



## **OPERATIONAL EVALUATION REPORT**

### **DASSAULT AVIATION FALCON 2000EX EASY (DASSAULT, ICAO F2TH)**

RIO DE JANEIRO, BRAZIL

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**FALCON 2000EX EASY**

**GRUPO DE AVALIAÇÃO DE AERONAVES (GAA)**

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## 1. INTRODUCTION

This report presents ANAC results of the operational evaluation of the Dassault Falcon 2000EX version **F2000EX EASy** and all its related variants: **F2000DX**, **F2000LX**, **F2000LXS**, **F2000S**.

The evaluation was conducted by documentation analysis using the information provided by the manufacturer and the determinations of the Operational Evaluation Board (OEB), Report Revision 18, issued by the European Aviation Safety Agency (EASA) on October 01<sup>st</sup>, 2013.

In case more detailed information is required, it is recommended that the OEB report is consulted.

ANAC used as guidance material the instructions contained in IAC 121-1009.

### 1.1. Purpose

This report:

- Defines the Pilot Type Rating assigned to the Falcon 2000EX EASy;
- Defines the requirements for training, checking and currency applicable to flight crew;
- Provides the Master Differences Requirements (MDR) for crews requiring differences qualification for mixed-fleet-flying;
- Describes the required Flight Simulation Training Device (FSTD) for crew training and checking.
- Provides the compliance statement of the manufacturer that the aircraft complies with the requirements of RBHA 91 and RBAC 135.

### 1.2. Applicability

This report is applicable to:

- Brazilian Operators of Falcon 2000EX EASy under RBHA 91 and RBAC 135 rules;
- RBAC 142 Training Centers;
- Civil Aviation Inspectors (INSPAC) related to safety oversight of these variants;
- ANAC Principal Operations Inspector (POI).

### 1.3. ANAC Responsibility/Authority.

Determinations made in this report are based on the evaluation of the primary authority and it was verified to be in accordance with current Brazilian regulations and guidance. Modifications and upgrades made to the model evaluated, or introduction of new aircraft variants, may require amendment of the findings in this report. ANAC has responsibility and authority to re-evaluate and modify sections of this report based on new advisory material or regulations, aircraft operating experience, or testing of new or modified aircraft.

## 2. SUMMARY AIRCRAFT DESCRIPTION

Falcon 2000EX EASy is a commercial designation for the F2000EX basic model embodied with modification M1691, which installs an Enhanced Avionics System (EASy) based on the Honeywell “Primus EPIC” product line.

Several other variants are derived from the F2000EX EASy through the application of modifications to that variant. These variants are detailed in this section.

For more information on the Falcon 2000EX EASy and its variants the *Type Certificate Data Sheet – TCDS*, issued by ANAC Product Certification Management (Gerência Geral de Certificação de Produto - GGCP), should be consulted.

### 2.1. F2000LX

The F2000LX is a F2000EX EASy fitted with winglets as per modification M2846.

### 2.2. F2000DX

The F2000DX is a F2000EX EASy with reduced fuel tanks capacity from 16730 lbs to 14694 lbs as per modification M3000 and changes to the Fuel Management Computer as per M3001.

Although the DX variant is treated in this report, the DX definition has not been validated by ANAC certification office by the time this report was published.

### 2.3. EASy II Avionic

The variants EX, LX or DX described above may be fitted with the avionic EASy II if modification M3254 is applied to those variants. If that is the case, then those variants are referred to as F2000EX EASy II, F2000LX EASy II, or F2000DX EASy II.

The EASy II avionic allows:

- Correction of some anomalies and introduction of some improvements identified during previous certifications;
- Replacement of obsolete Pentium II processors with more recent Pentium-M processors;
- Capability to integrate new features:
  - o LPV Approaches: Capability to perform LPV approaches using GPS Space-Based
  - o Augmentation Systems such as WAAS;
  - o Baro-VNAV Approach Improvements: temperature compensation of barometric VNAV approaches and VGP mode;
  - o ADS-B Out capability;
  - o I-PFD: integration of ADI and HSI in a single window allowing Synthetic Vision System display;
  - o Synthetic Vision System capability: display of terrain picture as background of the IPFD based on information retrieved from terrain database;
  - o XM graphical weather capability: display of graphical weather data uploaded through the XM radio system;

- CPDLC FANS-1A+ and OCL (Oceanic CLearance) capability;
- CPDLC ATN B1 capability;
- Runway Awareness Advisory System;
- 2nd Electronic Checklist function (for redundancy);
- Redundant Jeppesen Electronic Terminal Charts;
- Addition of circling approaches in FMS database.

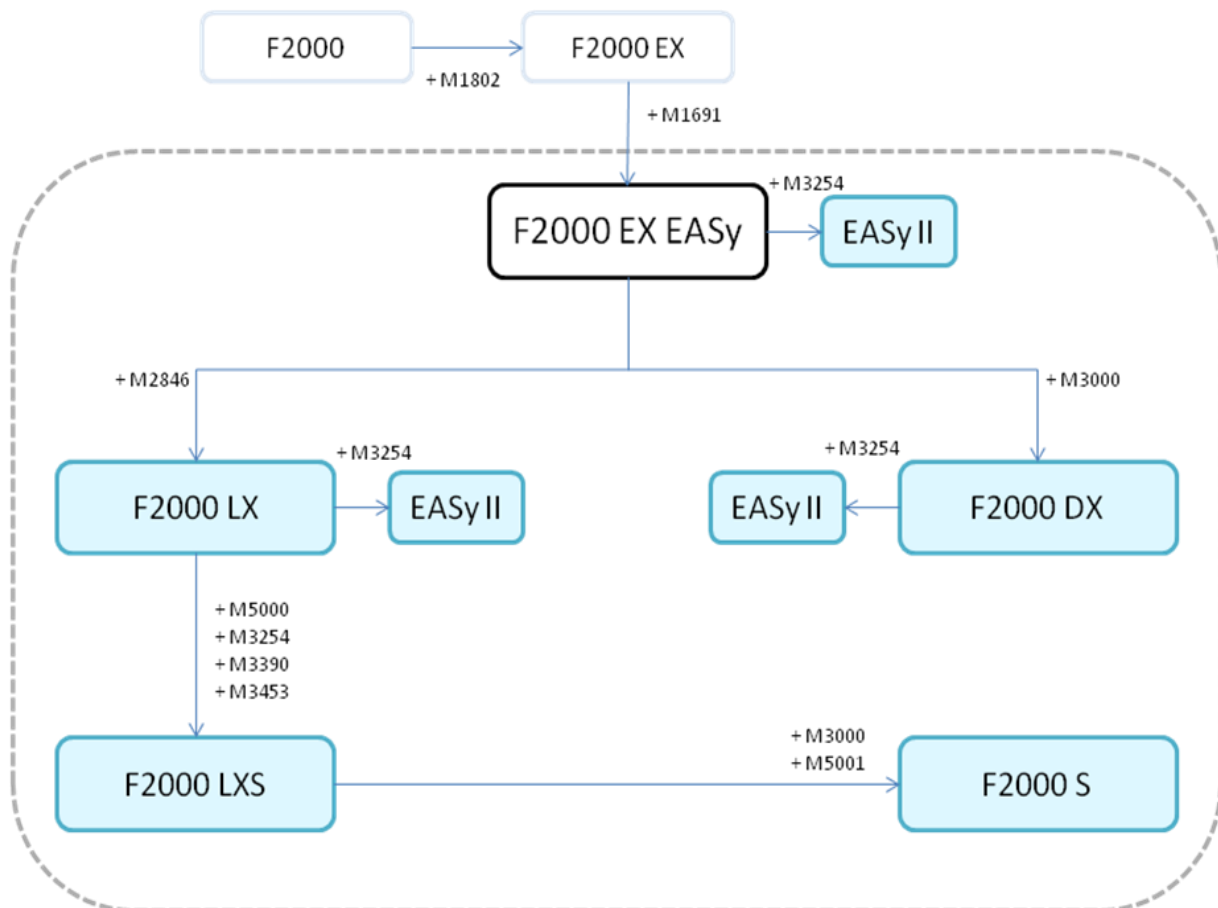
## 2.4. F2000LXS

The F2000LXS is a F2000EX EASy fitted with winglets (M2846), EASy II avionic (M3254), new FADEC software (M3453), increased takeoff weight (M3390) and with movable slats and improved performance (M5000).

## 2.5. F2000S

The F2000S is a F2000EX EASy fitted with some modifications of F2000LXS (M2846, M5000, M3254, M3453) but without increased takeoff weight (M3390) and with the addition of reduced fuel tank capacity (M3000).

The picture below illustrates the relationship between the F2000EX EASy version, its related variants and the modifications which introduce each variant.



### 3. PILOT TYPE RATING

The GAA recommends updating ANAC type rating list as indicated in table 1 below to incorporate the variants **F2000EX EASy**, **F2000DX**, **F2000LX**, **F2000LXS**, **F2000S** and the **EASy II** optional avionic.

**Table 1 – ANAC Type Rating List revision**

X – Habilitação de Tipo (Avião) – Terrestre – Operação Multi Pilot, Multi Engine (Todos os Motores – Continuação)				
FABRICANTE (1)	AERONAVE (2)		OBS (3)	DESIGNATIVO (4)
	MODELO	NOME		ANAC
		Falcon 2000EX	Falcon 2000EX EASy Falcon 2000DX Falcon 2000LX	
	Falcon 2000EX	Falcon 2000EX EASy II Falcon 2000DX EASy II Falcon 2000LX EASy II Falcon 2000LXS Falcon 2000S	D	F2EY

Although a same type rating is established for these variants as shown in column 4, there are considerable differences between them, which need to be addressed by the crew in terms of training, checking and currency. The Master Difference Requirement table presented in section 4 details the level of the differences between the variants.

### 4. MASTER DIFFERENCE REQUIREMENT (MDR)

Master Difference Requirements for variants of the Falcon 2000EX EASy are shown in table 2. These provisions apply when there are differences between variants which affect crew knowledge, skills, or abilities related to flight safety.

Table 2 – Falcon 2000EX EASy MDR

		From Airplane							
		F2000EX EASy	F2000DX	F2000LX	F2000EX EASy II	F2000DX EASy II	F2000LX EASy II	F2000 LXS	F2000S
To Airplane	F2000EX EASy	- / - / -	A/A/A	A/A/A	D/A/B	D/A/B	D/A/B	D/A/B	D/A/B
	F2000DX	A/A/A	- / - / -	A/A/A	D/A/B	D/A/B	D/A/B	D/A/B	D/A/B
	F2000LX	A/A/A	A/A/A	- / - / -	D/A/B	D/A/B	D/A/B	D/A/B	D/A/B
	F2000EX EASy II	D/A/B	D/A/B	D/A/B	- / - / -	A/A/A	A/A/A	B/A/A	B/A/A
	F2000DX EASy II	D/A/B	D/A/B	D/A/B	A/A/A	- / - / -	A/A/A	B/A/A	B/A/A
	F2000LX EASy II	D/A/B	D/A/B	D/A/B	A/A/A	A/A/A	- / - / -	B/A/A	B/A/A
	F2000LXS	D/A/B	D/A/B	D/A/B	B/A/A	B/A/A	B/A/A	- / - / -	A/A/A
	F2000S	D/A/B	D/A/B	D/A/B	B/A/A	B/A/A	B/A/A	A/A/A	- / - / -

## 5. OPERATOR DIFFERENCES REQUIREMENT (ODR)

Each operator of a mixed fleet of Falcon 2000EX EASy and other variants shall produce its own ODR, as required by IAC 121-1009.

## 6. SPECIFICATIONS FOR PILOT TRAINING

This section presents the training courses which were evaluated by EASA and are considered acceptable by ANAC.

### 6.1. Falcon 2000EX EASy, DX and LX Pilot Type Rating Course

The initial pilot type rating course described in this section was evaluated by EASA OEB and ANAC has found it to be compliant with the requirements of RBAC 61 Subpart K, RBAC 135 Subpart H. This course is recommended to be used as a baseline for Falcon 2000EX EASy type rating training.

#### 6.1.1. Pre requisites

To enroll the training program as described in this section the pilot must as a minimum:

- hold a commercial pilot license;
- hold an IFR rating;



- hold a Land Multiengine Class Rating (MLTE) or a type rating of a multiengine aircraft;
- had been approved in the theoretical exam of ANAC Airline Transport Pilot License (PLA); and
- have previous experience with EFIS / FMS operation.

If the pilot does not meet the above pre requisites, additional training should be incorporated in the training program.

#### 6.1.2. Type Rating Base Curriculum

The course is comprised of the ground segment and the flight segment. The base curriculum is outlined in Appendix 1.

The ground segment uses a combination of stand up instruction lessons and Cockpit Procedure Trainer (CPT) sessions. The CPT is a flight training device (FTD) which represents the cockpit environment including the cockpit controls and displays and which simulates the airplane systems in ground and flight operations.

The subjects covered in a stand up lesson should also be trained afterwards in a CPT session, in order to the pilot consolidate the systems architecture and operation using hands on exercises. The overall ground instruction segment shall not be less than 49 hours of instructor lessons and 15 hours for the CPT sessions. In addition, the daily ground instruction duration (instructor lesson plus CPT session) shall not exceed 6 hours.

The flight segment uses two Flight Simulation Training Devices (FSTD): the Fixed Based Simulator (FBS) and the Full Flight Simulator (FFS). The FBS is used in the first session of the flight segment and the FFS is used in the other 7 sessions and in the proficiency check session. The FBS session may also be replaced by a FFS sessions.

More information on the FSTDs can be found in section 10 of this report.

#### 6.1.3. Training Areas of Special Emphasis

The following topics regarding aircraft systems and/or procedures should receive special emphasis in a Falcon 2000EX EASy pilot type rating training course:

- Interpretation and use of the Crew Alerting System (CAS)
- Use of the Electronic Check List (ECL) and the QRHs
- Electrical Systems and associated failures
- Avionics system and associated failures (MAU)

### **6.2. Differences Training: Falcon 2000EX EASy to/from LX or DX**

According to the MDR, the maximum level of differences between the Falcon 2000EX EASy and the LX or DX is A. According to IAC 121-1009, level A corresponds to self instruction. Therefore, the pilot is responsible for reviewing the aircraft manuals to assess the differences between the variants.

### **6.3. Differences Training: Falcon 2000EX EASy, DX or LX to 2000EX, DX or LX installed with EASy II avionic**

According to the MDR, the maximum level of differences between the Falcon 2000EX, DX and LX EASy I and these variants installed with EASy II avionic is D. According to IAC 121-1009, level D

differences is only satisfied by performing the training in a maneuver device to assess the differences between the variants.

### 6.3.1. Pre requisites

The pilot must:

- hold a valid F2EY type rating and be qualified on F2000EX EASy; or
- had successfully completed a full initial type rating training on F2000EX EASy, up to but excluding the check ride.

### 6.3.2. Base Curriculum

The differences training course consists in 4 hours of ground instruction, 3 hours of Cockpit Procedure Trainer and 2 hours of Full Flight Simulator for each crew member.

### 6.3.3. Training Areas of Special Emphasis

The following subjects must receive special emphasis in the differences training course from the F2000EX EASy/DX/LX to F2000EX EASy II/DX EASy II/LX EASy II:

- Use of FPV vertical and lateral displacement in new IPFD design;
- Proficiency in performing ILS/LPV approaches using raw data;
- Use of the FPV in connection with the synthetic vision (terrain, virtual runway);
- Use of the Flight Management Computer Windows;
- DME distance in HUD during LPV approach;
- VNAV mode navigation.

## 6.4. Differences Training: Falcon 2000LX EASy II to/from F2000LXS

According to the MDR the maximum level of differences between the F2000LX EASy II and the F2000LXS is B. IAC 121-1009 establishes that level B training is satisfied with aided instruction to the pilot. The most common type of aided instruction is ground lesson with an instructor.

The prerequisite for the pilot to transition from the F2000LX EASy II to F2000LXS, or the other way back, is to be type rated on the base variant or to have completed the initial type rating training on the base aircraft up to but excluding the check ride.

There is not a base curriculum to recommend for this differences training, however the following aspects must receive special emphasis during the differences training from the base aircraft (F2000LX EASy II) to the candidate aircraft (F2000LXS):

- Take-off thrust with one engine inoperative is authorized for 10 minutes maximum (instead of 5 minutes for F2000EX EASy without FADEC V9 installed by M3453).
- Take-off performance calculations;
- Computation and use of wet runway performance landing data;
- VFR speed computation is different for F2000LXS ( $VFR = V_2 + 25$  kts) from other variants ( $VFR = V_2 + 10$  kts);
- In case of windshear conditions, the Go-Around button should not be pushed because windshear guidance is not yet available (windshear guidance will be available in EASy

II 2nd Certification). Crew has to fly the FPV up to AOA path limit symbol, as per AFM procedure.

- Take-off in SF1 configuration is not allowed until this take-off configuration is type design certified.

## **6.5. Differences Training: Falcon 2000LXS to/from Falcon 2000S**

According to the MDR, the maximum level of differences between the Falcon 2000LXS and the Falcon 2000 S is A. According to IAC 121-1009, level A corresponds to self instruction. Therefore, the pilot is responsible for reviewing the aircraft manuals to assess the differences between the variants.

## **7. SPECIFICATIONS FOR CHECKING**

### **7.1. Proficiency Check**

Proficiency check for initial Falcon 2000EX EASy type rating must be performed in accordance with RBAC 61 and RBAC 135, as applicable.

When operating the Falcon 2000EX EASy in a mixed fleet with other of its variants, a proficiency check completed in one variant is valid for all other variants, provided training and currency requirements as established in sections 6 and 8 are met.

### **7.2. Route Check**

For operators under RBAC 135 rules, pilot in command of Falcon 2000EX EASy must perform route checks in accordance with RBAC 135.299.

## **8. SPECIFICATIONS FOR CURRENCY**

Currency requirement level is set at level A between variants fitted with the same avionic (eg: only EASy or only EASy II) and level B between variants fitted with different avionic (eg: between EX EASy and EX EASy II).

For level B currency, the following applies:

- If a pilot has not flown on one variant for more than 6 months, he must perform a self-review on that variant prior to flying on that variant.
- If a pilot has not flown on one variant for more than one year, he must perform a minimum two hours Cockpit Procedure Training (CPT) session on that variant, covering the differences between EASy and EASy II specially take off and go around procedures.
- If the pilot has not flown an EASy II variant within a period of two years following the differences training, further differences training or a proficiency check on that variant will be required.
- If the pilot has not flown an EASy variant within a period of two years following the differences training, further differences training or a proficiency check on that variant will be required.

Requirements for Recent Experience must be met as established in RBAC 61.

## **9. OPERATION EXPERIENCE AND OPERATION CYCLES**

After the completion of an initial pilot type rating on the Falcon 2000EX EASy, it is recommended that the pilot completes at least 10 sectors of route experience with a qualified pilot in the aircraft, acting as pilot flying (PF) or pilot monitoring (PM).

For pilots already qualified and current on Falcon 900EX EASy and / or Falcon 7X, due to similar EASy avionics suits on Falcon 2000EX EASy, this recommendation reduces to 5 sectors.

For RBAC 135 operators, the operation experience and operation cycles must be completed as required by RBAC 135.244.

## **10. FLIGHT SIMULATION TRAINING DEVICES (FSTD)**

Full Flight Simulators used as described in section 6 shall be qualified by ANAC as level C or D, under JAR-FSTD A or FAA FAR Part 60, or other qualification basis, in case of grandfathering.

Fixed Based Simulator used as described in section 6 shall be qualified by ANAC as FTD 2 under JAR-FSTD A or FTD 6 under FAA FAR Part 60, or other qualification basis, in case of grandfathering.

It is important to highlight that training and checking for qualification on a variant equipped with EASy avionics shall be executed in an FSTD which replicates this same avionic.

In the same way, training and checking for qualification on a variant equipped with EASy II avionics shall be executed in a FSTD which replicates this same avionic.

## **11. COMPLIANCE WITH RBHA 91 AND RBAC 135**

Dassault Aviation provided a compliance statement with RBHA 91 and RBAC 135 rules, which was reviewed by ANAC and found to be acceptable.

## **12. SPECIAL OPERATIONS**

The Falcon 2000EX EASy may be fitted with several optional systems and features which enables certain special operations. They are:

- Head Up Display (HUD);
- Enhanced Flight Vision System (EFVS);
- Steep Approaches;
- Electronic Flight Bag (EFB);
- Operation with Autobrake.

The crew must be properly qualified to execute any of these operations and the operator might need authorization from ANAC to perform them.

EASA OEB report brings more detailed information on pilot qualification on these features.

## **13. MANUALS**

### **13.1. Master Minimum Equipment List - MMEL**

Falcon 2000EX EASy MMEL approved by the primary certification authority shall be used by Brazilian operators as a basis for developing their Operator Minimum Equipment List (MEL).

### **13.2. Airplane Flight Manual - AFM**

Brazilian AFM of Falcon 2000EX EASy, approved by GGCP, shall be used by Brazilian operators as a basis for developing their Operator Airplane Operation Manual (AOM).

## **14. APPENDIX**

Appendix 1 presents the footprint of Falcon 2000EX EASy pilot type rating course.

## APPENDIX 1

## FALCON 2000EX EASY TYPE RATING COURSE

Day 1	Day 2	Day 3	Day 4	Day 5
<b>Aircraft Publications</b> (1:30) <b>Aircraft General</b> (1:15) <b>Cockpit Design</b> (1:45) <b>Avionics Architecture</b> (1:00)	<b>Operating Method + CRM</b> (3:00) <b>Display &amp; Panel Management</b> (1:00) <b>PDU / MDU</b> (2:00)	<b>PDU / MDU</b> (4:00) <b>CPT 1</b> (2:00)	<b>PDU / MDU</b> (4:00) <b>CPT 2</b> (2:00)	<b>PDU / MDU</b> (2:00) <b>Abn/Emer proc</b> (1:00) <b>ECL management</b> (1:00) <b>CPT 3</b> (2:00)
Day 6	Day 7	Day 8	Day 9	Day 10
<b>Day Off</b>	<b>Electrical</b> (4:00) <b>CPT 4</b> (2:00)	<b>Engine / APU / T/R</b> (2:00) <b>Bleed &amp; Ice protection</b> (2:00) <b>Anemometry</b> (1:00) <b>CPT 5</b> (1:00)	<b>Air cond. &amp; Pressurization</b> <b>Oxygen, Fuel</b> (4:00) <b>CPT 6</b> (2:00)	<b>Hydraulics, Landing gear, Brakes, Flight controls</b> (3:00) <b>Fire protection</b> (1:00) <b>Lightning, structure &amp; Emer, Equipment / Door &amp; water waste</b> (1:00) <b>CPT 7</b> (1:00)
Day 11	Day 12	Day 13	Day 14	Day 15
<b>Performance, weight &amp; balance, Flight planning</b> (4:00) <b>CPT 8</b> (1:00)	<b>Performance, weight &amp; balance, Flight planning</b> (2:00) <b>MMEL, dispatchability</b> (1:00) <b>CPT 9</b> (2:00)	<b>GS test</b> (3:00) <b>GS Review</b> (1:00)	<b>Day Off</b>	<b>FBS</b> (4:00)
Day 16	Day 17	Day 18	Day 19	Day 20
<b>FFS 1</b> (4:00)	<b>FFS 2</b> (4:00)	<b>FFS 3</b> (4:00)	<b>FFS 4</b> (4:00)	<b>Day Off</b>
Day 21	Day 22	Day 23	Day 24	
<b>FFS 5</b> (4:00)	<b>FFS 6</b> (4:00)	<b>FFS 7</b> (4:00)	<b>Skill Test - FFS</b> (4:00)	

**Notes:**

**FFS = Full Flight Simulator**

**FBS = Fixed Based Simulator**

**CPT = Cockpit Procedure Trainer**

**FFS and FBS sessions DO NOT INCLUDE time for briefing and de-briefing.**

The training outlined above reflects the training evaluated by EASA and considered acceptable by ANAC for Falcon 2000EX EASy pilot type rating course. An operator or a training center may develop a variation of this training, provided it is proven that it maintains an equivalent level of safety. Depending on the level of the modification, ANAC may judge necessary an operational evaluation of the proposed training.