EUROPEAN AVIATION SAFETY AGENCY

Operational Evaluation Board (OEB) Report

Diamond aircraft

DA-42
Twin Star

Final Report dated: 13. December 2010

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Diamond 42

Twin Star

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Executive Summary

Background
The EASA Certification Directorate has requested Certification Flight Standard to perform an OEB Catch-up process for the Diamond 42 (DA-42) aeroplane to assess pilot training.
This report is based on the evaluation of approved training courses and interviews with NAA's and training organisations, in addition the OEB team visited the Diamond Aircraft Factory and actually participated in a flight on the DA 42.

Training on Advanced Twin Piston Aeroplanes vs. Conventional Twin Piston Aeroplanes
The DA 42 is an advanced twin piston aeroplane, it contains Electronic Flight Instrument System (EFIS) displays and enjoy single lever, engine operation, with automatic engine control and automatic feathering facilities. It is inevitable that the DA 42 will be used for initial training in a short space of time. Its operation may well be much simpler than that of a conventional twin piston aeroplane, which leaves the student in a vulnerable position when reverting back to a more conventional aeroplane. The Multi-Engine Piston (MEP) syllabus is based upon the theory of conventional aeroplane operation and should not be over simplified because of the advance in technology. It is important that the MEP training course emphasises the theoretical differences between conventional and advanced systems. Specific differences training are required before the holder of a MEP class rating can exercise the privileges of the rating on another MEP aeroplane. Such training should include airborne operation and be conducted by a Flight Training Organisation (FTO) or a Type Rating Training Organisation (TRTO).

Applicability
The report is published to assist in the development of training programs for private operations and to assist the National Aviation Authority (NAAs) in their approval process. The report is valid until amended, superseded or withdrawn by subsequent operational evaluation determinations.

Procedures, requirements and references
EASA conducted this OEB process in accordance with JAR-FCL 1 requirements.
This evaluation was based on the Common Procedures Document (CPD) and the Memorandum of understanding (MoU) between EASA and European NAAs.

Class Rating and Licence endorsement
The DA 42 will be listed in the "CLASS AND TYPE RATING LIST AND ENDORSEMENT (Aeroplanes)" Table 1.
See attachment 1

Evan Nielsen
EASA, Certification Directorate
Flight Standards Manager
13. December 2010

Acronyms

AFM	Aeroplane Flight Manual
AMC	Acceptable Means of Compliance
AOC	Air Operator Certificate
ATPL	Airline Transport Pilot Licence
ATO	Approved Training Organisation
EECU	Electronic Engine Control Unit
DH	Decision Height
MDH	Minimum Descent Height
EASA	European Aviation Safety Agency
EFIS	Electronic Flight Instrument System
FADEC	Full Authority Digital Engine Control
FNPT	Flight & Navigation Procedures Trainer
FPV	Flight Path Vector
FSTD	Flight Simulation Training Device
FTD	Flight Training Device
FTO	Flight Training Organisation
IFR	Instrument Flight Rules
JAR-FCL 1	Joint Aviation Requirements Flight Crew Licensing (Aeroplanes)
LHS	Left Hand Seat
LVP	Low Visibility Procedures
MDR	Master Difference Requirements
MDU	Multifunction Display Unit
MEP	Multi Engine Piston
NAA	National Aviation Authority
OEB	Operational Evaluation Board
OTD	Other Training Device
PF	Pilot Flying
PIC	Pilot In Command
PNF	Pilot Not Flying
PPL	Private Pilot License
QRH	Quick Reference Handbook
RVR	Runway Visual Range
SOP	Standard Operating Procedures
TRI	Type Rating Instructor
TRTO	Type Rating Training Organisation
VFR	Visual Flight Rules
VMC	Visual Meteorological Conditions

1. General Description of the DA-42

The DA-42 2008 is listed in the EASA Type Certificate Data Sheet No TDCS A.005 and TCDS A.513, both dated 16. July 2010, this report is applicable to all variants of the DA 42 listed in the TDCSs.

The DA 42 Series is a modern glass-cockpit and composite structure aeroplane, twin-engine, four seat, low wing mono-plane with retractable tricycle landing gear. The aeroplane is propelled by two piston diesel engines driving 3-blade propellers. It has a cantilever wing and a 'T' tail.
The minimum crew is 1 pilot, Maximum passenger seating Capacity 3
The aeroplane can be operated Day/Night, VFR/IFR and into known or forecast icing conditions.

2. Training syllabi.

The assessment was made with reference to all relevant regulations and approved training programmes provided by European NAAs.
A training programme shall be developed. This programme shall include a breakdown of flying and theoretical knowledge instruction in a week-by-week or phase presentation, a list of standard exercises and a syllabus summary. In particular, synthetic flight training and theoretical knowledge instruction shall be phased in such a manner as to ensure that students shall be able to apply to flying exercises the knowledge gained on the ground. Arrangements should be made so that problems encountered in instruction can be resolved during subsequent training. The content and sequence of the training programme shall be acceptable to the Authority.

On completion of the course, the candidate shall be capable of handling the aeroplane safely and confidently under both normal and abnormal condition.

2.1 Regulations regarding training requirements.

JAR-FCL 1.235 stipulates difference training requirements between variants.

JAR-FCL 1.261 and associated Appendix stipulates minimum training requirements for MEP including minimum duration as follows:

Theoretical training:
1.261(a)(2) Minimum 7:00 hours instruction

Flight Instruction:
1.261(b)(2) Minimum 2:30 hrs. Dual Flight Training - Normal operations
Minimum 3:30 hrs. Dual Flight Training - Asymmetrical conditions

AMC FCL 1.261(a) stipulate associated syllabus for theoretical knowledge instruction.

3. Prerequisites.

Whilst it is theoretically possible to complete a course of Private Pilot License (PPL) training on a MEP aeroplane the candidate is required to have 70 hours flight time as pilot in command (PIC) of aeroplanes before making licence application. It is therefore assumed that the applicant for a MEP class rating will be in possession of at least a valid PPL (A) and have 70 hours experience as PIC before commencing the course.

4. Training assessment

The OEB recommends that the training should be committed to adequately support a product that cumulates a series of top of the line technologies which are not yet a common place in the general aviation sector: glass cockpit, Diesel engines, Electronic Engine Control Unit (EECU) and propeller control with single lever engine operation, composite a/c structure.

4.1 Training course for obtaining MEP (land) class rating

An applicant for a single-pilot Multi-engine Class rating shall complete a training course conducted by a FTO or a TRTO, the course shall be approved by the Authority.

The OEB has assessed approved training courses provided by European NAA's.

The OEB recommends:

Ground training:

a. The theoretical part of the course should be performed over a period of at least 2 days.

b. Pilots without any previous experience with EFIS, FMS and integrated avionics will receive additional training, which could be completed before entry into the DA 42 pilot training course or be integrated in the course.

c. Flight Navigation Procedures Trainer (FNPTs) and Other Training Devices (OTDs) form part of the training especially with regards to the Garmin 1000 avionics system.

d. The characteristics of an "all electric aeroplane" which need electrical power to operate the engines and includes the basics of an Full Authority Digital Engine Control (FADEC) controlled powerplant

e. The human factors aspects of complex avionics/EFIS in VFR and IFR environment should be specifically addressed.

Flight training:

Relevant requirements of JAR-FCL 1.261 and 1.240 shall be complied with.

4.2 Differences Training between DA 42 and other MEP (land) Aeroplanes and vice versa.

The DA 42 is an advanced twin piston aeroplane, with Electronic Flight Instrument System (EFIS) displays, integrated avionics (Garmin 1000) and single lever engine operation, with electronic engine control and automatic feathering facilities.

The additional knowledge and training required according to JAR-FCL 1.235 (c) (1) when receiving difference training between this aeroplane and older conventional MEP aeroplanes and vice versa will be extensive.

The OEB recommends:

Difference training courses between MEP variants should be conducted by a FTO or TRTO when the differences between the variants include:

I) electronic Flight Instrument System (EFIS) displays,
II) integrated avionics,
III) single lever engine operation,
IV) other systems as determined by the Authority.

Appendix 1

"CLASS AND TYPE RATING LIST AND ENDORSEMENT (Aeroplanes)"

Table 1
Class Rating List (Aeroplane) - Single-pilot - Single/multi-engine piston aeroplane (land/sea)

1	2 Aeroplanes		3	4
Manufacturer	**Model**	**Name**		**Licence Endorsement**
Diamond		DA 42	(D) **6**	MEP (land)
	6 Difference training is required with every MEP (land) listed in table 10			

END