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Flight Standardization Board Report

Revision: 6
Date: XX/XX/XXXX

Manufacturer
Bombardier, Inc.

Type Certificate Data Sheet (TCDS)	TCDS Identifier	Marketing Name	Pilot Type Rating
T00005NY	BD-100-1A10	Challenger 300 and Challenger 350	CL-30

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1. RECORD OF REVISIONS

Revision Number	Section(s)	Date
Original	All	10/22/2003
1	Special Emphasis	11/05/2004
2	Appendix 5	07/29/2008
3	Appendix 6	10/25/2016
4	All	10/25/2018
5	Appendix 8	03/18/2021
6	3, 4, 5, 10.4, Appendix 9	XX/XX/XXXX

2. INTRODUCTION

Aircraft Evaluation Groups (AEG) are responsible for working with aircraft manufacturers and modifiers, during the development and Federal Aviation Administration (FAA) certification of new and modified aircraft, to determine:

1) The pilot type rating;
2) Flightcrew member training, checking, and currency requirements; and
3) Operational suitability.

This report lists those determinations for use by:

1) FAA employees who approve training programs;
2) FAA employees and designees who certify airmen; and
3) Aircraft operators and training providers to assist them in developing their flightcrew member training, checking, and currency.

3. HIGHLIGHTS OF CHANGE

This revision adds Appendix 9 for the Autothrottle (AT) System for Challenger 350.

4. BACKGROUND

The Transport Aircraft Long Beach AEG formed a Flight Standardization Board (FSB) that evaluated the Bombardier BD-100-1A10 as defined in FAA Type Certificate Data Sheet (TCDS) No. T00005NY. The evaluation was conducted during March 2003 using the methods described in the current edition of FAA Advisory Circular (AC) 120-53, Guidance for Conducting and Use of Flight Standardization Board Evaluations.

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.

In July 2016, the FSB conducted flight evaluations of the previously installed Avionics Software version "2.2" and Required Navigation Performance (RNP) approach capability in a Bombardier BD-100-1A10. The flight evaluation and the associated Airplane Flight Manual (AFM) changes were found to be operationally suitable.

In June and September 2018, the FSB conducted flight evaluations of steep approach capability, which was found to be operationally suitable. The associated AFM change was also reviewed and accepted. Please see Appendix 7, Challenger 350 Steep Approach Landing Operations, for further details.

In May/June 2022, an FSB was convened in conjunction with Transport Canada Civil Aviation (TCCA) Operational Evaluation Board to determine operational suitability and evaluate training, checking, and currency requirements of the Autothrottle (AT) System in the Challenger 350.

5. ACRONYMS

- 14 CFR Title 14 of the Code of Federal Regulations
- AC Advisory Circular
- ACS Airman Certification Standards
- ACFT Aircraft
- ACS Airmen Certification Standards
- ADI Attitude Direction Indicator
- ADS-B Automatic Dependent Surveillance-Broadcast
- ADS-C Automatic Dependent Surveillance-Contract
- AEG Aircraft Evaluation Group
- AEO All-Engines-Operating
- AFCS Automatic Flight Control System
- AFM Airplane Flight Manual
- AFMS Airplane Flight Manual Supplement
- AHRS Attitude and Heading Reference System
- AIP Aeronautical Information Publication
- ALD Actual Landing Distance
- ALS Approach Light System
- AOA Angle of Attack
- AOM Aircraft Operating Manual
- ARR Arrival
- AT Autothrottle
- ATC Air Traffic Control
- ATN Aeronautical Telecommunication Network
- ATP Airline Transport Pilot
- AV Audiovisual Presentation
- CAVOK Ceiling and Visibility Okay
- CDU Control Display Unit
- CPDLC Controller-Pilot Data Link Communications

- CFIT Controlled Flight Into Terrain
- CPT Cockpit Procedures Trainers
- DBU Data Base Unit
- DC Direct Current
- DCP Display Control Panel
- DEP Departure
- DH Decision Height
- DME Distance Measuring Equipment
- EASA European Aviation Safety Agency
- EFB Electronic Flight Bag
- EFVS Enhanced Flight Vision System
- EGPWS Enhanced Ground Proximity Warning System
- EICAS Engine Indicating and Crew Alerting System
- EPU Estimated Position Uncertainty
- ETP Equal Time Point
- EVS Enhanced Vision System
- FAA Federal Aviation Administration
- FAF Final Approach Fix
- FANS Future Air Navigation System
- FCOM Flightcrew Operating Manual
- FFS Full Flight Simulator
- FMS Flight Management System
- FOV Field of View
- FPA Flight Path Angle
- FPLN Flight Plan
- FPV Flight Path Vector
- FSB Flight Standardization Board
- FSTD Flight Simulation Training Device
- FTD Flight Training Device
- GNSS Global Navigation Satellite System
- GPS Global Positioning System
- GPSS Global Positioning Satellite Sensor
- HO Handout
- HSI Horizontal Situation Indicator
- HUD Head-Up Display
- IAP Instrument Approach Procedure
- ICBI Interactive Computer-Based Instruction
- IFIS Integrated Flight Information System
- ILS Instrument Landing System
- IR Infrared
- IRS Inertial Reference System
- LDP Landing Decision Point
- LED Light Emitting Diode
- LNAV Lateral Navigation

- LPV Localizer Performance with Vertical Guidance
- LRN Long-Range Navigation
- LRU Line Replaceable Unit
- LSA Low-Speed Awareness
- LSP Left Seat Pilot
- MA Missed Approach
- MDR Master Differences Requirements
- METAR Aviation Routine Weather Report
- MFD Multifunction Display
- MFF Mixed Fleet Flying
- MFW Multifunction Window
- MLW Maximum Landing Weight
- MTOW Maximum Takeoff Weight
- MZFW Maximum Zero Fuel Weight
- NAS National Airspace System
- NEXRAD Next Generation Weather Radar
- NM Nautical Mile
- NSP National Simulator Program
- OEI One-Engine-Inoperative
- OEM Original Equipment Manufacturer
- OM Operating Manual
- OpSpecs Operations Specifications
- PAPI Precision Approach Path Indicator
- PDU Pilot Display Unit
- PF Pilot Flying
- PFD Primary Flight Display
- PIC Pilot in Command
- PM Pilot Monitoring
- PNR Point of No Return
- POI Principal Operations Inspector
- PRAIM Predictive Receiver Autonomous Integrity Monitoring
- PTT Part Task Trainers
- QRH Quick Reference Handbook
- RA Radio Altimeter
- RAIM Receiver Autonomous Integrity Monitoring
- RF Radius to Fix
- RNAV Area Navigation
- RNP Required Navigation Performance
- RNP AR Required Navigation Performance Authorization Required
- SAAAR Special Aircraft and Aircrew Authorization Required
- SB Service Bulletin
- SBAS Satellite-Based Augmentation System
- SIC Second in Command
- SOP Standard Operating Procedure

- STC Supplemental Type Certificate
- SU Stand-Up Instruction
- SVS Synthetic Vision System
- TAF Terminal Aerodrome Forecast
- TAWS Terrain Awareness and Warning System
- TC Type Certificate
- TCAS Traffic Alert and Collision Avoidance System
- TCBI Tutorial Computer-Based Instruction
- TCCA Transport Canada Civil Aviation
- TCDS Type Certificate Data Sheet
- TCE Training Center Evaluator
- TOGA Takeoff/Go-Around
- TSS Traffic Surveillance System
- V_1 Takeoff Decision Speed
- VASI Visual Approach Slope Indicator
- VMC Visual Meteorological Conditions
- VNAV Vertical Navigation
- VOR Very High Frequency Omni-Directional Range
- V_{REF} Reference Landing Speed
- WAAS Wide Area Augmentation System

6. DEFINITIONS

These definitions are for the purpose of this report only.

6.1 Base Aircraft. An aircraft identified for use as a reference to compare differences with another aircraft.

6.2 Current. A crewmember meets all requirements to operate the aircraft under the applicable operating part.

6.3 Differences Tables. Describe the differences between a pair of related aircraft, and the minimum levels operators must use to conduct differences training and checking of flightcrew members. Differences levels range from A to E.

6.4 Master Differences Requirements (MDR). Specifies the minimum levels of training and checking required between a pair of related aircraft, derived from the highest level in the Differences Tables.

6.5 Mixed Fleet Flying (MFF). The operation of a base aircraft and one or more related aircraft for which credit may be taken for training, checking, and currency events.

6.6 Operational Evaluation. The AEG process to determine pilot type rating, minimum flightcrew member training, checking, and currency requirements, and unique or special airman certification requirements (e.g., specific flight characteristics, no-flap landing).

6.7 Operational Suitability. The AEG determination that an aircraft or system may be used in the National Airspace System (NAS) and meets the applicable operational regulations (e.g., Title 14 of the Code of Federal Regulations (14 CFR) parts 91, 121, 125, and 135).

6.8 Qualified. A flightcrew member holds the appropriate airman certificate and ratings as required by the applicable operating part.

6.9 Related Aircraft. Any two or more aircraft of the same make with either the same or different type certificates (TC) that have been demonstrated and determined by the Administrator to have commonality.

6.10 Seat-Dependent Tasks. Maneuvers or procedures using controls that are accessible or operable from only one flightcrew member seat.

6.11 Special Emphasis Area. A training requirement unique to the aircraft, based on a system, procedure, or maneuver, which requires additional highlighting during training. It may also require additional training time, specialized flight simulation training devices (FSTD), or training equipment.

6.12 Specific Flight Characteristic. A maneuver or procedure with unique handling or performance characteristics that the FSB has determined must be checked.

7. PILOT TYPE RATING

7.1 Type Rating. The Bombardier BD-100-1A10 type rating designation is CL-30.

7.2 Common Type Ratings. Not applicable.

7.3 Military Equivalent Designations. Military aircraft that qualify for the CL-30 type rating can be found at www.faa.gov under "Licenses & Certificates," "Airmen Certification," "Online Services," "Aircraft Type Rating Designators." This webpage is kept up-to-date and can be found at https://www.faa.gov/licenses_certificates/airmen_certification/.

8. RELATED AIRCRAFT

8.1 Related Aircraft on Same TCDS. Challenger 300 and Challenger 350.

8.2 Related Aircraft on Different TCDS. Not applicable.

9. PILOT TRAINING

9.1 Airman Experience. Airmen receiving initial, upgrade, or transition training should have experience in transport category turbojet aircraft, new generation avionics, high altitude operations, and flight management system (FMS) experience, etc. Pilots without this experience may require additional training.

9.2 Special Emphasis Areas.

9.2.1 Pilots must receive special emphasis on the following areas during initial, recurrent, and transition ground training:

9.2.1.1 Ground Training:

a) Wing leading edge contamination and its effect on clean stall speed.

b) The integration of the primary flight display (PFD)/multifunction display (MFD)/FMS and reversion modes provides multiple means of making essential navigation and communication selections.

9.2.2 Pilots must receive special emphasis on, and perform the following areas during initial and transition flight training:

9.2.2.1 Flight training (full flight simulator (FFS)) – Level C or D FFS and/or aircraft):

a) Aileron/elevator disconnect (jammed controls in each axis).

b) PFD, MFD, and engine indicating and crew alerting system (EICAS) reversionary modes.

c) Integrated use of EICAS messages, switch positions, and synoptic pages to determine aircraft system status.

d) Delayed engine response to full power applications at high altitudes (especially high altitude stalls).

e) Low energy rejected landing from idle thrust.

f) High altitude (above 31,000 ft) handling characteristics with the autopilot and yaw damper inoperative.

g) Enhanced ground proximity warning system (EGPWS) (including the loss of terrain mode when making MFD selections).

h) Loss of all direct current (DC) power.

i) Crew communications while wearing the oxygen mask using pressure breathing.

j) Primary, optional, and reversionary options of PFD, MFD, and FMS.

9.3 Specific Flight Characteristics. Maneuvers or procedures required to be checked as referenced in the Airline Transport Pilot (ATP) and Type Rating for Airplane Airmen Certification Standards (ACS). There are no specific flight characteristics.

9.4 Seat-Dependent Tasks. Pilots must receive training in this seat-dependent task: Nosewheel steering (left seat); initial, transition, upgrade, and recurrent training.

9.5 Regulatory Training Requirements Which Are Not Applicable to the Bombardier BD-100-A10. None

9.6 FSTDs. There are no specific systems, procedures, or maneuvers that are unique to the Bombardier BD-100-1A10 that require a specific FSTD for training.

9.7 Training Equipment. There are no specific systems or procedures that are unique to the Bombardier BD-100-1A10 that require specific training equipment.

9.8 Differences Training Between Related Aircraft. Pilots must receive differences training when operating in a mixed fleet between the Challenger 300 and the Challenger 350. The level of training is specified in Appendix 3, Differences Tables.

10. PILOT CHECKING

10.1 Landing from a No-Flap or Nonstandard Flap Approach. The probability of flap extension failure on the Bombardier BD-100-1A10 is not extremely remote due to system design. Therefore, demonstration of a no-flap approach and landing during pilot certification is required. During a § 61.58 proficiency check, § 91.1065 competency check, or § 135.293 competency check, this task may be required.

NOTE: Refer to FAA Order 8900.1, Volume 5, Airman Certification, when the test or check is conducted in an aircraft versus an FFS.

10.2 Specific Flight Characteristics. Maneuvers or procedures required to be checked as referenced in the ATP and Type Rating for Airplane ACS.

There are no specific flight characteristics.

10.3 Seat-Dependent Tasks. Pilots must be checked in this seat-dependent task: Nosewheel steering (left seat); initial, recurrent, upgrade, and transition training.

10.4 Other Checking Items. Proficiency in manual and automatic (including FMS) flight in normal, abnormal, and emergency situations must be demonstrated at each proficiency or competency check by all crewmembers, as applicable.

10.5 FSTDs. There are no specific systems, procedures, or maneuvers that are unique to the Bombardier BD-100-1A10 that require a specific FSTD for checking.

10.6 Equipment There are no specific systems or procedures that are unique to the Bombardier BD-100-1A10 that require specific equipment.

10.7 Differences Checking Between Related Aircraft. Pilots must receive differences checking when operating in a mixed fleet between the Challenger 300 and the Challenger 350. The level of checking is specified in Appendix 3.

11. PILOT CURRENCY

Pilots must maintain steep approach currency by completing three steep approaches within 3 calendar-months in the airplane or FFS.

11.1 Differences Currency Between Related Aircraft. Not applicable.

12. OPERATIONAL SUITABILITY

The Bombardier BD-100-1A10 has been found operationally suitable for operations under parts 91 and 135. The FSB determined operational compliance by conducting an evaluation of aircraft serial No. 20003 and 20004 in March 2003.

13. MISCELLANEOUS

13.1 Forward Observer Seat. No forward observer seat was evaluated.

13.2 Aircraft Approach Category. The Bombardier BD-100-1A10 is considered a Category C aircraft for the purposes of determining the appropriate instrument approach procedure (IAP) in accordance with 14 CFR part 97, § 97.3.

13.3 Normal Landing Flaps. The Bombardier BD-100-1A10 normal "final flap setting" per § 91.126(c) is flaps 30.

APPENDIX 1. DIFFERENCES LEGEND

Training Differences Legend

Differences Level	Type	Training Method Examples	Conditions
A	Self-Instruction	• Operating manual (OM) revision (handout (HO)) • Flightcrew operating bulletin (HO)	• Crew has already demonstrated understanding on base aircraft (e.g., updated version of engine). • Minor or no procedural changes required. • No safety impact if information is not reviewed or is forgotten (e.g., different engine vibration damping mount). • Once called to attention of crew, the difference is self-evident.
B	Aided Instruction	• Audiovisual presentation (AV) • Tutorial computer-based instruction (TCBI) • Stand-up instruction (SU)	• Systems are functionally similar. • Crew understanding required. • Issues need emphasis. • Standard methods of presentation required.
C	Systems Devices	• Interactive (full-task) computer-based instruction (ICBI) • Cockpit Procedures Trainers (CPT) • Part task trainers (PTT) • Level 4 or 5 flight training device (FTD 4-5)	• Training can only be accomplished through systems training devices. • Training objectives focus on mastering individual systems, procedures, or tasks versus highly integrated flight operations or “real-time” operations. • Training devices are required to assure attainment or retention of crew skills to accomplish more complex tasks usually related to aircraft systems.
D	Maneuvers Devices	• Level 6 or 7 flight training device (FTD 6-7) • Level A or B full flight simulator (FFS A-B)	• Training can only be accomplished in flight maneuver devices in a real-time environment. • Training requires mastery of interrelated skills versus individual skills. • Motion, visual, control-loading, and specific environmental conditions may be required.
E	Level C/D FFS or Aircraft	• Level C or D full flight simulator (FFS C-D) • Aircraft (ACFT)	• Motion, visual, control-loading, audio, and specific environmental conditions are required. • Significant full-task differences that require a high fidelity environment. • Usually correlates with significant differences in handling qualities.

Checking Differences Legend

Differences Level	Checking Method Examples	Conditions
A	None	None
B	• Oral or written exam • Tutorial computer-based instruction (TCBI) self-test	Individual systems or related groups of systems.
C	• Interactive (full-task) computer-based instruction (ICBI) • Cockpit Procedures Trainers (CPT) • Part task trainers (PTT) • Level 4 or 5 flight training device (FTD 4-5)	• Checking can only be accomplished using systems devices. • Checking objectives focus on mastering individual systems, procedures, or tasks.
D	• Level 6 or 7 flight training device (FTD 6-7) • Level A or B full flight simulator (FFS A-B)	• Checking can only be accomplished in flight maneuver devices in a real-time environment. • Checking requires mastery of interrelated skills versus individual skills. • Motion, visual, control-loading, and specific environmental conditions may be required.
E	• Level C or D full flight simulator (FFS C-D) • Aircraft (ACFT)	Significant full-task differences that require a high fidelity environment.

APPENDIX 2. MASTER DIFFERENCES REQUIREMENTS (MDR) TABLE

These are the minimum levels of training and checking required, derived from the highest level in the Differences Tables in Appendix 3. Differences levels are arranged as training/checking.

To Related Aircraft ↓	From Base Aircraft →	Challenger 300	Challenger 300 (Advanced Avionics)	Challenger 350	Challenger 350 (Collins Pro Line 21 V2.2)
Challenger 300		Not Applicable	B/B	B/B	B/B
Challenger 300 (Advanced Avionics)		B/B	Not Applicable	B/B	B/B
Challenger 350		B/B	B/B	Not Applicable	B/B
Challenger 350 (Collins Pro Line 21 V2.2)		B/B	B/B	B/B	(1)(2)(3)

NOTES:

(1) Challenger 350 to Challenger 350 with Autothrottle System Differences have been evaluated at D/B.
(2) Challenger 350 with Autothrottle System to Challenger 350 Differences have been evaluated at B/B.
(3) Challenger 350 with Autothrottle Differences for Steep Approach have been evaluated at D/B.

APPENDIX 3. DIFFERENCES TABLES

This Design Differences Table, from the Challenger 300 to the Challenger 300 (Advanced Avionics) or Challenger 350, was proposed by Bombardier and validated by the FSB. It lists the minimum differences levels operators must use to conduct differences training and checking of flightcrew members.

FROM BASE AIRCAFT: Challenger 300 TO RELATED AIRCRAFT: Challenger 300 (Advanced Avionics) or Challenger 350	DESIGN	REMARKS	FLT CHAR	PROC CHNG	TRAINING	CHECKING
	Aircraft General	(Challenger 350 Performance Upgrade) Passenger cabin updated with larger cabin windows.	No	No	A	A
	Aircraft General	(Challenger 350 Performance Upgrade) Larger winglets.	No	No	A	A

FROM BASE AIRCAFT: Challenger 300 TO RELATED AIRCRAFT: Challenger 300 (Advanced Avionics) or Challenger 350	DESIGN	REMARKS	FLT CHAR	PROC CHNG	TRAINING	CHECKING
	Limitations	(Challenger 350 Performance Upgrade) Increased operating weights: • Maximum takeoff weight (MTOW) AFM from 38,850 lbs to 40,600 lb. • MTOW Cert from 40,100 lbs to 40,600 lb. • Maximum Landing Weight (MLW) from 33,750 lb to 34,150 lb. • Maximum zero fuel weight (MZFW) from 27,200 lb to 28,200 lbs.	No	No	A	A
	ATA 22 Autoflight	½ bank not allowed in lateral navigation (LNAV) mode below normal transition 31,600 ft.	No	Yes	A	A

FROM BASE AIRCAFT: Challenger 300 TO RELATED AIRCRAFT: Challenger 300 (Advanced Avionics) or Challenger 350	DESIGN	REMARKS	FLT CHAR	PROC CHNG	TRAINING	CHECKING
	ATA 22 Autoflight	Go-around or missed approach. If LNAV is active prior to selection of takeoff/go-around (TOGA), LNAV remains engaged vs. defaulting to Roll or TO mode.	No	Yes	B	B
	ATA 23 Communications	Future Air Navigation System (FANS) 1/A+. Controller-Pilot Data Link Communications (CPDLC) and Automatic Dependent Surveillance-Contract (ADS-C) controlled via FMS 6200 control display unit (CDU). Aeronautical Telecommunication Network (ATN)/Links 2000+.	No	Yes	B	B
	ATA 31 Indicating/Recording Systems	Coast-to-Coast or Wall-to-Wall. Sky/ground PFD presentation.	No	No	B	A

FROM BASE AIRCAFT: Challenger 300 TO RELATED AIRCRAFT: Challenger 300 (Advanced Avionics) or Challenger 350	DESIGN	REMARKS	FLT CHAR	PROC CHNG	TRAINING	CHECKING
	ATA 31 Indicating/Recording Systems	Selectable advisory Flight Path Vector (FPV) available on left and right PFDs if optional inertial reference system (IRS) is installed. With Synthetic Vision System (SVS) displayed, the FPV is defaulted on.	No	Yes	B	B
	ATA 31 Indicating/Recording Systems	SVS provides situational awareness (advisory) to the crew by adding 3D terrain and runway data superimposed on the PFDs. SVS is pilot selectable.	No	Yes	B	B
	ATA 31 Indicating/Recording Systems	Normalized angle of attack (AOA) indication on PFD, advisory only.	No	No	B	A
	ATA 31 Indicating/Recording Systems	Readouts, flags, annunciation, and messages relocated on PFD and MFD.	No	Yes	A	A

FROM BASE AIRCAFT: Challenger 300 TO RELATED AIRCRAFT: Challenger 300 (Advanced Avionics) or Challenger 350	DESIGN	REMARKS	FLT CHAR	PROC CHNG	TRAINING	CHECKING
	ATA 34 Navigation	Dual IRS replaces the dual Attitude and Heading Reference System (AHRS) – Laser 6. No control panel. Ground alignment is automatic.	No	Yes	B	A
	ATA 34 Navigation	Provides true heading, support to Polar navigation, and immunity to magnetic distortions, backup to Global Positioning Satellite (GPS) position in remote and Oceanic areas.	No	Yes	A	A
	ATA 34 Navigation	Aircraft is Required Navigation Performance Authorization Required (RNP AR) >0.3 capable. Aircraft and pilot authorization required. Specialty Training. See Appendix 6.	-	-	-	-

FROM BASE AIRCAFT: Challenger 300 TO RELATED AIRCRAFT: Challenger 300 (Advanced Avionics) or Challenger 350	DESIGN	REMARKS	FLT CHAR	PROC CHNG	TRAINING	CHECKING
	ATA 34 Navigation	Traffic Surveillance System (TSS)-4100 (Traffic Alert and Collision Avoidance System (TCAS)/Transponder) installed. TCAS and air traffic control (ATC) controlled from a single line replaceable unit (LRU). New TCAS audio "Level Off, Level Off" replaces "Adjust Vertical Speed Adjust".	No	Yes	A	A
	ATA 34 Navigation	TCAS control panel changes. Intuitive to pilot.	No	No	A	A

FROM BASE AIRCAFT: Challenger 300 TO RELATED AIRCRAFT: Challenger 300 (Advanced Avionics) or Challenger 350	DESIGN	REMARKS	FLT CHAR	PROC CHNG	TRAINING	CHECKING
	ATA 34 Navigation	FMS 6200 replaces V3.0.3, resulting in changes to the following pages: • Global Navigation Satellite System (GNSS) Control. • Frequency Data. • Fix Info. • Very high frequency omni-directional range (VOR)/distance measuring equipment (DME) Control. • Pos Init. • Hold List. • Progress. • Defaults. • Arrival Data. • Fuel Management. • Nearest Airports. • Index. • Long-range navigation (LRN) Status. • DEP (departure)/ARR (arrival). • Database. • RNP receiver autonomous integrity monitoring (RAIM). • Flight Plan (FPLN) Predictive Receiver Autonomous Integrity Monitoring (PRAIM). • Satellite-Based Augmentation System (SBAS) Service providers.	No	Yes	B	A

FROM BASE AIRCAFT: Challenger 300 TO RELATED AIRCRAFT: Challenger 300 (Advanced Avionics) or Challenger 350	DESIGN	REMARKS	FLT CHAR	PROC CHNG	TRAINING	CHECKING
	ATA 34 Navigation	FMS 6200 auto position initialization from onside Global Positioning Satellite Sensor (GPSS) sensor. Auto mode armed on DEFAULT page.	No	Yes	B	A
	ATA 34 Navigation	FMS 6200 Number of characters in route names increases from 9 to 10. Number of Fix Points increases from 5 to 10. Number of pilot-defined waypoints increases from 50 to 100.	No	Yes	A	A

FROM BASE AIRCAFT: Challenger 300 TO RELATED AIRCRAFT: Challenger 300 (Advanced Avionics) or Challenger 350	DESIGN	REMARKS	FLT CHAR	PROC CHNG	TRAINING	CHECKING
	ATA 34 Navigation	FMS 6200 new features: • Terrain Awareness and Warning System (TAWS) Mode 5 Alert. • Auto Position Initialization. • V-speed out of Range message. • Actual Landing Distance (ALD) operation with contaminated runway. • Equal Time Point (ETP)/Point of No Return (PNR). • Remote (Data Base Unit (DBU)/Initiated) Database Dataload. • Manual Landing Factor. • Airway-to-Airway Transitions.	No	Yes	B	A
	ATA 34 Navigation	SBAS localizer performance with vertical guidance (LPV) 0.3 approach with Radius to Fix (RF) legs capable (not AR or Special Aircraft and Aircrew Authorization Required (SAAAR) at this time).	No	No	B	B

FROM BASE AIRCAFT: Challenger 300 TO RELATED AIRCRAFT: Challenger 300 (Advanced Avionics) or Challenger 350	DESIGN	REMARKS	FLT CHAR	PROC CHNG	TRAINING	CHECKING
	ATA 34 Navigation	Optimal SmartRunway and SmartLanding.	No	No	B	B
	ATA 34 Navigation	MultiScan weather radar with turbulence detection controlled at Display Control Panels (DCP) and Multiscan. Radar Menu and annunciations. Enhanced ground clutter suppression allowing usable weather detection on ranges up to 320 nautical miles (NM). Provisions for predictive windshear detection growth.	No	Yes	B	A

FROM BASE AIRCAFT: Challenger 300 TO RELATED AIRCRAFT: Challenger 300 (Advanced Avionics) or Challenger 350	DESIGN	REMARKS	FLT CHAR	PROC CHNG	TRAINING	CHECKING
	ATA 46 Information Systems	Optional Integrated Flight Information System (IFIS) Version 7.0 upgrade. Enhances electronic charts display and satellite graphical weather: • New XM weather capabilities for Canada and Puerto Rico. • Split viewing of approach charts. • Enroute charts. All new capabilities are available via commercial subscription service.	No	Yes	B	A
	ATA 70 Powerplant	*(Challenger 350 Performance Upgrade) Honeywell Level C engine thrust increases 7.3% at takeoff.	No	Yes	A	A

This Design Differences Table, from the Challenger 300 (Advanced Avionics) or Challenger 350 to the Challenger 300, was proposed by Bombardier and validated by the FSB. It lists the minimum differences levels operators must use to conduct differences training and checking of flightcrew members.

FROM BASE AIRCAFT: Challenger 300 (Advanced Avionics) or Challenger 350 **TO RELATED AIRCRAFT: Challenger 300**	**DESIGN**	**REMARKS**	**FLT CHAR**	**PROC CHNG**	**TRAINING**	**CHECKING**
	Aircraft General	Passenger cabin differs in layout and features. Smaller cabin windows.	No	No	A	A
	Aircraft General	Smaller winglets.	No	No	A	A
	Limitations	Decreased operating weights: • MTOW AFM from 40,600 lb to 38,850 lb. • MTOW Cert from 40,600 lb to 40,150 lb. • MLW from 34,150 lb to 33,750 lb. • MZFW from 28,200 lb to 27,200 lb.	No	No	A	A

FROM BASE AIRCAFT: Challenger 300 (Advanced Avionics) or Challenger 350 TO RELATED AIRCRAFT: Challenger 300	DESIGN	REMARKS	FLT CHAR	PROC CHNG	TRAINING	CHECKING
	ATA 22 Autoflight	½ bank allowed in LNAV mode below normal transition 31,600 ft.	No	Yes	A	A
	ATA 22 Autoflight	Go-around or missed approach. If LNAV is active prior to selection of TOGA, automatic flight control system (AFCS) guidance defaults to Roll or TO mode.	No	Yes	B	B
	ATA 23 Communications	No CPDLC (FANS 1/A+, ADS-C).	No	No	A	A
	ATA 31 Indicating/Recording Systems	Traditional Attitude Direction Indicator (ADI) and horizontal situation indicator (HSI) presentation on PFD.	No	No	A	A
	ATA 31 Indicating/Recording Systems	No selectable advisory FPV available on left and right PFDs.	No	No	A	A

FROM BASE AIRCAFT: Challenger 300 (Advanced Avionics) or Challenger 350 TO RELATED AIRCRAFT: Challenger 300	DESIGN	REMARKS	FLT CHAR	PROC CHNG	TRAINING	CHECKING
	ATA 31 Indicating/Recording Systems	No SVS.	No	No	A	A
	ATA 31 Indicating/Recording Systems	No advisory AOA indication on PFD.	No	No	A	A
	ATA 31 Indicating/Recording Systems	Readouts, flags, annunciation, and messages relocated on PFD and MFD.	No	Yes	A	A
	ATA 31 Indicating/Recording Systems	V-Bar design does not include white triangles at end of V-Bar cue.	No	No	A	A
	ATA 34 Navigation	Dual AHRS installed with control panel. Ground alignment is not automatic. No optional Dual IRS.	No	Yes	B	B

FROM BASE AIRCAFT: Challenger 300 (Advanced Avionics) or Challenger 350 TO RELATED AIRCRAFT: Challenger 300	DESIGN	REMARKS	FLT CHAR	PROC CHNG	TRAINING	CHECKING
	ATA 34 Navigation	No true heading to support to Polar navigation; immunity to magnetic distortions nor backup to GPS position in remote and Oceanic areas.	No	Yes	A	A
	ATA 34 Navigation	TCAS and ATC separate controls. New TCAS audio “Adjust Vertical Speed” versus “Level Off, Level Off.”	No	Yes	A	A
	ATA 34 Navigation	No Automatic Dependent Surveillance-Broadcast (ADS-B) Out and ADS-B In growth capability.	No	No	A	A
	ATA 34 Navigation	TCAS control panel changes. Intuitive to pilot.	No	No	A	A

FROM BASE AIRCAFT: Challenger 300 (Advanced Avionics) or Challenger 350 TO RELATED AIRCRAFT: Challenger 300	DESIGN	REMARKS	FLT CHAR	PROC CHNG	TRAINING	CHECKING
	ATA 34 Navigation	FMS V3.0.3 installed instead of FMS 6200. This has resulted in changes to the following pages: • GNSS Control. • Frequency Data. • Fix Info. • VOR/DME Control. • Pos Init. • Hold List. • Progress. • Defaults. • Arrival Data. • Fuel Management. • Nearest Airports. • Index. • LRN Status. • DEP/ARR. • Database. • RNP RAIM. • FPLN PRAIM. • SBAS Service Providers.	No	Yes	B	A

FROM BASE AIRCAFT: Challenger 300 (Advanced Avionics) or Challenger 350 TO RELATED AIRCRAFT: Challenger 300	DESIGN	REMARKS	FLT CHAR	PROC CHNG	TRAINING	CHECKING
	ATA 34 Navigation	No FMS auto position initialization from onside GPSS sensor.	No	Yes	B	A
	ATA 34 Navigation	FMS V3.0.3 Number of characters in route names decreases from 10 to 9. Number of Fix Points decreases from 10 to 5. Number of pilot-defined waypoints decreases from 100 to 50.	No	Yes	A	A
	ATA 34 Navigation	FMS contaminated runway ALDs calculations and landing reference speed ($V_{REF)}$ not supported.	No	Yes	B	B
	ATA 34 Navigation	RNP Missed Approach (MA) annunciation logic change.	No	No	B	B

FROM BASE AIRCAFT: Challenger 300 (Advanced Avionics) or Challenger 350 TO RELATED AIRCRAFT: Challenger 300	DESIGN	REMARKS	FLT CHAR	PROC CHNG	TRAINING	CHECKING
	ATA 34 Navigation	FMS A1 and A2 message lines relocated.	No	No	B	A
	ATA 34 Navigation	FMS A1 message not repeated ADI.	No	No	B	A
	ATA 34 Navigation	Estimated Position Uncertainty (EPU) not displayed on FMS NAV source block.	No	No	B	A
	ATA 34 Navigation	“UNABLE RNP” replaced with “NO APPR.”	No	No	B	B
	ATA 34 Navigation	FMS limitations differ.	No	No	B	B
	ATA 34 Navigation	RNP AR >0.3 capable.	No	Yes	D	B

FROM BASE AIRCAFT: Challenger 300 (Advanced Avionics) or Challenger 350 TO RELATED AIRCRAFT: Challenger 300	DESIGN	REMARKS	FLT CHAR	PROC CHNG	TRAINING	CHECKING
	ATA 34 Navigation	FMS V3.0.3 does not support: • TAWS Mode 5 Alert. • Auto Position Initialization. • V-speed Out of Range messages. • ALD operation with contaminated runway. • ETP/PNR. • Remote (DBU-Initiated) Database Download. • Manual Landing Factor. • Airway-to-Airway Transitions.	No	No	A	A
	ATA 34 Navigation	SBAS LPV available only via Supplemental Type Certificate (STC).	No	No	A	A
	ATA 34 Navigation	No optional SmartRunway and SmartLanding.	No	No	A	A

FROM BASE AIRCAFT: Challenger 300 (Advanced Avionics) or Challenger 350 TO RELATED AIRCRAFT: Challenger 300	DESIGN	REMARKS	FLT CHAR	PROC CHNG	TRAINING	CHECKING
	ATA 34 Navigation	Weather radar not MultiScan technology.	No	Yes	A	A
	ATA 46 Information Systems	No optional IFIS Version 7.0 upgrade.	No	Yes	B	A
	ATA 70 Powerplant	Challenger 300 engine thrust 7.3% decrease in takeoff thrust when compared to performance upgrade.	No	Yes	A	A

APPENDIX 4. CHALLENGER 300 IFIS "FILE SERVER SYSTEM"

1. PURPOSE AND APPLICABILITY

The following is provided for the benefit of FAA Principal Operations Inspectors (POI), air carrier operators, and 14 CFR part 142 training centers for their use in determining the acceptance of the Electronic Flight Bag (EFB) applications as provided by the IFIS installation in the Challenger 300. As described in the current edition of FAA AC 120-76, Authorization for Use of Electronic Flight Bags, this installation is classified as "installed equipment." EFB/IFIS functions are classified as Training Level C, Checking Level C.

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 Electronic Chart function allows the viewing of selected Jeppesen navigations charts. The Enhanced Map Overlays function is split into an application and a server that together provide map overlays of geopolitical, airspace, and airway data. The Graphical Weather Depiction function provides various weather images, such as Next Generation Weather Radar (NEXRAD), that are uploaded via data link. The standard aircraft configuration contains the Enhanced Map Overlays functions. Electronic charts and graphical weather are offered as customer-selected options.

3. FSB SPECIFICATIONS FOR TRAINING

Training is set at Level C. Level C training requires that flightcrews operating under 14 CFR parts 91 subpart K (part 91K) or 135 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 Aviation Routine Weather Reports (METAR) and Terminal Aerodrome Forecasts (TAF) for origin, destination, and alternate airports. Other part 91 operators are strongly encouraged to follow these same training guidelines.

4. FSB SPECIFCATIONS FOR CHECKING

Checking is set at Level C. Level C checking requires a demonstration of proficiency in a task or system. A check is required for initial differences and recurrent training. The check may be administered by a company check pilot, a Training Center Evaluator (TCE), or other person authorized by the Administrator. 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 standard operating procedures (SOP).

5. FSB SPECIFICATIONS FOR CURRENCY

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

APPENDIX 5. SOFTWARE UPGRADE

Challenger 300 Advanced Avionics (with Optional Collins Pro Line 21 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.

Level B training and checking is required for the Collins Pro Line 21 software installation for the Challenger 300 Advanced Avionics and the Challenger 350 (Collins Pro Line 21 V2.2). 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. Please see Appendix 3 of this document.

APPENDIX 6. RNP AR APPROACH CAPABILITY

1. RNP AR TRAINING

The RNP AR training described in this appendix does not replace the requirements or considerations in the current edition of FAA AC 90-101, Approval Guidance for RNP Procedures with AR. This report's requirements and recommendations are in addition to AC-90-101. Initial RNP AR training for the Challenger 300 (Advanced Avionics) and Challenger 350 is defined as Level D training in accordance with Appendix 1 of this document.

2. TRAINING PREREQUISITES

An applicant for RNP AR training must have first completed a CL-30 initial or recurrent course that includes the appropriate avionics installation.

3. INITIAL TRAINING REQUIREMENTS

The following is the recommended minimum level of training.

3.1 Ground Training. Prior to commencing RNP AR training, please see Appendix 2 of this document for the training requirements for the Challenger 300 (Advanced Avionics) or Challenger 350 Pro Line 21 V2.2 avionics software upgrade.

3.2 Flight Training. Training should be conducted in the left seat while performing the pilot flying (PF) duties in addition to training 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 RF segment and RF missed approach procedure. Seat-dependent training is necessary due to the specific duties of each pilot position. These duties include callouts, aircraft instrument scan, energy management, and checklist usage.

4. 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. Title 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 POIs to include RNP AR approaches in all applicable checking evaluations.

5. 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 parts 91

and 135. One approach should be terminated via a missed approach near the final approach fix (FAF). The second approach should be completed to a landing.

6. RNP AR CURRENCY

No specific currency requirements currently exist for RNP AR approaches. However, please refer to AC 90-101 for further guidance. Some part 135 operators may have training programs and operations specifications (OpSpec) that dictate required currency requirements. Any questions regarding RNP AR currency may be addressed to the FAA Flight Technologies and Procedures Division.

APPENDIX 7. CHALLENGER 350 STEEP APPROACH LANDING OPERATIONS

1. BACKGROUND

In June/Sept 2018, an FSB was convened in conjunction with the European Aviation Safety Agency (EASA) and Transport Canada Civil Aviation (TCCA) Operational Evaluation Board to determine operational suitability and evaluate training, checking, and currency requirements for conducting steep approach landing operations in the Challenger 350.

NOTE: This appendix does not apply to the Challenger 300 variant.

Steep approach landing operations are defined as those glidepaths greater than 4.5° and less than or equal to 6.0°. Challenger 350 aircraft modification for steep approach operation is accomplished through applicable Service Bulletin (SB) incorporation and operated in accordance with the Airplane Flight Manual Supplement (AFMS) 10 and is limited to 5.5°.

The FSB evaluation included numerous steep approach operations in the actual aircraft flown on a modified LPV wide area augmentation system (WAAS) glidepath of 5.5°. All-engines-operating (AEO) and one-engine-inoperative (OEI) steep approach operations were flown, terminating in a landing, execution of a missed approach, and/or balked landing procedure. Although steep approach operations in the Challenger 350 aircraft must be conducted with AEO, the FSB evaluated piloting skills required to perform an OEI extraction should an engine fail at or below Landing Decision Point (LDP).

2. PILOT TYPE RATING

Not applicable.

3. RELATED AIRCRAFT

Not applicable.

4. PILOT TRAINING

4.1 Experience/Prerequisite. The PF must be qualified and current on the Challenger 350 aircraft. The steep approach curriculum may be conducted concurrently with initial or recurrent training.

4.1.1 The PM must be:

a) A previously trained Challenger 350 aircraft pilot on steep approaches, or

b) Another pilot being trained in the same initial or recurrent course.

NOTE: Steep approach operations training is generally conducted as a crew. However, a pilot training alone may attend the course with another pilot acting as PM.

4.2 Special Emphasis Areas.

4.2.1 Ground and flight training:

a) Differences in radio altimeter (RA) callout strapping and its effect on perceived descent rate.

b) Glideslope intercept rate difference between normal and steep approach.

4.3 Ground Training.

4.3.1 Ground training must consist of training in the following areas and is appropriate to both pilot positions:

a) Supplement information contained in the AFM, OM or Flightcrew Operating Manual (FCOM), and quick reference handbook (QRH). Review to include limitations, emergency procedures, normal procedures, abnormal procedures, and performance.

b) Stabilized approach concept as a key to success.

c) Visual differences between 3.0° and 5.5° sight picture.

d) Illusions to include: runway dimension on height perception, crosswind condition perception, ground rush illusion, and black hole.

e) United Kingdom Aeronautical Information Publication (AIP) information and authorization for London City Airport (EGLC) operations.

f) Lighting aids available to the crew.

g) Converted meteorological visibility calculations.

h) Pilot techniques to include: avoidance of abrupt control inputs, early configuration prior to glideslope intercept, and rate of pitch change at glideslope intercept.

4.4 Flight Training.

4.4.1 Flight training must be conducted in an FFS Level D or the aircraft. FFS must have 14 CFR part 60 Class I or II airport modeling. Aircraft training must have an acceptable means to replicate 5.5° glideslope.

4.4.2 Autopilot use is NOT permitted during steep approach operations.

4.4.3 Flight training must contain the following and is applicable to duties for both the PF and PM:

a) One approach following a 5.5° glideslope to full stop using normal procedures.

b) One approach following a 5.5° glideslope to go-around using normal procedures.

c) One approach following a 5.5° glideslope with an engine failure during approach to a single-engine go-around using abnormal procedures.

d) One approach following a 5.5° glideslope with an engine failure below 200 ft to a landing.

e) One approach following a 5.5° glideslope in nighttime conditions to a full stop using normal procedures.

4.4.4 Environmental conditions for the flight training should attempt to replicate:

a) Minimum ceiling and visibilities.

b) Maximum allowable winds up to limiting values.

4.4.5 When using an FFS:

a) Repositions should occur to a point beyond and below the glideslope intercept to allow for PF practice of glideslope intercept transition.

b) The last steep approach should occur in real-time starting from takeoff to landing.

c) Increase turbulence level as wind speeds are increased due to building induced flow.

4.5 Recurrent Training. The FSB recommends, regardless of the number of steep approaches operationally completed, recurrent training be accomplished every 12 calendar-months.

4.5.1 The ground training segment must cover the items listed in subparagraph 4.3 above and may be abbreviated as deemed adequate by the instructor.

4.5.2 The flight training will include a minimum of three steep approach operations, which must include the following:

- One steep approach to a landing.
- One steep approach to a missed approach.
- One steep approach at night.

5. PILOT CHECKING

There is no checking requirement for Challenger 350 steep approach operation qualification. Documented satisfactory completion of steep approach operation training is sufficient.

6. PILOT CURRENCY

Three steep approaches must be conducted within 3 calendar-months in the airplane and/or approved FFS.

In the event that no approaches have been conducted within 3 calendar-months, the crew will complete at least three steep approaches and also conduct a self-review of all steep approach applicable information in the AFM, OM or FCOM, QRH, and any other operator-identified material.

7. OPERATIONAL SUITABILITY

The FSB requires ground and flight training for competency in conducting steep approach operations. Steep approach operations are demanding into any airport and can include modified procedures, short runways, and greater than "normal" sink rates. The FSB has determined that the conduct of steep approach operations, once trained, does not require greater than average piloting skills, and the Challenger 350 is operationally suitable.

Any pilot in command (PIC)/second in command (SIC) who has been properly qualified in the Challenger 350 aircraft under 14 CFR parts 61, 91K, or 135 may conduct steep approach operations provided the requirements of this appendix have been satisfactorily accomplished.

*An operational suitability determination does not constitute an operational authorization.
*Be advised, it is common that individual airport authorities have training and documentation requirements specific to their airfields with regards to steep approach requirements.

APPENDIX 8. COLLINS HEAD-UP DISPLAY (HUD) AND ENHANCED VISION SYSTEM (EVS)

1. BACKGROUND

This appendix addresses the installation of the Collins HUD System, HUD-6650, and Collins EVS-3600 (STC No. ST02691SE), for the Bombardier BD-100-1A10 (Challenger 350). It also addresses the combined operation of both systems, hereafter treated as enhanced flight vision system (EFVS).

Pilots using EVS should be careful not to conclude that the flightpath is free of hazards merely because none are visible in the EVS image either in the Collins HUD (EFVS configuration) or in the EVS Multifunction Window (MFW).

Collins HUD, EVS, and EFVS-proposed courseware, which includes the training program and Operations Manuals, was evaluated operationally by the FSB in February 2020 at the Collins Aerospace facility in Wilsonville, Oregon and in March 2020 at the Bombardier Flight Test facility in Wichita, Kansas.

During the evaluation, which included a determination of the system's operational suitability, the FSB found the Collins HUD and the Collins EVS operationally suitable for providing situational awareness for the crew.

NOTE: No determination of operational credit per 14 CFR part 91, § 91.176 was evaluated.

2. PILOT TYPE RATING REQUIREMENTS

The pilot type rating established for the BD-100-1A10 is CL-30 and remains unchanged.

NOTE: The installation of the evaluated Collins HUD/EVS/EFVS is only available on the Challenger 350 model.

3. RELATED AIRCRAFT

Not applicable

4. PILOT TRAINING

4.1 HUD.

The Collins HUD pilot training requirements consists of those items related to standalone, initial, recurrent, transition, and upgrade training for both ground and flight. Unless covered concurrently during an initial or recurrent type rating course, a prerequisite to beginning this course is prior training, qualification, and currency in the Challenger 350 airplane. It should be noted that the program focuses principally upon training events flown by the Left Seat Pilot (LSP)/PF.

The Collins Aerospace training was evaluated and found to be suitable to provide the pilot with the necessary knowledge and skills to use the HUD system installed on the Challenger 350 during all phases of flight according to the approved AFM.

Pilot training is comprised of ground (theoretical) and flight (practical) training. The flight training portion must be accomplished using an FFS or an aircraft.

NOTE: During this FSB evaluation, no FFS was available. All determinations were conducted in an aircraft.

4.1.1 Ground Training.

The ground training segment hereafter presented has been found adequate to provide pilots with the necessary knowledge to understand the Collins HUD system characteristics, operating logics, procedures, and limitations to the appropriate standard in preparation for the appropriate flight training segment.

For all operators, the recommended ground training should include the following elements:

- Operational concepts (initial, upgrade, transition, and recurrent).
- Benefits of HUD (initial, upgrade, and transition).
- Limitations (initial, upgrade, transition, and recurrent).
- Normal and abnormal procedures (initial, upgrade, transition, and recurrent).
- System components and controls (initial, upgrade, transition and recurrent).
- Symbology and indications (initial, upgrade, transition, and recurrent).
- HUD operations (initial, upgrade, transition, and recurrent).

The FSB recommends special emphasis in the following areas:

a) Instruction covering Collins HUD operational concepts, crew duties and responsibilities, and operational procedures including preflight, normal, and non-normal pilot activities (initial, upgrade, transition, and recurrent).

b) Collins Aerospace published manuals or equivalent material availability which explains all modes of operation, the use of various HUD controls, clear descriptions of HUD symbology, including limit conditions and failures, and incorporating the crew procedures guide clearly delineating PF duties and responsibilities during all phases of flight during which HUD operations are anticipated. Emphasis on the availability and limitations of visual cues encountered on approach both before and after decision height (DH) (initial, upgrade, transition, and recurrent).

4.1.2 Flight Training.

When an FFS is used, only FAA-approved Challenger 350 FFSs with both a visual and the Collins HUD system installed may be used. For FFS training, all required approaches should be flown from no closer than the FAF for instrument approaches and from no closer than approximately 1,000 feet above ground level (AGL) and 3 to 4 NM to the runway threshold for visual approaches.

The flight training segment hereafter presented is found adequate to provide the means for the pilot to gain the necessary skills and knowledge to safely and efficiently operate the Collins HUD through demonstration, instruction, and practice of maneuvers and procedures pertinent to the Collins HUD operation.

NOTE: When training is conducted in an aircraft, the following maneuvers may be amended as necessary for safety of flight.

For all operators, the recommended flight training should include the following elements:

- Normal takeoff (initial, upgrade, transition, and recurrent).
- Airwork (initial, upgrade, transition, and recurrent).
- Instrument landing system (ILS) ceiling and visibility okay (CAVOK) (practice deviation of glideslope) (initial, upgrade, transition, and recurrent).
- Takeoff with engine failure at takeoff decision speed (V_1) (initial, upgrade, transition, and recurrent).
- ILS approach with OEI resulting in an OEI go-around (initial, upgrade, transition, and recurrent).
- Area Navigation (RNAV) approach and landing with OEI (initial, upgrade, transition, and recurrent).
- Normal takeoff with reduced visibility (initial, upgrade, transition, and recurrent).
- Non-precision approach resulting in a circle to landing (initial, upgrade, transition, and recurrent).
- Takeoff with wind shear (initial, upgrade, transition, and recurrent).
- Instrument approach encountering wind shear resulting in a go-around (initial, upgrade, transition, and recurrent).
- Visual approach and landing (initial, upgrade, transition, and recurrent).

The FSB recommends special emphasis in the following areas:

a) Flight aspects related to the HUD unique symbology. Despite the fact the HUD is most commonly treated as a PFD repeater, there are elements displayed in the combiner that are not featured in PFD standard symbology or that are not identical to those depicted in the PFDs mostly due to the HUD monochromatic display characteristic (e.g., the low-speed awareness (LSA) tapes) (Initial, Upgrade, Transition, and Recurrent).

b) Over-reliance on the HUD during circling approach. The need to stay "outside" the aircraft with the runway/airport environment visual as much as possible until established on inbound turn to final is important (Initial, Upgrade, Transition, and Recurrent).

c) Declutter mode transition at 1,500 ft (Initial, Upgrade, Transition, and Recurrent).

d) HUD stowage prior to entry/egress of left pilot seat (Initial, Upgrade, Transition and Recurrent).

4.2 EVS MFW.

The EVS MFW Original Equipment Manufacturers (OEM) Operations Manuals (AFM, AOM, and QRH) were evaluated by this FSB and have been found suited to qualify flightcrews by means of their self-study. The FSB recommends special emphasis in the following area: EVS "visual" of any Approach Light System (ALS), RWY environment etc., does NOT constitute "RWY in sight" criteria.

4.3 EFVS.

Collins EFVS pilot training requirements consists of those related to initial training. A prerequisite to this training is prior qualification and currency in the Challenger 350 airplane as well as in the HUD operation.

The Collins EFVS proposed training was evaluated and found suited to provide the pilots with the necessary knowledge and skills to use the Collins EFVS installed on the Challenger 350 during all phases of flight according to the approved AFM.

Pilot training is comprised of ground (theoretical) and flight (practical) training. The flight training portion must be accomplished using an FFS or an aircraft.

Collins EFVS training is generally conducted as an established crew. However, a pilot training alone may attend the course with another pilot acting as a second crewmember.

The pilot acting as second crewmember must be:

- A qualified and current Challenger 350 pilot; or
- A qualified and current Challenger 350 flight instructor; or
- Another pilot being trained in the same course.

4.3.1 Initial Ground Training.

The ground training segment hereafter presented has been found adequate to provide pilots with the necessary knowledge to understand EFVS characteristics, operating logics, procedures, and limitations to the appropriate standard in preparation for the initial flight training segment.

For all operators, the recommended initial ground training should include the following elements as far as the Challenger 350 EFVS design characteristics permit:

4.3.1.1 General Operating Subjects:

- General overview of the system.
- Regulatory requirements pertinent to the operation being conducted.
- Visual references considerations when using EFVS and natural visibility.
- Temperature compensation.

4.3.1.2 Infrared (IR) Theory:

- General characteristics of EFVS image.
- Image quality is contingent on ambient weather conditions.
- Runway and approach lighting system, including the effect on light-emitting diode (LED) lights on EVS.
- Parallax effect.

4.3.1.3 Description of the EFVS Hardware:

- EVS sensors.
- EVS processor.
- HUD/Pilot Display Unit (PDU)/HUD computer/power supply unit.
- EFVS Control/MFW Operation/HUD format.
- EVS button description and conditions for use/HUD control panel.
- EVS differences on HUD:
  1. EFVS controls for the HUD.
  2. EVS MFW image.
  3. EFVS symbology in HUD.
  4. EFVS failures, including fault messages.

4.3.1.4 Review of the Operations Manuals (Limitations, Normal, Abnormal, and Emergency Procedures).

4.3.1.5 EFVS Operating Procedures:

- General use and philosophy of EFVS operation.
- Normal operations:
  1. Display adjustments for brightness and contrast (daytime and nighttime).
  2. Proper use of flight director, autopilot (including minimum use height), altitude alert system.
  3. Use of FPV and Flight Path Angle (FPA) during EFVS operations.
  4. Cross-checking HUD presentations against EVS sensor image.

5. Precision and non-precision approaches.
6. Obstacle and terrain clearance considerations.

- Weather conditions.
- Crosswind conditions, including the use of caged and uncaged modes.
- Abnormal procedures and limitations.
- Briefings.

4.3.1.6 Human Factor Issues:

- Interpretation of EFVS images.
- Visual anomalies.
- Misinterpretation of the IR video cues by the pilot.
- Familiarization to IR imagery.
- Effect of combining the EVS image with HUD symbology.
- Design eye position.
- Emphasize that the display of an IR image (2D image) in a HUD (narrow field of view (FOV)) that may result into some "tunneling" and "fascinating" effects.
- Visual effects.

4.3.2 Initial Flight Training.

When an FFS is used, only FAA-approved Challenger 350 FFSs with both a visual and the EFVS capabilities installed may be used. For FFS training, all required approaches should be flown from no closer than the FAF for instrument approaches and from no closer than approximately 1,000 ft AGL and 3 to 4 NM to the runway threshold for visual approaches.

The flight training segment hereafter presented has been found adequate to provide the means for the pilot to gain the necessary skills and knowledge to operate safely and efficiently EFVS through demonstration, instruction, and practice of maneuvers and procedures pertinent to EFVS operation.

Airports, departures, arrivals, and approaches pairings may be used at the discretion of the instructor in order to accommodate various crews and/or training needs.

The geographic local in which the crew operates predominately should be considered with city pairs, local regulations, operating units, and terminology adjusted accordingly.

For all operators, the recommended initial flight training program should include the following elements as far as the Challenger 350 EFVS design characteristics permit:

4.3.2.1 Pre-Briefing Events:

- Address simulated EFVS image quality versus actual aircraft.
- Some visual effects cannot be replicated in the FFS.
- HUD/EFVS display brightness may be different than that in the aircraft.

4.3.2.2 Preflight Procedures:

- Seat positioning/Design eye position: Design eyebox and cockpit cutoff angle.
- Rudder pedal adjustment.
- EFVS setup.
- Displays, modes, annunciations, and adjustments for brightness and contrast.
- System use, checks, and tests.
- Taxi with EFVS on:
  1. Night visual meteorological conditions (VMC) and low visibility.
  2. Daytime with low visibility.

4.3.2.3 Takeoff and Departure Phase:

- Normal takeoff (night).
- Takeoff with reduced visibility (dry).

4.3.2.4 In-Flight Tasks. Demonstration of EFVS symbology and imagery in night VMC, including Controlled Flight into Terrain (CFIT) scenarios.

4.3.2.5 Instrument Procedures. Different approach lighting configurations; use/non-use of aircraft lighting and taxi lights in flight and on ground; use and potential hazards of FPV and FPA reference cues; determination of enhanced flight visibility.

4.3.2.5.1 The following are to be completed in night time/VMC conditions:

- Precision approach.
- Non-precision approach.
- Instrument approach into mountainous airport (approach type is at instructor's discretion).

4.3.2.6 Postflight Procedures: Taxi to ramp (Low visibility).

4.3.2.7 Abnormal and Emergency Procedures: System malfunction presented during the approach.

4.3.2.7.1 Crew task allocations, crew coordination, and callouts pertinent to EFVS operations must be reinforced during training.

4.3.2.7.2 The FSB recommends special emphasis in the following areas:

a) IR theory and associated limitations. The pilots should be made aware of the general IR theory and the characteristics of the EFVS image, including the dependency of the image on the weather conditions or any meteorological phenomena that may potentially degrade the EFVS image and may require it to be removed.

b) EFVS visual cues not in same place with various flap settings.

c) Both Visual Approach Slope Indicators (VASI) and Precision Approach Path Indicator (PAPI) coloration under EFVS are monochromatic and must not be used.

5. PILOT CHECKING

The pilot will have successfully completed the ground training when the pilot displays adequate working knowledge of the HUD/EFVS to pass an oral or written examination covering HUD/EFVS operations.

Upon conclusion of the flight training segment the pilot must complete a proficiency check in which he or she must successfully demonstrate appropriate HUD/EFVS flight maneuvers and procedures in simulated flight in accordance with the appropriate operating procedures and within the tolerances specified in the ATP and Type Rating for Airplane ACS.

Checking requires a proficiency check conducted in a Level C FFS, with a daylight visual display or in a Level D FFS, which have been qualified by the National Simulator Program (NSP) for HUD/EFVS. A HUD/EFVS-equipped Challenger 350 aircraft may also be utilized. This check can be accomplished concurrently with a proficiency or competency check under §§ 61.57 and 61.58, or §§ 135.293 and 135.297.

APPENDIX 9. AUTOTHROTTLE (AT) SYSTEM

1. BACKGROUND

In May/June 2022, an FSB was convened in conjunction with the Transport Canada Civil Aviation (TCCA) to evaluate training, checking and currency requirements for the added Autothrottle (AT) System functionality in the Challenger 350 and determine operational suitability.

NOTE: This appendix does not apply to the Challenger 300 variant.

The proposed courseware, which included the training program and Operations Manuals, was evaluated operationally by the FSB at CAE Inc. training facilities in Montreal, Canada and at the Bombardier Flight Test Center facility in Wichita, Kansas.

2. PILOT TYPE RATING REQUIREMENTS

The pilot type rating established for the BD-100-1A10 is CL-30 and remains unchanged.

NOTE: The installation of the evaluated AT functionality is only available on the Challenger 350 model.

3. RELATED AIRCRAFT

NOTE: Pilots receiving initial training on a CL-350 equipped with AT are considered qualified to operate AT and non-AT equipped CL-350 aircraft.

4. PILOT TRAINING

Training Differences: Level D.

4.1 Experience/Prerequisite. The PF must be qualified and current on the Challenger 350 aircraft. The AT curriculum may be integrated into initial, recurrent, RNP AR and/or Steep Approach training.

4.2 Special Emphasis Areas.

4.2.1 Autothrottle availability during various phases of one-engine-inoperative (OEI) flight.

4.2.2 Energy management in normal and VNAV modes.

4.3 Ground Training.

4.3.1 The ground training segment presented has been found to be adequate to provide pilots with the necessary knowledge to understand the AT characteristics, operating logics, procedures, and limitations to the appropriate standard.

4.3.2 For all operators, ground training is recommended at Level B training. Please refer to Appendix 2 of this document for specific training levels.

4.4 Flight Training.

4.4.1 Flight training must be conducted in a Level D simulator or the aircraft.

4.5 Seat Dependent Task.

No seat dependent tasks have been identified.

5. PILOT CHECKING

Checking Differences: Level B.

Documented satisfactory completion of ground training exam and AT training to proficiency is sufficient.

6. PILOT CURRENCY

Not applicable.

7. OPERATIONAL SUITABILITY

The FSB has found the Challenger 350 AT to be operationally suitable under 14 CFR parts 91 and 135.*

*An operational suitability determination does not constitute an operational authorization.

NOTE: Any pilot in command (PIC)/second in command (SIC) who has been properly qualified in the Challenger 350 aircraft may use the AT provided the requirements of this appendix have been satisfactorily accomplished.