European Aviation Safety Agency
JOINT AVIATION AUTHORITIES

JOINT OPERATIONAL EVALUATION BOARD

REPORT

Gulfstream G200 “catch-up”

25 September 2008

European Aviation Safety Agency
Postfach 10 12 53
D-50452 Köln, Germany

www.jaat.eu

1. CONTENTS

2. REVISION RECORD

Issue Nr.	Date	Pages	Publication
0	30 July 2008	All	Draft: 15/08/08 Final: 25/09/08

3. GLOSSARY

AFM	Airplane Flight Manual
AMC	Acceptable Means of Compliance
AOC	Air Operator Certificate
AOM	Airplane Operations Manual
AP	Autopilot
APU	Auxiliary Power Unit
APR	Automatic Performance Reserve
AT	Auto Throttle
ATC	Air Traffic Control
ATPL	Airline Transport Pilot License
AWO	All Weather Operations
CDU	Control Display Unit
CPD	Common Procedures Document
CPL	Commercial Pilot License
CPT	Cockpit Procedure Trainer
CVR	Cockpit Voice Recorder
DA	Decision Altitude
DCP	Display Control Panel
DH	Decision Height
EASA	European Aviation Safety Agency
EFB	Electronic Flight Bag
EFIS	Electronic Flight Instrument System
EGPWS	Enhanced Ground Proximity Warning System
EICAS	Engine Indicating and Crew Alerting System
FAA	Federal Aviation Administration
FAR	Federal Aviation Regulation
FCL	Flight Crew Licensing
FCOM	Flight Crew Operating Manual
FCP	Flight Control Panel
FDR	Flight Data recorder
FGS	Flight Guidance System
FMA	Flight Mode Annunciator
FMS	Flight Management System
FSB	Flight Standardization Board
FTD	Flight Training Device
GPS	Global Positioning System
GPWS	Ground Proximity Warning System
IAI	Israel Aerospace Industries
IEM	Interpretative and Explanatory Material
IFR	Instrument Flight Rules
ILS	Instrument Landing System
IRS	Inertial Reference System
ISA	International Standard Atmosphere
JAA	Joint Aviation Authorities
JAR	Joint Aviation Requirements
JOEB	Joint Operational Evaluation Board
JSET	Joint Simulator Evaluation Team
LIFUS	Line Flying Under Supervision
LOFT	Line Oriented Flight Training
M	Mach
MCR	Master Common Requirements
MCDU	Multifunction Control Display Unit
MDA	Minimum Descent Altitude
MDR	Master Difference requirements
MFD	Multi-Function Display
MMEL	Master Minimum Equipment List
MSL	Mean Sea Level

MTOW	Maximum Take-Off Weight
MLAW	Maximum Landing Weight
MZFW	Maximum Zero Fuel Weight
NAA	National Aviation Authority
ODR	Operator Difference Requirements
PFD	Primary Flight Display
PIC	Pilot In Command
PTM	Pilot Training Manual
QRH	Quick Reference Handbook
RVSM	Reduced Vertical Separation Minima
SOP	Standard Operating Procedure
STD	Synthetic Training Device
TAWS	Terrain Awareness and Warning System
TCAS	Traffic Alert and Collision Avoidance System
TGL	Temporary Guidance Leaflet
TRTO	Type Rating Training Organization
VFR	Visual Flight Rules
V_{MO}	Maximum operating speed
V_S	Stall speed

4. EXECUTIVE SUMMARY

Gulfstream has requested an EASA/JAA JOEB "catch-up" for the Gulfstream G200. The G-200 aircraft entered service with European operators some years ago and this evaluation concentrated on establishing the training requirements. No other subjects, like MMEL, EFB, All Weather Operations and Cabin Crew were considered and no additional authorities were involved in this evaluation.

The Evaluation was conducted in compliance with the JAA Terms of References for JOEB's, including catch-up processes and the JOEB handbook. Further guidance was found in the Common Procedures for Conducting Operational Evaluations.

No comparison was made between the G200 and any other Gulfstream or IAI model aircraft. Credit for training, checking and currency on another model should only be given after a comparing evaluation is performed and the results are accepted by NAA's and operators.
This report specifies the EASA/JAA minimum requirements for the initial Type Rating Training Course, Checking and recent experience on the G200, which are recommended for the approval by the JAA/EASA Member States.

The report is aimed at helping private and commercial operators in the development of training programs. The report is a reflection of the status at the time of writing and provisions in this report are effective until amended, superseded or withdrawn by subsequent operational evaluation determinations.

The G200 is an airplane with a complexity and with capabilities, which can be compared to larger transport airplanes and it is operated in the same environment. It is therefore recommended, that non-AOC holders follow the requirements and recommendations in this report.

The scope of the evaluation was limited to Category 1 approach operations and standard take-off minima.
Specific training for operations below Category 1 approach minima and take-off minima below standard minima requires a separate evaluation.

.....

Evan Nielsen
Head of Certification Flight Standards
EASA

Date: 25 September 2008

.....

Jaap Meijer
Chairman JOEB G200

Date: 25 September 2008

5. OPERATIONAL EVALUATION

5.1 History

The airplane was originally developed in Israel and certified both in Israel and the USA as IAI-1126/GALAXY in December 1998. After it’s certification, the FAA conducted a FSB evaluation of the IAI Galaxy, but this evaluation was of a limited scope, i.e. Type Rating determination, training, checking and currency requirements.
General Dynamics, parent company of Gulfstream Aerospace, acquired the IAI Galaxy in 2001 and the aircraft was renamed Gulfstream G200. Significant modifications to the airplane were introduced over the years, which followed.
Gulfstream applied for and obtained an EASA Type Certificate in 2004.

Gulfstream’s G200 is manufactured in Israel and flown to Dallas, TX for the final phase before delivery to clients (“completion”).

5.2 Overview

The G200 is a swept wing executive aircraft, designed for a maximum of 18 passengers, however, a typical outfitting is for 8-10 passengers and 2 cockpit crew.
The MTOW of the G200 is 16,080 kg (35,450 lbs) in the basic AFM or 16,170 kg (35,650 lb under Supplement 12). It is capable of cruise speeds up to Mach 0.85 (M_{mo}) at a maximum altitude of 45,000 ft MSL.

The aircraft is equipped with two Pratt & Whitney 306A engines. Take off thrust rating is 6040 pounds per engine. The engines incorporate a Digital Electronic Engine Control system and thrust reversers, while an Auto-Throttle system is optional equipment.

The cockpit is equipped with a Collins ProLine 4 EFIS system and dual Collins FMS

5.3 Process

The catch-up evaluation of the G200 consisted of a number of distinct steps:

- Evaluation
- Completion of draft report
- Presentation of draft report
- Incorporate comments.

These steps were completed in July-August 2008.

The **evaluation** was performed by obtaining information on Type Rating training courses already approved and in use and comparing the outline of these courses with the requirements in JAR-FCL and EU-OPS.

After this evaluation, a **draft report** was completed and distributed to prepare for the formal presentation.

The manufacturer was invited to raise comments on the draft report.
These comments were **incorporated** in the final version of the report.

The JOEB should be involved in conducting future evaluations of the G200 aircraft, its derivatives and of all changes to the aircraft, such as software modifications and/or the addition of new systems. The Board will then determine the associated impact on training, checking and currency and will amend this report accordingly.

5.4 Results

1. In accordance with the provisions in JAR-FCL a Single License Endorsement is assigned to the G200. The License Endorsement is: **G200.**

2. The initial Type Rating training course as described in paragraph 8 is recommended for approval as a minimum.

3. Special attention should be given to the pre-requisite requirements for candidate-pilots.

4. Some items require special emphasis during training. They are mentioned in paragraph 10.

6. An EASA/JAA MMEL was not offered for evaluation during this JOEB process. The FAA MMEL is available for consultation on the website www.opspecs.com.

6. MASTER DIFFERENCE REQUIREMENTS

Master Difference Requirements (MDR’s) for the G200 do not apply at this time. Paragraph is reserved for possible future variants.

7. OPERATOR DIFFERENCE REQUIREMENTS

Operator Difference Requirements (ODR’s) for the G200 do not apply at this time. Paragraph is reserved for possible future variants.

8. INITIAL TYPE RATING TRAINING COURSE

8.1 TRAINING

The G200 Type Rating training course was evaluated.
The training course, which is described in more detail in APPENDIX 3 is recommended by EASA/JAA as the minimum for initial Type Rating qualification training and checking (JAR-FCL), as well as for the relevant portion of Conversion training and checking (EU-OPS).
The course was verified to fulfill the requirements of JAR-FCL AMC 1.261 (c) (2) in an acceptable way.
This Type Rating training course is an intense and demanding course. Additional training should be considered for pilots without any previous experience with EFIS and FMS.

The safe operation of the airplane is predicated upon the awareness, at all times and of both pilots, of the airplane’s Flight Modes and flight parameters. Strict adherence to Crew Coordination Procedures (CCP’s) in normal, as well as in abnormal situations is essential and should be regarded as mandatory. These CCP’s, specific to aircraft type and to operator, should be fully integrated in the training. The Training Organization, therefore, should be made aware of the specific Crew Coordination Procedures as established by the operator, before training is started. Pilots having no relevant experience with the application of Crew Coordination Procedures will benefit from a bridge-course on this topic.

Pilots having no relevant experience with the operation of an integrated Avionics, Flight Management System and Flight Guidance System, like the Collins Pro-Line 4 suite, will benefit from a bridge-course on this topic.
These specific additional courses should ideally be completed before the Full Flight Simulator training phase.

Emergency procedures are an essential part of the training curriculum. To avoid confusion during training, as well as during actual operations, the Training Organization and the candidate pilots need to be made aware of the items to be performed without immediate reference to the checklist. These steps should be defined before training is started, preferably by the operator as part of its Standard Operating Procedures.

Further areas of special emphasis are covered in a separate paragraph (10).

EASA/JAA recommends to include Line Flying Under Supervision in the conversion training program and to follow the requirements of EU-OPS 1.945, including Appendix 1 (Conversion training and checking) and EU-OPS 1.955 (Nomination as commander).

8.2 CHECKING

Ground school examination and Type Rating skill test have to comply with JAR-FCL 1.240, 1.261 and 1.262 and the related appendices.

8.3 FLIGHT SIMULATOR

One of the two G200 Flight Simulators at FlightSafety in Dallas, TX was evaluated in January/February 2008 by an evaluation team of Germany (LBA). Qualification to level D was issued (Certificate nr. DE-1A-060Z/CU.

9. DIFFERENCES TRAINING COURSE

Difference training does not apply, as the G200 is a separate type. The JOEB did not conduct any evaluation of possible credits to be taken into account when training from another type to the G200.
Paragraph reserved for future variants

10. SPECIAL EMPHASIS TRAINING

The JOEB has identified several aircraft systems and/or procedures (listed below) that should receive special emphasis in an approved G200 Training Program:

Systems Integration Training:

- Primary Flight Display (PFD).
- EICAS.
- Flight Guidance System (FGS).
- Flight Management System (FMS).

Flight Training (Full Flight Simulator - Level C or D and/or aircraft):

- Dual Generator Failure procedure.
- Loss of cabin pressure procedures.
- Instrument flying on standby instruments
- Fuel leaks.
- Smoke procedures, including smoke removal

The JOEB recommends early exposure to the FCP, FMA and FMS, especially for pilots with no previous EFIS or FMS experience. Establishing early confidence in manually flying the aircraft, converting from manual to automatic (FMS controlled) flight mode and back is equally important due to heavy reliance on the Automatic Flight Control System (AFCS). In the event of a flight path deviation due to input error or system malfunction, the flight crew must be able to comfortably transition from automatic to manual mode and back in an orderly fashion.

11. RECURRENT TRAINING/CHECKING

Recurrent training and currency serve to maintain a pilot’s continued competency for the operational tasks to be performed. During proficiency checks this competency is established.
It is every operator’s responsibility to establish a recurrent training and proficiency checking program, approved by the National Authority, which is relevant to the type of airplane and the intended operation.

The requirements for a recurrent training program may vary with several factors which have a significant influence. Some of these factors are: actual exposure of the flight crew member(s), specific routes and aerodromes used by the operator and new developments in technology. These factors and/or a combination thereof will determine how much recurrent training will actually be required.

It is recommended to follow the requirements of EU-OPS, subpart N, paragraph 1.965 as a minimum and to consider expansion, as appropriate, of these requirements for pilots, who have had only limited exposure and/or who do not any longer fulfill the currency requirements.

12. RECENT EXPERIENCE

There are no specific currency requirements applicable to the G200, beyond those of EU-OPS, Subpart N, paragraph 1.970 for AOC holders or JAR-FCL 1.026 and 1.245 for private operators.

13. CABIN CREW REQUIREMENTS

There is no requirement for cabin crew to be carried on the G200 and the JOEB did not assess an EASA/JAA any cabin crew issue for the G200.
The JOEB recommends that, if any are carried, they are fully trained in accordance with EU-OPS 1 Subpart O.

14. COMPLIANCE CHECK

A check for compliance with the equipment requirements in EU-OPS, subparts K and L was not performed.

15. MASTER MINIMUM EQUIPMENT LIST

The FAA has published a Master Minimum Equipment List. The latest version of this MMEL, which includes revision 4, is dated 20 August 2007.
The JOEB did not assess an EASA/JAA MMEL for the G200.

Paragraph reserved for future developments.

16. ELECTRONIC FLIGHT BAG

The JOEB did not evaluate an EFB for the G200.
Applications for approval of use of an EFB on board G200 airplanes should be directed to the National Authority.

17. All Weather Operations

The training requirements for the G200, as laid down in this report, are limited to operations under “standard” conditions. For approval of Low Visibility Take-Offs and/or approach limitations below Cat I, a specific training course for All Weather Operations is required.

18. MISCELLANEOUS

18.1 Landing Minimum Category

Vref (1,23 x Vsr) is 140 knots at the maximum gross landing weight of 30,000 lbs (13,608 kg). According to EU-OPS 1.430 (C), Appendix 2, the G200 is operated as a category C aircraft for all approaches.

APPENDIX 1. MASTER DIFFERENCE REQUIREMENTS (MDR)

Appendix reserved for future variants.

APPENDIX 2. OPERATOR DIFFERENCE REQUIREMENTS (ODR)

Appendix reserved for future variants

APPENDIX 3 Initial Type Rating training course.

The following curriculum is considered to be the minimum for the initial Type Rating training and checking for the Gulfstream G200:

Ground School (8 days, 65 hrs), consisting of

- Classroom presentations of aircraft systems, including normal, abnormal and emergency procedures.
- Classroom presentations on aircraft and system limitations.
- Classroom presentations on Weight & Balance, Performance and Flight Planning.
- Written Test (scheduled on last day)

Fixed Base Simulator phase (System Integration), consisting of

- Two fixed base simulator sessions (2 x 4 hrs per crew, 2 x 2 hrs per pilot as Pilot Flying and 2 x 2 hours per pilot as Pilot Not Flying)
-

Full Flight Simulator phase, consisting of

- Six full flight simulator training sessions (6 x 4 hrs per crew, 6 x 2 hrs per pilot as Pilot Flying and 6 x 2 hrs per pilot as Pilot Not Flying) + briefing/debriefing.
  All required relevant elements are trained to proficiency.
- 1 License Skill Test (1 x 4 hrs per crew, 1 x 2 hours per pilot as Pilot Flying and 1 x 2 hrs per pilot as Pilot Not Flying).

Aircraft training (landings),

- As required, minimum 6 landings, or 4 (if > 500 hrs on MPA airplanes, of similar size and performance).