the maximum prescribed height or initiated at the maximum prescribed height.

**Note:** The indicated airspeed for the initial climb portion of the departure prior to the acceleration segment is to be flown at a climb speed of  $V_2+10$  to 20 kt.

#### Noise Abatement Departure Procedure 1 (NADP 1) – Close In Noise Reduction

This procedure involves a power reduction at or above the prescribed minimum altitude and delaying flap retraction until the prescribed maximum altitude is attained. At the prescribed maximum altitude, accelerate and retract flaps on schedule while maintaining a positive rate of climb and complete the transition to normal en-route climb speed.

The noise abatement procedure is not to be initiated at less than 240 m (800 ft) above aerodrome level.

The use of FLEX (reduced) power takeoff procedure is highly recommended and encouraged whenever takeoff conditions permit. Refer to the FLEX Takeoff Supplement in the AFM for more details. Additionally, the FMS TOLD (Takeoff and Landing Data) function will automatically calculate the airplane performance when the FLEX option is selected in the Takeoff Initialization pages.

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- a. After takeoff from the departure airport, the initial climb speed shall not be less than  $V_2+10$  kt. As noted earlier the automatic speed targets will produce the speed target of  $V_2+10$  kt as a factor of normal rotation rates at any takeoff weight.
- b. On reaching an altitude at or above 240 m (800 ft) above airport level, select MANual under the Guidance Panel Speed window then select climb power by selecting VNAV or FLCH on the Guidance Panel. The autothrottle will then adjust power to the climb rating. Maintain a climb speed of  $V_2+10$  to 20 kt with flaps in the take-off configuration. Should the Standard Instrument Departure Procedure require a turn any time during the departure, maintain a minimum speed of  $V_2+10$  kt while in the turn.

**Note:** The use of VNAV is at the discretion of the PIC. Selecting VNAV has two benefits. The first is that when VNAV is selected, the vertical mode becomes VFLCH. The second benefit is that use of VNAV/VFLCH will ease compliance with published SID altitudes and reduce the probability of altitude excursions when climbing at high rates of climb.

- c. At no more than an altitude equivalent to 900 m (3,000 ft) above airport level, while maintaining a positive rate of climb, deselect MANual under the Guidance Panel Speed window and accelerate and retract flaps on schedule. Limit bank angles to 15 degrees while the flaps are retracting until reaching a speed greater than  $V_{REF}$  on the speed tape.
- d. At 900 m (3,000 ft) above airport level, accelerate to en-route climb speed in the clean configuration.

### **Noise Abatement Departure Procedure 2 (NADP 2) – Distant Noise Reduction**

This procedure involves initiation of flap retraction on reaching the minimum prescribed altitude. The flaps are to be retracted on schedule while maintaining a positive rate of climb. The power reduction is to be performed with the initiation of the first flap retraction or when the zero flap configuration is attained. At the prescribed altitude, complete the transition to normal en-route climb procedures.

The noise abatement procedure is not to be initiated at less than 240 m (800 ft) above aerodrome level.

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The use of FLEX (reduced) power takeoff procedure is highly recommended and encouraged whenever takeoff conditions permit. Refer to the FLEX Takeoff Supplement in the AFM for more details. Additionally, the FMS TOLD (Takeoff and Landing Data) function will automatically calculate the airplane performance when the FLEX option is selected in the Takeoff Initialization pages.

- a. After takeoff from the departure airport, the initial climb speed shall not be less than  $V_2+10$  kt. As noted earlier the automatic speed targets will produce the speed target of  $V_2+10$  kt as a factor of normal rotation rates at any weight.
- b. On reaching an altitude equivalent to at least 240 m (800 ft) above aerodrome level, decrease aircraft body angle/angle of pitch while maintaining a positive rate of climb, retract flaps and accelerate towards VZF (200 kt). Doing so will result in the automatic speed target changing to 200 kt. Select MANual speed then select either VNAV or FLCH on the Guidance Panel. The autothrottle will reduce power to the climb rating. Limit bank angle to 15 degrees while the flaps are retracting until reaching a speed greater than VREF on the speed tape.

**Note:** The use of VNAV is at the discretion of the PIC. Selecting VNAV has two benefits. The first is that when VNAV is selected, the vertical mode becomes VFLCH. The second benefit is that use of VNAV/VFLCH will ease compliance with published SID altitudes and reduce the probability of altitude excursions when climbing at high rates of climb.

- c. Maintain a positive rate of climb and accelerate to and maintain a climb speed of 200 kt until 900 m (3,000 ft) above aerodrome level.
- d. On reaching 900 m (3,000 ft) above aerodrome level, deselect MANual under the Speed window on the Guidance Panel and transition to normal en-route climb speed.

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### ENGINE FAILURE CONSIDERATIONS

#### General

All takeoff performance in the Airplane Flight Manual assumes that an engine fails at or after V<sub>1</sub>. With this in mind, should an engine fail at or after V<sub>1</sub>, the PF should follow the AFM procedures for an engine failure during takeoff.

- a. Maintain directional control.
- b. After a positive rate of climb is established, call for gear retraction.
- c. Climb at V<sub>2</sub> to V<sub>2</sub>+10 kt until a minimum of 450 m (1,500 ft) above the departure airport elevation before commencing the Engine Failure Checklist. Should any turns be required as mandated by ATC for terrain or traffic or as mandated by the Standard Instrument Departure Procedure for terrain clearance or airspace limitations, maintain a minimum speed of V<sub>2</sub> to V<sub>2</sub>+10 kt while in the turn.

#### Engine Failure During an NADP 2 Procedure

Should the engine failure occur during an NADP 2 procedure above 240 m (800 ft) during or after flap retraction, accelerate to V<sub>SE</sub> and continue the climb using either climb power or MCT if necessary to clear obstacles to a minimum of 450 m (1,500 ft) above the departure airport elevation before commencing the Engine Failure Checklist.

### STANDARD DEPARTURE PROCEDURE GUIDANCE

If the operational limitations above preclude the use of either the NADP 1 or 2 procedures, the following guidance is offered. This procedure was developed during the certification process for all of the applicable models and meets noise abatement requirements at most airports.

This procedure involves initiation of flap retraction on reaching the minimum prescribed altitude. The flaps are to be retracted on schedule while maintaining a positive rate of climb. The power reduction is to be performed with the initiation of the first flap retraction. At the prescribed altitude, complete the transition to normal en-route climb procedures.

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## NOISE ABATEMENT DEPARTURE PROCEDURES FOR JAA / EASA OPERATORS

The standard procedure is not to be initiated at less than 120 m (400 ft) above aerodrome level. If turns are required by the Standard Instrument Departure procedure, it is recommended that flap retraction be delayed until the turns are completed and that the minimum speed of  $V_2+10$  kt be maintained during all turns.

The use of FLEX (reduced) power takeoff procedure is highly recommended and encouraged whenever takeoff conditions permit. Refer to the FLEX Takeoff Supplement in the AFM for more details. Additionally, the FMS TOLD (Takeoff and Landing Data) function will automatically calculate the airplane performance when the FLEX option is selected in the Takeoff Initialization pages.

- a. After takeoff from the departure airport, the initial climb speed shall not be less than  $V_2+10$  kt. As noted earlier the automatic speed targets will produce the speed target of  $V_2+10$  kt as a factor of normal rotation rates at any weight.
- b. On reaching an altitude equivalent to at least 120 m (400 ft) above aerodrome level, select VNAV or FLCH on the Guidance Panel while maintaining a positive rate of climb, and accelerate to 200 kt. Doing so will result in the automatic speed target changing to 200 kt and the autothrottle will reduce power to the climb rating. Retract flaps on schedule. Limit bank angle to 15 degrees while the flaps are retracting until reaching a speed greater than  $V_{REF}$  on the speed tape.

**Note:** The use of VNAV is at the discretion of the PIC. Selecting VNAV has two benefits. The first is that when VNAV is selected, the vertical mode becomes VFLCH. The second benefit is that use of VNAV/VFLCH will ease compliance with published SID altitudes and reduce the probability of altitude excursions when climbing at high rates of climb.

- c. Maintain a positive rate of climb and accelerate to and maintain a climb speed of 200 kt until 750 m (2,500 ft) above aerodrome level.
- d. On reaching 750 m (2,500 ft) above aerodrome level, transition to normal en-route climb speed of 250 kt as presented automatically.

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## **APPENDIX A – DEMONSTRATED MANEUVER MARGINS**

During certification, all airplanes covered by this Supplement demonstrated maneuver margins above the stick shaker speed as required by JAR/CS 25.143(g) as noted in the Table A-1 below.

<b>Configuration</b>	<b>Speed</b>	<b>Bank Angle</b>	<b>Power Setting</b>
Takeoff	V <sub>2</sub>	30°	Asymmetric
Takeoff	V <sub>2</sub> +10 kt	40°	All Engines Operating
En Route	V <sub>SE</sub>	40°	Asymmetric
Landing	V <sub>REF</sub>	40°	Symmetric for 3° Flight Path Angle

**Table A-1**

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