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Flight Standardization Board (FSB) Report

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Bombardier Challenger

BD-100-1A10
(Challenger 300 and 350)

Pilot Type Rating
CL-30

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TABLE OF CONTENTS

SECTION	PAGE
1. REVISION RECORD.....	3
2. PURPOSE.....	3
3. BACKGROUND	4
4. APPLICATION OF FSB REPORT	5
5. PILOT “TYPE RATING” REQUIREMENTS.....	5
6. “MASTER DIFFERENCE REQUIREMENTS” (MDRs)	6
7. FSB SPECIFICATIONS TRAINING	6
8. FLIGHT MANAGEMENT SYSTEM, V-NAV, and CAT II	8
9. FSB SPECIFICATIONS FOR CHECKING	9
10. FSB SPECIFICATIONS FOR CURRENCY	9
11. FSB SPECIFICATIONS FOR DEVICES AND SIMULATORS.....	9
12. ALTERNATE MEANS OF COMPLIANCE TO THIS REPORT	10
APPENDIX 1 – INTEGRATED FLIGHT INFORMATION SYSTEM (IFIS).....	11
APPENDIX 2 – AVIONICS UPGRADE TO VERSION 2.2	13
APPENDIX 3 – RNP APPROACH CAPABILITY.....	14

1. REVISION RECORD

Revision Number	Section(s)	Page(s) Affected	Date
Original	All	All	10/22/2003
1	Special Emphasis	3, 4, 9, 10	11/05/2004
2	Appendix 2	12-13	07/29/2008
3	All	All	10/25/2016

Extensive changes to the verbiage for consistency with other FAA guidance.

Revision 3 incorporates the Challenger 300 Advanced Avionics (Collins Pro Line 21 Advanced Avionics) and the Challenger 350 into the entire document. Introduces RNP-AR approach capability on appropriately equipped aircraft and also includes the Collins Pro Line 21 Version 2.2 avionics upgrade.

2. PURPOSE

The primary purpose of this report is to specify FAA master training, checking and currency requirements applicable to crews operating the Bombardier BD-100-1A10 (Challenger 300/350). This report can assist 14 CFR part 135 Operators, FAA Principal Operations Inspectors (POIs), and 14 CFR part 142 training centers and their FAA Training Center Program Managers (TCPMs) in the development and approval of 14 CFR part 135 and 142 training programs. Provisions of this report are effective until amended, superseded, or withdrawn by subsequent FSB determinations.

Relevant acronyms are defined as follows:

AC	Advisory Circular
ACO	Aircraft Certification Office
AEG	Aircraft Evaluation Group
AFCS	Automatic Flight Control System
AFM	Airplane Flight Manual
AP	Autopilot
APM	Aircrew Program Manager
ATP	Airline Transport Pilot
BA	Bombardier Aerospace
CAT II	Category 2 Approaches
CFR	Code of Federal Regulations
EFB	Electronic Flight Bag
EFIS	Electronic Flight Instrument System
EGPWS	Enhanced Ground Proximity Warning System
EICAS	Engine Indication and Crew Alerting System
EMS	Electrical Management System
FAA	Federal Aviation Administration
FDA	Flight Director Annunciator
FCOM	Flight Crew Operating Manual

FFS	Full Flight Simulator
FGP	Flight Guidance Panel
FMS	Flight Management System
FSB	Flight Standardization Board
FTD	Flight Training Device
GPWS	Ground Proximity Warning System
ICAO	International Civil Aviation Organization
IFIS	Integrated Flight information System
JAA	Joint Aviation Authorities
NSP	National Simulator Program
METAR	Meteorological Terminal Aviation Routine Weather Report
MFD	Multifunctional Display
MNPS	Minimum Navigational Performance Specifications
OET	Operational Evaluation Team
PF	Pilot Flying
PDF	Primary Flight Display
PM	Pilot Monitoring
POI	Principal Operations Inspector
PTS	Practical Test Standards
RF	Radius to Fix
RNP	Required Navigation Performance
RNP-AR	Required Navigation Performance with Authorization Required
RVSM	Reduced Vertical Separation Minimums
QRH	Quick Reference Handbook
SOP	Standard Operating Procedure
TAF	Terminal Aerodrome Forecast
TAWS	Terrain Avoidance Warning System
TCAS	Traffic Alert and Collision Avoidance System
TCDS	Type Certificate Data Sheet
TCPM	Training Center Program Manager
VNAV	Vertical Navigation

3. BACKGROUND

The Bombardier BD-100-1A10, also known as the Challenger 300/350, is a transcontinental range business jet certified under Title 14 of the Code of Federal Regulations (14 CFR) part 25. It is listed on FAA Type Certificate Data Sheet T00005NY as model BD-100-1A10. The FSB conducted a joint operational evaluation of the Challenger 300/350 with two Civil Aviation Inspectors from Transport Canada resulting in concurrent FSB and Transport Canada Operational Evaluation Reports. Two JAA pilots participated in the ground school portion and flew two training sessions each.

In March 2003, the FAA Challenger 300 Flight Standardization Board (FSB) and the Transport Canada Operational Evaluation Team (OET) received Challenger 300 initial pilot training course provided by Bombardier Aerospace (BA) at its Flight Test Center located in Wichita, Kansas. Training consisted of classroom instruction conducted by

two instructors from the Bombardier Training Center in Dallas, Texas, supplemented with demonstrations using a Systems Integration training device.

The FSB performed Advisory Circular 120-53 test T5, which is essentially an evaluation of all the FAA Practical Test Standards (PTS) maneuvers required for an airman to receive a pilot type rating. This was accomplished in production equivalent Challenger 300 aircraft registration numbers C-GIPX (serial #20003) and C-GJCV (serial #20004), in Wichita, Kansas.

The FSB/OET conducted 10 flight legs, totaling approximately 24 hours, to determine if the Challenger 300 was suitable for operation in the U.S. under 14 CFR parts 91 and 135. In the time available on those flights, the FSB evaluated the AFM normal, abnormal, and emergency procedures.

The FSB is responsible for conducting evaluations of future changes to the Challenger 300 (such as engine changes, systems and instrumentation changes, software changes, or installation of new systems) and its derivatives. The FSB will determine the impact those changes have on training, checking, and currency, and will amend this report accordingly.

An FSB was conducted September 2014 to include the Challenger 350. The Challenger 300 and the Challenger 350 share the TCDS model designation of BD-100-1A10. The Challenger 350 is an upgrade to the Challenger 300 to include performance and avionics upgrades. Both the Challenger 300 and Challenger 350 share the type rating designation CL-30.

An FSB was conducted July 2016 on both the Challenger 300 and Challenger 350 to include an avionics upgrade, designated Version 2.2, and to evaluate training, checking, and currency for RNP-AR approach capability.

4. APPLICATION OF FSB REPORT

The guidelines in this report apply to: Operations Aviation Safety Inspectors, Principal Operations Inspectors (POI), Training Center Program Managers (TCPM), Aircrew Program Managers (APM), 14 CFR part 135 Air Carrier Check Pilots and Instructors, Airline Transport Pilots instructing in air transportation service, Certificated Flight Instructors, Aircrew Program Designees, and Training Center Evaluators.

5. PILOT “TYPE RATING” REQUIREMENTS

In accordance with 14 CFR parts 1 and 61, the pilot type rating for the Challenger 300/350 is designated as “**CL-30**”. This designator is consistent with the current ICAO Doc 8643 and FAA Doc 7340. At Bombardier’s request, the FSB did not conduct a comparison between the Challenger 300/350 and any other Bombardier models; therefore, no credit may be given for training, checking, or currency between the Challenger 300/350 and any other aircraft or variations.

6. “MASTER DIFFERENCE REQUIREMENTS” (MDRs)

MDR tables for the Challenger 300/350 variations are shown below. Definitions for the various levels of the Training/Checking/Currency may be found in Advisory Circular 120-53B (as amended).

Master Differences Requirements (MDR)					
AIRCRAFT TYPE RATING CL-30		FROM AIRPLANE			
		Challenger 300	Challenger 300 (Collins Pro Line 21 Advanced)	Challenger 350	Challenger 350 (Collins Pro Line 21 V2.2)
TO AIRPLANE	Challenger 300	—	B/A/A	B/B/A	B/B/A
	Challenger 300 (Collins Pro Line 21 Advanced)	B/A/A	—	B/B/A	B/B/A
	Challenger 350	B/B/A	B/B/A	—	B/A/A
	Challenger 350 (Collins Pro Line 21 V2.2)	B/B/A	B/B/A	B/A/A	—

7. FSB SPECIFICATIONS TRAINING

7.1 Training General.

The provisions of this training section apply to Challenger 300/350 programs for pilots having previous experience in 14 CFR part 91 or 14 CFR part 135 air carrier operations, and in multi-engine turbojet or turboprop aircraft. Additional requirements, as determined by the operator’s POI, the FSB, and AFS-200, may be necessary for airmen not having such experience. Paragraph 7.3 of this section contains a list of special emphasis items to be included in an approved training program.

7.2 Differences Training.

Differences training is accomplished in accordance with 14 CFR § 135.347. When any combination of the Challenger 300 and Challenger 350 are flown, appropriate instruction in design and systems differences will be required for both airplanes, consistent with MDR provisions listed in Section 6. In addition, any changes in aircraft software (e.g., upgrades from version X to version Y) involving the entire fleet would require differences training.

7.3 Special Emphasis Training.

The FSB has identified several aircraft systems and/or procedures that must receive special emphasis in a Challenger 300/350 Training Program.

a) Ground Training:

- (1) Flight Management System (FMS) - The Challenger employs a sophisticated Collins FMS. Early exposure to the FMS is important, especially for pilots with no previous EFIS or FMS experience.
- (2) Wing leading edge contamination and its effect on clean stall speed.
- (3) Terrain Avoidance Warning System (TAWS).
- (4) Traffic Alert and Collision Avoidance System (TCAS).
- (5) Enhanced Ground Proximity Warning System (EGPWS).

b) Systems Integration Training (Flight Training Device – Level 5 FTD or higher):

The integration of the PFD/MFD/FMS and reversion modes provides multiple means of making essential navigation and communication selections. Pilots should be proficient with all primary, optional, and reversionary options.

c) Flight Training (Full Flight Simulator – Level C or D FFS and/or aircraft):

- (1) Aileron/elevator disconnect (jammed controls in each axis).
- (2) Primary Flight Display (PFD), Multifunction Display (MFD), and EICAS reversionary modes.
- (3) Integrated use of EICAS messages, switch positions, and synoptic pages to determine aircraft system status.
- (4) Delayed engine response to full power applications at high altitudes (especially high altitude stalls).
- (5) Low energy rejected landing from idle thrust.
- (6) High altitude (above 31,000 feet) handling characteristics with the autopilot and yaw damper inoperative.
- (7) Traffic Alert and Collision and Avoidance System (TCAS).
- (8) Terrain Avoidance Warning System (TAWS).
- (9) Enhanced GPWS (including the loss of terrain mode when making MFD selections).
- (10) Loss of all DC Power.

- (11) Crew communications while wearing the oxygen mask using pressure breathing.
- (12) Zero-flap approaches and landings to a full stop.

A number of other characteristics of the Challenger 300/350 should be emphasized throughout the training program:

- a) Pilots must be vigilant in monitoring speed profiles in all flight regimes. With the engines at in-flight idle and very little drag available, it is very hard to slow down and descend at the same time.
- b) The aircraft exhibits very little drag rise until speed increases well above M_{MO}/V_{MO} . Care must be taken to monitor speeds when initiating enroute or emergency descents.
- c) Enroute descents must be well planned to avoid high and fast predicaments that may exacerbate the difficulty in reducing speed in a timely manner.
- d) Due to low drag and high residual thrust, speed control is very sensitive in the landing configuration, particularly in gusty conditions. Pilots must be vigilant in controlling speed.
- e) On approach, the aircraft is operating on the low part of the power curve with slower engine response. Therefore, it is necessary to be aware of speed, descent, and power changes to resist over controlling.
- f) When performing an ILS approach utilizing only the Integrated Standby Instruments, attitude, airspeed, and navigation information is presented properly; however, heading reference is only available from the standby compass. This should be emphasized during initial and recurrent training.
- g) Vertical Navigation and VNAV-MDA approaches require special emphasis due to potential for mode confusion.

8. FLIGHT MANAGEMENT SYSTEM, V-NAV, and CAT II

The Collins FMS is a sophisticated FMS. Each certificate holder's Training Program should include a succinct statement of its philosophy regarding use of Flight deck automation. Early and often exposure to the system is important. This is especially true for pilots with little or no previous EFIS or FMS experience. The integration of the Primary Flight Display (PFD), Multifunction Display (MFD), and EICAS Reversionary modes provides multiple means of making essential navigation and communication selections. Pilots should be proficient with all primary, optional, and diversionary options. It is recommended that all students obtain a minimum of 8 hours of hands-on instruction in a flight training device (FTD) or simulator with these systems. Establishing early confidence in manually flying the aircraft, converting back and forth from manual to automatic (FMS controlled) flight mode, is equally important due to heavy reliance on the AFCS. In the event of a flight path deviation due to input error or system malfunction, the flightcrew must be able to comfortably transition from automatic to manual operation and back in an orderly fashion consistent with certificate holder's automation philosophy.

Computer-based instruction for the Collins FMS would be a valuable asset for pilots with no previous experience in operating a Collins FMS.

The FSB conducted CAT II evaluations for the Challenger 300. Multiple approaches were flown at two different Airports with CAT II ILS beams. Approaches were flown with the Flight Director and Autopilot coupled as well as Flight Director only. Coupled approaches proved to be satisfactory, placing the aircraft well within the touchdown zone.

LANDING MINIMA. In accordance with 14 CFR part 97 § 97.3, the Challenger 300/350 is a category C aircraft during straight-in instrument approaches.

9. FSB SPECIFICATIONS FOR CHECKING

TYPE RATING.

The applicant must meet the requirements of 14 CFR part 61 § 61.157 (a)(1)(ii), (v), (b), or (d) for the addition of a CL-30 type rating to an ATP certificate. 14 CFR § 61.63(d) and (e) applies for the addition of a CL-30 type rating to any other grade of certificate. Testing, Checking, and Evaluations specified by 14 CFR part 61, §§ 61.58, 61.155, 61.157, and FAA Practical Test Standards apply.

NO FLAP APPROACHES.

Checking in “FLAPS 0” approaches and landings is required per the Airline Transport Pilot and Type Rating Practical Test Standards for Airplane (FAA-S-8081-5F Area of Operation VI, Task I).

10. FSB SPECIFICATIONS FOR CURRENCY

Currency will be maintained, or reestablished, in accordance with 14 CFR §§ 61.57 and 61.58.

11. FSB SPECIFICATIONS FOR DEVICES AND SIMULATORS

Device and simulator characteristics are designated by 14 CFR part 60. The National Simulator Program (NSP) and the Principal Operations Inspectors (POI) must address the acceptability of differences between devices, simulators, and aircraft. Requests for device approval should be made to the POI. The POI may approve those devices for operators if their characteristics clearly meet the established FAA criteria and have been qualified by the NSP.

12. ALTERNATE MEANS OF COMPLIANCE TO THIS REPORT

The FSB chairman should be consulted by the POI when alternate means of compliance, other than those specified in this report, are proposed. The FAA General Aviation and Commercial Division (AFS-800) or the FAA Air Transportation Division (AFS-200) must approve alternate means of compliance. If an alternate means of compliance is sought, operators will be required to submit a proposed alternate means for approval that provides an equivalent level of safety to the provisions of AC 120-53 and this FSB report. Analysis, demonstrations, proof of concept testing, differences documentation, and/or other evidence may be required.

APPENDIX 1

Integrated Flight Information System (IFIS) “File Server System”

1.1 PURPOSE AND APPLICABILITY

The following is provided for the benefit of FAA Principal Inspectors, air carrier operators, and 14 CFR part 142 training centers for their use in determining the acceptance of the Electronic Flight Bag (EFB) applications (described below) as provided by the IFIS installation in the Challenger 300. As described in AC 120-76C (as amended), Guidelines for the Certification, Airworthiness, and Operational Use of Electronic Flight Bags, are certified with Class 3 EFB Hardware and Type C applications. Applications are classified as Type C due to the interactivity of the Electronic Charts with the aircraft. The charts can be manipulated (i.e., zoomed, scrolled) as Type B, but are classified Type C because aircraft present position is provided on the installed display on the airport depictions and charts. EFB/IFIS functions are classified as Training Level C, Checking Level B, and Currency Level B.

1.2 EFB DESCRIPTION

The term EFB is used interchangeably with the term IFIS. The EFB/IFIS functions are intended to provide situational awareness only and do not provide alerts or warnings. The three major functions provided by the EFB/IFIS are support for navigational charts, enhanced map overlays, and graphical weather images. The charts function allows the viewing of selected Jeppesen navigations charts. The Enhanced Maps function is split into an application and a server that together provide map overlays of geopolitical, airspace, and airway data. The Graphical Weather function provides various weather images, such as NEXRAD, that are uploaded via Datalink. The standard aircraft configuration contains the Enhanced Map Overlays functions. Electronic Charts and Graphical Weather are offered as customer selected options.

1.3 FSB SPECIFICATIONS FOR TRAINING

Training is set at Level C. Level C training requires that flightcrews operating under 14 CFR part 135 or part 91 subpart K master the EFB/IFIS functions. As a minimum, the crew should be trained to efficiently access the airport depiction charts, Departure Procedures, Arrival Procedures, and approach charts using the EFB/IFIS electronic chart function. Pilots should master the graphic weather depiction function to obtain METARS and TAFs for origin, destination, and alternate airports. Other 14 CFR part 91 operators are strongly encouraged to follow these same training guidelines.

1.4 FSB SPECIFICATIONS FOR CHECKING

Checking is set at Level B. Level B checking requires a demonstration of proficiency in a task or system. A check is required for initial differences training. The check may be administered by a company check pilot, a Training Center Evaluator, or other person authorized by the FAA. Recommended tasks include demonstrating competency in using

the electronic chart functions to display departures, arrivals, and approaches, utilizing the graphical weather text functions, and adherence to company SOPs.

1.5 FSB SPECIFICATIONS FOR CURRENCY

Pilots who have not utilized the EFB/IFIS for a period exceeding 90 days should review the operating manual and company SOPs prior to their next operational flight. Operators should establish a means of ensuring that pilots are current. Level B is set.

1.6 FSB SPECIFICATIONS FOR DEVICES OR SIMULATORS

Flight Training Devices, Simulators, and/or Part Task Trainers may be used for initial training and checking provided that the device accurately duplicates the recommended FMS and EFB functions. Training done in the airplane may be accomplished either in actual flight conditions or on the ground provided all necessary avionics equipment is ON and operational.

APPENDIX 2**CHALLENGER 300 ADVANCED AVIONICS (with optional Collins Pro Line V2.2 software installation) and CHALLENGER 350 (with Collins Pro Line V2.2 software installation)**

A Challenger 300 with the optional installation of the Collins Pro Line 21 Advanced Avionics Suite is identified as the Challenger 300 Advanced Avionics.

The optional Collins Pro Line 21 Version 2.2 software installation for the Challenger 300 Advanced Avionics and the Challenger 350 require an initial .5-hour training program. This required training may be computer-based or instructor-led. If authorization is sought for RNP-AR approaches, this avionics training must be completed prior to or concurrent to RNP-AR training. Computer-based and instructor-led training is defined as Level B training as defined in AC 120-53 (as amended). Please refer to the MDR table in section 6 of this document.

There is no checking element associated with this upgrade.

NOTE: If the crew is training in a full flight simulator, the FSB encourages that crewmembers and training providers review and comply with 14 CFR §§ 135.335(b)(3) and 142.59.

APPENDIX 3**RNP-AR APPROACH CAPABILITY****3.0 RNP-AR TRAINING**

The RNP-AR training described in this section does not replace the requirements or considerations in Advisory Circular AC 90-101A (as amended), Approval Guidance for RNP Procedures with AR. This report's requirements and recommendations are in addition to AC-90-101A (as amended). Initial RNP-AR training for the Challenger 300 (s/n 20408-20500) and Challenger 350 is defined as Level D training in accordance with AC 120-53B (as amended).

3.1 TRAINING PREREQUISITES

An applicant for RNP-AR training must have first completed a CL-30 Initial or Recurrent course that includes Version 2.2 avionics.

3.2 INITIAL TRAINING REQUIREMENTS

The following is the recommended minimum level of training.

- 3.2.1 Ground Training. The FSB recommends 2 hours of instructor-led ground school. A computer-based training program of up to 1 hour may replace 1 hour of the ground training portion. The ground school should be in accordance with AC 91-101A (as amended).

NOTE: Prior to commencing an RNP-AR training program, please refer to Appendix 2 of this document for the training requirements for the Version 2.2 avionics software upgrade.

- 3.2.2 Flight Training – 4 hours of simulator-based training. The full flight simulator must be at Level C or higher. 2 hours should be conducted in the left seat while performing the Pilot Flying (PF) duties in addition to 2 hours conducted in the right seat while performing the duties of the Pilot Monitoring (PM). A minimum of two different approaches should be flown in each crewmember duty position. At least one approach from each duty position should include a Radius to Fix (RF) segment and RF missed approach procedure. Seat dependent training is necessary due to the specific duties of each pilot position. These duties include call-outs, aircraft instrument scan, energy management, and checklist usage.

3.3 CHECKING/COMPLETION STANDARDS

Credit for completion will be given once the applicant satisfactorily demonstrates to the instructor adequate knowledge and practical application of RNP-AR operations. No checking is required for 14 CFR part 91 operators. 14 CFR part 135 operators may be subject to checking per their FAA-approved training program. Due to the unique nature

of these approaches, the FSB encourages Principal Operations Inspectors to include RNP-AR approaches in all applicable checking evaluations.

3.4 RECURRENT TRAINING REQUIREMENTS

The operator should incorporate recurrent RNP-AR training that employs the unique RNP-AR characteristics of the operator's approved procedures as part of the overall program. The FSB recommends that two different RNP-AR approaches be conducted (one as PF and one as PM) with recurrent training in accordance with the applicable subparts of 14 CFR parts 91 and 135. One approach should be terminated via a missed approach near the Final Approach Fix. The second approach should be completed to a landing.

3.5 RNP-AR CURRENCY

No specific currency requirements currently exist for RNP-AR approaches; however, please refer to AC 90-101A (as amended) for further guidance. Some 14 CFR part 135 operators may have training programs and OpSpecs that dictate required currency requirements. Any questions regarding RNP-AR currency may be addressed to the FAA Flight Technologies and Procedures Division (AFS-400).