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Flight Standardization Board (FSB) Report

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Manufacturer
Bombardier, Inc.

Type Certificate Data Sheet (TCDS)	TCDS Identifier	Marketing Name	Pilot Type Rating
A21EA	CL-600-2B16	Challenger 604	CL-604
A21EA	CL-600-2B16	Challenger 604 ^(SB)	CL-604
A21EA	CL-600-2B16	Challenger 605	CL-604
A21EA	CL-600-2B16	Challenger 605 ^(SB)	CL-604
A21EA	CL-600-2B16	Challenger 650	CL-604

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1 RECORD OF REVISIONS

Revision Number	Sections(s)	Page(s) Affected	Date
Original	All	All	11/21/1996
1	Cover Sheet, Table of Contents, Revision Record, Highlights of Revision 1 Changes, 1.1, 1.2, 1.3, 1.4, 1.5, 1.7, 1.9, 2.1, 2.2, 2.3, 3.1, 4.1, 5.1, 5.2, 5.3, 5.4, 6.1, 6.2, 6.3, 6.4, 7.1, 7.2, 8.1, 9.1, 9.2, 9.3, 14.1, Appendix 1, 2, 3, and 5	1 – 25, 27, 51 - 92	12/5/2006
2	Cover sheet, Table of Contents, Revision Record, Highlights of Revision 2 Changes, Appendix 6 and 7	1 – 4, 93 – 101	11/10/2009
3	Cover Sheet, Table of Contents, Revision Record, Highlights of Revision 3 Changes, Appendix 7	1 – 4, 98 - 102	5/25/2012
4	Cover Sheet, Table of Contents, Revision Record, Highlights of Revision 4 Changes, 1, 2, 4, 5, 6, 7, 9, 10, 12, 14, Appendices 5, 7, 8, and 9	1, 3 – 5, 7 – 10, 12 – 18, 28, 41 - 76	12/03/2015
5	ALL	ALL	03/09/2018

2 INTRODUCTION

- 2.1 Aircraft Evaluation Groups (AEGs) 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.
- 2.2 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

- 3.1 The purpose of this revision is to meet FAA Section 508 compliance, FAA writing guidelines revised Flight Standardization Board (FSB) report requirements, and add a steep approach appendix.

NOTE: Due to significant administrative changes, revision bars are not used in this revision.

4 BACKGROUND

- 4.1 August—September 1995, the Long Beach AEG formed an FSB that evaluated the Canadair/Bombardier CL-604 as defined in FAA Type Certificate Data Sheet (TCDS) # A21EA. The evaluation was conducted using the methods described in FAA Advisory Circular (AC) 120-53, Crew Qualification and Pilot Type Rating Requirements for Transport Category Aircraft Operated Under FAR Part 121.
- 4.2 August—September 2006, the FSB conducted an evaluation of the CL-605 in accordance with AC 120-53 to validate the same pilot type rating proposal by Bombardier. It, as well as the associated Airplane Flight Manual (AFM) change, was found to be operationally suitable. Training and checking requirements are listed in Appendix 3, Differences Tables.
- 4.3 August 2009, the FSB evaluated the Rockwell Collins Model 6605 Head-Up Display System (HUD). It, as well as the associated AFM change, was found to be operationally suitable. Training and checking requirements are listed in Appendix 4, Head-Up Display (HUD) System.
- 4.4 January 2012, the FSB evaluated the CMA-2700 Enhanced Vision System (EVS) projected onto a Rockwell Collins Model 6605 HUD. It, as well as the associated AFM change, was found to be operationally suitable. Training and checking requirements are listed in Appendix 5, Enhanced Flight Vision System (EFVS).

- 4.5 September 2015, the FSB evaluated the Rockwell Collins Proline 21 avionics upgrades in the Challenger 605 production configuration. It, as well as the associated AFM change, was found to be operationally suitable. Training and checking requirements are listed in Appendix 6, Challenger 650 Avionics Upgrade Version 1.4.1.3.
- 4.6 November 2015, the FSB evaluated the Required Navigation Performance 0.3 – Authorization Required (RNP AR) capability in the upgraded Challenger 605 production configuration. It, as well as the associated AFM change, was found to be operationally suitable. Qualifications, training, and checking requirements are listed in Appendix 7, Required Navigation Performance 0.3 Authorization Required (RNP AR).
- 4.7 January 2017, the FSB evaluated the London City Airport (EGLC) steep approach capability. It, as well as the associated AFM change, was found to be operationally suitable. Training and checking requirements are listed in Appendix 8, Steep Approach Landing Operations.

5 ACRONYMS

14 CFR	Title 14 of the Code of Federal Regulations
3D	Three-Dimensional
AC	Advisory Circular
ADG	Air Driven Generator
ADI	Attitude Deviation Indicator
ADS-B	Automatic Dependent Surveillance - Broadcast
ADS-C	Automatic Dependent Surveillance - Contract
AEG	Aircraft Evaluation Group
AEO	All Engines Operative
AFCS	Automatic Flight Control System
AFM	Airplane Flight Manual
AFMS	Airplane Flight Manual Supplement
AGL	Above Ground Level
ALD	Actual Landing Distance
AOA	Angle of Attack
APU	Auxiliary Power Unit
AR	Authorization Required
ARP	Air Data Reference Panel
ATN	Aeronautical Telecommunication Network
CAS	Crew Alerting System
CBT	Computer-Based Training
CCP	Cursor Control Panel
CDU	Control Display Unit
CPAM	Cabin Pressure Acquisition Module
CPDLC	Controller-Pilot Data Link Communications
CRM	Crew Resource Management
DBU	Data Base Unit
DCP	Display Control Panel

DH	Decision Height
EFIS	Electronic Flight Instrument System
EFVS	Enhanced Flight Vision System
EGNOS	European Geostationary Navigation Overlay Service
EICAS	Engine Indicating and Crew Alerting System
ETP	Equal Time Point
EVS	Enhanced Vision System
FAA	Federal Aviation Administration
FAF	Final Approach Fix
FANS	Future Air Navigation System
FCP	Flight Control Panel
FCOM	Flightcrew Operating Manual
FD	Flight Director
FFS	Full Flight Simulator
FMA	Flight Mode Annunciator
FMS	Flight Management System
FPV	Flight Path Vector
FSB	Flight Standardization Board
FSTD	Flight Simulation Training Device
FTD	Flight Training Device
GPS	Global Positioning System
HDD	Head-Down Display
HUD	Head-Up Display
IFIS	Integrated Flight Information System
ILS	Instrument Landing System
IRS	Inertial Reference System
ISI	Integrated Standby Instrument
LED	Light-Emitting Diode
LNAV	Lateral Navigation
LPV	Localizer Performance with Vertical Guidance
MDA	Minimum Descent Altitude
MDR	Master Differences Requirements
MFD	Multifunction Display
NAS	National Airspace System
OEI	One Engine Inoperative
PFD	Primary Flight Display
PIC	Pilot in Command
PF	Pilot Flying
PM	Pilot Monitoring
PNR	Point of No Return
QRH	Quick Reference Handbook
RAAS	Runway Awareness Advisory System
RF	Radius-to-Fix
RNP AR	Required Navigation Performance Authorization Required
RPM	Revolutions Per Minute
RTU	Radio Tuning Unit

SA	Situational Awareness
SAAAR	Special Aircraft and Aircrew Authorization Required
SBAS	Satellite-Based Augmentation System
SIC	Second in Command
STV	Supplemental Type Certificate
SVS	Synthetic Vision System
TAWS	Terrain Awareness and Warning System
TCAS	Traffic Alert and Collision Avoidance System
TCDS	Type Certificate Data Sheet
WAAS	Wide Area Augmentation System

6 DEFINITIONS

These definitions are for the purposes 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 crewmembers. Difference levels range from A to E.
- 6.4 Master Differences Requirements (MDR). Specifies the highest training and checking difference levels between a pair of related aircraft derived from the Differences Tables.
- 6.5 Mixed Fleet Flying. 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. An AEG process to determine pilot type rating, minimum crewmember training, checking, and currency requirements, and unique or special airman certification requirements (e.g., specific flight characteristics, no-flap landing).
- 6.7 Operational Suitability. An 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, 133, 135).
- 6.8 Qualified. A crewmember 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 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 training devices, or training equipment.
- 6.12 Specific Flight Characteristics. 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 Challenger 604, Challenger 604^(SB), Challenger 605, Challenger 605^(SB), and Challenger 650 aircraft share the same type rating designation: CL-604.
- 7.2 Common type ratings: Not Applicable.
- 7.3 Military equivalent designations: Military aircraft that qualify for the CL-604 can be found on the [faa.gov](http://www.faa.gov/licenses_and_certificates/airmen_certification/) website under Licenses and Certificates, Airmen Certification, Online Services, Aircraft Type Rating Designators. This webpage is kept up-to-date and can be found at http://www.faa.gov/licenses_certificates/airmen_certification/.

8 RELATED AIRCRAFT

- 8.1 Related Aircraft on same TCDS:
 - 8.1.1 Challenger 604.
 - 8.1.2 Challenger 604^(SB).
 - 8.1.3 Challenger 605.
 - 8.1.4 Challenger 605^(SB).
 - 8.1.5 Challenger 650.
- 8.2 Related Aircraft on different TCDS: Not applicable.

9 PILOT TRAINING

- 9.1 Airman Experience:
 - 9.1.1 Airmen receiving CL-604 initial type training will benefit from prior experience operating multi-engine transport turbojet aircraft, new generation avionics, high altitude operations, Flight Management System (FMS), and HUD experience. Pilots without this experience may require additional training.

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

9.2 Special Emphasis Areas:

9.2.1 Challenger 604, Challenger 604^(SB), Challenger 605, Challenger 605^(SB), and Challenger 650 pilots must receive special emphasis on the following areas during initial ground/system integration training:

- a) FCP.
- b) FMA.
- c) Air Data Reference Panel (ADRP) or Cursor Control Panel (CCP) [as applicable].
- d) Integrated Flight Information System (IFIS) [when installed].
- e) Display Control Panel (DCP).
- f) FMS.
- g) Any additional requirements in the attached Appendixes.

9.2.2 Challenger 604, Challenger 604^(SB), Challenger 605, Challenger 605^(SB), and Challenger 650 pilots must receive special emphasis on, and perform, the following areas during initial flight training:

- a) Dual hydraulic system malfunctions (system 1 or 2 and system 3).
- b) Roll control during dual hydraulic system failure, including crosswind landing and rollout.
- c) Air Driven Generator (ADG) deployment.
- d) Instrument Landing System (ILS) approach on standby instruments.
- e) Primary Flight Display (PFD), Multifunction Display (MFD), and Engine Indicating and Crew Alerting System (EICAS) status page reversionary modes.
- f) Inability to exclusively use EICAS messages to determine aircraft system status. Some switches (i.e., L/R to aux fuel transfer, fuel crossflow, and Alternating Current essential bus transfer) are not represented by EICAS messages.
- g) Operations with inoperative Autothrottle [when installed].
- h) Flight Control System Jam procedures.
- i) Any additional requirements in the attached Appendixes.

9.3 Specific Flight Characteristics:

Maneuvers/procedures required to be checked as referenced in the Airline Transport Pilot (ATP) and Type Rating Practical Test Standards (PTS) or Airman Certification Standards (ACS), as applicable. There are no specific flight characteristics.

9.4 Seat Dependent Tasks:

9.4.1 Passenger Oxygen System activation (right seat); initial training.

9.4.2 Nosewheel steering tiller (left seat); initial, transition, and upgrade training.

9.4.3 HUD (left and/or right seat) when installed; See Appendix 4.

9.4.4 EFVS (left and/or right seat) when installed; See Appendix 5 for regulatory reference.

9.5 Regulatory Training Requirements Which Are Not Applicable to Challenger 604, Challenger 604^(SB), Challenger 605, Challenger 605^(SB), and Challenger 650. None.

9.6 Flight Simulation Training Devices (FSTD). There are no specific systems, procedures, or maneuvers that are unique to the Challenger 604, Challenger 604^(SB), Challenger 605, Challenger 605^(SB), and Challenger 650 that require a specific FSTD for training.

9.7 Training Equipment. There are no specific systems or procedures that are unique to the Challenger 604, Challenger 604^(SB), Challenger 605, Challenger 605^(SB), and Challenger 650 that require specific training equipment.

9.8 Differences Training Between Related Aircraft. Pilots must receive differences training between the Challenger 604, Challenger 604^(SB), Challenger 605, Challenger 605^(SB), and Challenger 650. The level of training is specified in Appendix 3.

10 PILOT CHECKING

10.1 Landing from a No Flap or Non-Standard Flap Approach:

The probability of flap extension failure on the Challenger 604, Challenger 604^(SB), Challenger 605, Challenger 605^(SB), and Challenger 650 is not extremely remote due to system design. Therefore, demonstration of a no flap approach and landing during pilot certification or a 14 CFR part 61, § 61.58 proficiency check, part 91, § 91.1065 competency check, or part 135, § 135.293 competency check is required. Refer to FAA Order 8900.1, Volume 5 when the test or check is conducted in an aircraft versus a Full Flight Simulator (FFS).

10.2 Specific Flight Characteristics:

Maneuvers/procedures required to be checked as referenced in the ATP and Type Rating PTS or ACS, as applicable. There are no specific flight characteristics.

10.3 Seat Dependent Tasks:

There are no seat dependent tasks

10.4 Other Checking Items:

10.4.1 Proficiency in manual and automatic (including FMS and Autothrottle) flight in normal, abnormal, and emergency situations must be demonstrated at each proficiency/competency check by all crewmembers.

10.4.2 The use of manual modes and/or emergency systems must be demonstrated at each proficiency/competency check by all crewmembers. Examples of systems to be utilized: electrical, hydraulic, pressurization, flight controls, gear, and ADG.

10.5 FSTDs:

10.5.1 HUD must be checked in a level C or D FFS in both day and night conditions. Additional information and requirements are in Appendix 4.

10.6 Equipment. There are no specific systems or procedures that are unique to the Challenger 604, Challenger 604^(SB), Challenger 605, Challenger 605^(SB), and Challenger 650 that require specific equipment.

10.7 Differences Checking Between Related Aircraft:

Pilots must receive differences checking between the Challenger 604, Challenger 604^(SB), Challenger 605, Challenger 605^(SB), and Challenger 650. The level of checking is specified in Appendix 3, and any additional requirements are in the attached Appendices.

11 PILOT CURRENCY

11.1 Pilots must maintain currency in the following:

11.1.1 HUD Approaches – see Appendix 4.

11.1.2 EFVS Approaches – see Appendix 5 for regulatory reference.

11.1.3 RNP AR Approaches – see Appendix 7.

11.1.4 Steep Approaches – see Appendix 8.

12 OPERATIONAL SUITABILITY

The Challenger 604, Challenger 604^(SB), Challenger 605, Challenger 605^(SB), and Challenger 650 are operationally suitable for operations under 14 CFR parts 91, 91K, and 135. The FSB determined operational compliance by conducting an evaluation of aircraft serial number 5301 on 09/14/1995. The list of operating rules evaluated is on file at the Long Beach AEG.

13 MISCELLANEOUS

13.1 Flightcrew Sleeping Facilities (Part 135). None

13.2 Forward Observer Seat:

The Challenger 604, Challenger 604^(SB), Challenger 605, Challenger 605^(SB), and Challenger 650 forward observer seat as installed by SA02355NY-T, ST02502CH, and ST02543CH-D have been evaluated and determined to meet the requirements of § 135.75(b) and FAA AC 120-83, Flight Deck Observer Seat and Associated Equipment.

13.3 Landing Minima Categories:

Reference 14 CFR part 97, § 97.3. The Challenger 604, Challenger 604^(SB), Challenger 605, Challenger 605^(SB), and Challenger 650 is considered Category C aircraft for the purposes of determining “straight-in landing weather minima.” 1.3 V_{SO} at Flaps 45 is 137 knots at the maximum gross landing weight of 38,000 pounds.

13.4 Emergency Evacuation:

The FSB has not evaluated an emergency evacuation on the Challenger 604, Challenger 604^(SB), Challenger 605, Challenger 605^(SB), and Challenger 650.

13.5 Normal Landing Flaps:

The Challenger 604, Challenger 604^(SB), Challenger 605, Challenger 605^(SB), and Challenger 650 normal “final landing flap setting” per § 91.126(c) is Flaps 45.

APPENDIX 1. DIFFERENCES LEGEND

Training Differences Legend

Differences Level	Type	Training Method Examples	Conditions
A	Self-Instruction	<ul style="list-style-type: none"> • Operating manual revision (HO) • Flightcrew operating bulletin (HO) 	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • Audiovisual presentation (AV) • Tutorial computer-based instruction (TCBI) • Stand-up instruction (SU) 	<ul style="list-style-type: none"> • Systems are functionally similar. • Crew understanding required. • Issues need emphasis. • Standard methods of presentation required.
C	Systems Devices	<ul style="list-style-type: none"> • 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) 	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • Level 6 or 7 flight training device (FTD 6-7) • Level A or B full flight simulator (FFS A-B) 	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • Level C or D full flight simulator (FFS C-D) • Aircraft (ACFT) 	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • Oral or written exam • Tutorial computer-based instruction self-test (TCBI) 	<ul style="list-style-type: none"> • Individual systems or related groups of systems.
C	<ul style="list-style-type: none"> • 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) 	<ul style="list-style-type: none"> • Checking can only be accomplished using systems devices. • Checking objectives focus on mastering individual systems, procedures, or tasks.
D	<ul style="list-style-type: none"> • Level 6 or 7 flight training device (FTD 6-7) • Level A or B full flight simulator (FFS A-B) 	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • Level C or D full flight simulator (FFS C-D) • Aircraft (ACFT) 	<ul style="list-style-type: none"> • 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.

Related Aircraft ↓	Base Aircraft →	CL-604	CL-604 ^(SB)	CL-605	CL-605 ^(SB)	CL-650
CL-604		Not applicable	A/B	C/B	C/B	C/B
CL-604 ^(SB)		B/B	Not applicable	B/B	B/B	B/B
CL-605		C/B	A/B	Not applicable	B/B	B/B
CL-605 ^(SB)		C/B	A/B	B/B	Not applicable	B/B
CL-650		C/B	A/B	B/B	B/B	Not applicable

The next page has definitions, explanations, and descriptions of the variations of the Aircraft Marketing Names as identified on TCDS number A21EA as CL-600-2B16 (CL-604 Variant).

CL-604 refers to the basic Challenger 604 aircraft, including serial numbers 5301 to 5699, and is referred to as Challenger 604.

CL-604^(SB) refers to a CL-604 which have installed Service Bulletin 604-23-013 or 604-23-014 implementing the Future Air Navigation System (FANS) 1A+ Controller-Pilot Data Link Communications (CPDLC) plus Automatic Dependent Surveillance – Contact (ADS-C) avionics upgrade only. This aircraft is referred as the Challenger 604^(SB).

CL-605 refers to the basic CL-605 which does not have any of Avionics Upgrade Service Bulletins installed as defined in paragraph 1 of Appendix 6. These aircraft include serial numbers 5701 to 5990 and is referred to as a Challenger 605.

CL-605^(SB) refers to a 605 aircraft with at least one to all of the Avionics Upgrade Service Bulletins installed as denoted in paragraph 1 of Appendix 6. This aircraft is referred to as Challenger 605^(SB). RNP AR training/checking/currency requirements are addressed in Appendix 7.

CL-650 incorporates all the Avionics Upgrade Service Bulletins as denoted in paragraph 1 of appendix 6. These aircraft are newly manufactured via block point change on the assembly line and denoted as serial number 6050 and subsequent. These aircraft are referred to as Challenger 650. RNP AR training/checking/currency requirements are addressed in Appendix 7.

APPENDIX 3. DIFFERENCES TABLES

CL-604 to CL-604^(SB)

This Design Differences table, from the Challenger 604 to the Challenger 604^(SB), was proposed by Bombardier and validated via analysis by the FSB in October 2017. It lists the minimum differences levels operators must use to conduct differences training and checking of flightcrew members.

FROM BASE AIRCRAFT: CL-604	DESIGN	REMARKS	FLT CHAR	PROC CHNG	TRAINING	CHECKING
TO RELATED AIRCRAFT: CL-604 ^(SB)						
	Limitations	Optional AFM Supplement BAS63045019	No	No	A	A
	23 - Communications	Optional FANS 1A+ (CPDLC plus ADS-C) via CMU-1000.	No	Yes	B	B

CL-604^(SB) to CL-604

This Design Differences table, from the Challenger 604^(SB) to the Challenger 604, was proposed by Bombardier and validated via analysis by the FSB in October 2017. It lists the minimum differences levels operators must use to conduct differences training and checking of flightcrew members.

FROM BASE AIRCRAFT: CL-604 ^(SB) TO RELATED AIRCRAFT: CL-604	DESIGN	REMARKS	FLT CHAR	PROC CHNG	TRAINING	CHECKING
	Limitations	AFM Supplement BAS63045019	No	No	A	A
	23 - Communications	Challenger 604 without SB does not support: FANS 1A+ (CPDLC plus ADS-C) via CMU-1000.	No	Yes	A	B

CL-604^(SB) to CL-605

This Design Differences table, from the Challenger 604^(SB) to the Challenger 605, was proposed by Bombardier and validated via analysis by the FSB in October 2017. It lists the minimum differences levels operators must use to conduct differences training and checking of flightcrew members.

FROM BASE AIRCRAFT: CL-604 ^(SB) TO RELATED AIRCRAFT: CL-605	DESIGN	REMARKS	FLT CHAR	PROC CHNG	TRAINING	CHECKING
	Limitations	AFM Supplement BAS63045019	No	No	A	A
	23 - Communications	Optional FANS 1A+ (CPDLC plus ADS-C) via FMS 6200 CDU. Not Available without SB.	No	Yes	A	B

CL-604^(SB) to CL-605^(SB)/CL-650

This Design Differences table, from the Challenger 604^(SB) to the Challenger 605^(SB)/Challenger 650, was proposed by Bombardier and validated via analysis by the FSB in October 2017. It lists the minimum differences levels operators must use to conduct differences training and checking of flightcrew members.

FROM BASE AIRCRAFT: CL-604 ^(SB) TO RELATED AIRCRAFT: CL-605 ^(SB) / CL-650	DESIGN	REMARKS	FLT CHAR	PROC CHNG	TRAINING	CHECKING
	Limitations	AFM Supplement BAS63045019	No	No	A	A
	23 - Communications	Optional FANS 1A+ (CPDLC plus ADS-C) via FMS 6200 CDU. Not Available without SB.	No	Yes	A	B

CL-605 to CL-604^(SB)

This Design Differences table, from the Challenger 605 to the Challenger 604^(SB), was proposed by Bombardier and validated via analysis by the FSB in October 2017. It lists the minimum differences levels operators must use to conduct differences training and checking of flightcrew members.

FROM BASE AIRCRAFT: CL-605	DESIGN	REMARKS	FLT CHAR	PROC CHNG	TRAINING	CHECKING
TO RELATED AIRCRAFT: CL-604 ^(SB)						
	Limitations	AFM Supplement BAS63045019	No	No	A	A
	23 - Communications	Optional FANS 1A+ (CPDLC plus ADS-C) via CMU-1000.	No	Yes	B	B

CL-604 to CL-605

This Design Differences table, from the Challenger 604 to the Challenger 605, 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 AIRCRAFT: CL-604 TO RELATED AIRCRAFT: CL-605	DESIGN	REMARKS	FLT CHAR	PROC CHNG	TRAINING	CHECKING
	Aircraft General	Passenger cabin windows increased in size and raised. Over wing emergency exit raised.	No	No	A	A
	Aircraft General	Aerodynamic tail cone redesigned	No	No	A	A
	21 - Air Conditioning	Thermostatically controlled pilot and copilot heated floor mats installed	No	No	A	A
	21 - Air Conditioning	Footwarmers and windshield heater and fan deleted.	No	No	A	A
	21 - Air Conditioning	Copilot demist handle and CKPT HEAT switch on air conditioning panel removed	No	No	A	A

FROM BASE AIRCRAFT: CL-604 TO RELATED AIRCRAFT: CL-605	DESIGN	REMARKS	FLT CHAR	PROC CHNG	TRAINING	CHECKING
	21 - Air Conditioning	2 nd Cabin Pressure Acquisition Module (CPAM) installed, standby cabin altitude indicator removed	No	Yes	A	A
	21 - Air Conditioning	Cabin temperature control transfer switch (CABIN TEMP CONT XFER) added to air conditioning control panel	No	Yes	A	A
	22 - Autoflight	Autothrottle is standard equipment	No	Yes	B	A
	22 - Autoflight	Autothrottle control panel and switches installed on left glareshield	No	Yes	B	A
	23 - Communications	Radio Tuning Units (RTU) removed, tuning functions performed by CCP/MFD	No	Yes	B	A
	24 - Electrical Power	AC/DC utility switch/light added to Electrical Power panel and minor changes in electrical power distribution	No	Yes	A	A

FROM BASE AIRCRAFT: CL-604 TO RELATED AIRCRAFT: CL-605	DESIGN	REMARKS	FLT CHAR	PROC CHNG	TRAINING	CHECKING
	27 - Flight Controls	STALL annunciators removed from glareshield, replaced by STALL indications on PFD	No	Yes	A	A
	31 - Indicating/ Recording Systems	Pro Line 21 replaces Pro Line 4 Six displays replaced by four large (10x12) displays Air Data Reference Panel (ARP), DCP, Weather Radar Control Panel, EICAS Control Panel removed, replaced by DCP (On-side PFD) and Cursor Control Panel (CCP) (On-side MFD) Industry standard color convention for displays adopted.	No	Yes	C	B
	31 - Indicating/ Recording Systems	EICAS - Crew Alerting System (CAS) messages combined into single stack, same stacking philosophy.	No	No	A	A

FROM BASE AIRCRAFT: CL-604 TO RELATED AIRCRAFT: CL-605	DESIGN	REMARKS	FLT CHAR	PROC CHNG	TRAINING	CHECKING
	31 - Indicating/Recording Systems	Auxiliary Power Unit (APU) temperature and Revolutions Per Minute (RPM) display on MFD is different in format.	No	No	A	A
	31 - Indicating/Recording Systems	EFIS - Advisory AOA indicator available on each PFD	No	No	A	A
	31 - Indicating/Recording Systems	Optional Capability of supporting: Enhanced map displays, XM/Universal weather display, etc.	(*)	(*)	(*)	(*)
	31 - Indicating/Recording Systems	Over Speed test (OVSP TEST) switch removed. No pre-flight Over Speed test required.	No	Yes	A	A
	31 - Indicating/Recording Systems	EICAS - Single warning/caution switch/light on glareshield (one per side)	No	No	A	A

FROM BASE AIRCRAFT: CL-604 TO RELATED AIRCRAFT: CL-605	DESIGN	REMARKS	FLT CHAR	PROC CHNG	TRAINING	CHECKING
	31 - Indicating/ Recording Systems	Standby instruments, Electro-pneumatic standby Altitude/Airspeed and Attitude instruments replaced by an Integrated Standby Instrument (ISI)	No	Yes	A	A
	31 - Indicating/ Recording Systems	Electronic clocks (two) replaced with a single Global Positioning System (GPS) - capable clock	No	No	A	A
	33 - Lights	Circuit breaker and integral cockpit panel lighting and some switch/lights changed to Light Emitting Diode (LEDs)	No	No	A	A
	33 - Lights	Pulsating landing lights are standard equipment	No	No	A	A
	34 - Navigation	Barometer knob functionality and location is modified	No	Yes	A	A
	34 - Navigation	Inertial Reference System (IRS) system capable of in-flight navigation alignment	No	Yes	A	A

FROM BASE AIRCRAFT: CL-604 TO RELATED AIRCRAFT: CL-605	DESIGN	REMARKS	FLT CHAR	PROC CHNG	TRAINING	CHECKING
	34 - Navigation	FMS Control Display Unit (CDU). Smaller CDU-6200 installed. Alpha-numeric key layout differs	No	Yes	A	A
	34 - Navigation	FMS Color convention on PFD differs	No	No	A	A
	34 - Navigation	Terrain Awareness and Warning System (TAWS) altitude callouts available for both Decision Height (DH) and Minimum Descent Altitude (MDA)	No	Yes	A	A
	49 - Airborne Auxiliary Power	APU Honeywell 36-150 is standard	No	Yes	A	A

(*) - Not evaluated by the FSB.

CL-605 to CL-604

This Design Differences table, from the Challenger 605 to the Challenger 604, 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 AIRCRAFT: CL-605 TO RELATED AIRCRAFT: CL-604	DESIGN	REMARKS	FLT CHAR	PROC CHNG	TRAINING	CHECKING
	Aircraft General	Passenger cabin windows are smaller in size and situated lower.	No	No	A	A
	Aircraft General	Over wing emergency exit is situated lower.	No	No	A	A
	Aircraft General	Different aerodynamic tail cone	No	No	A	A
	21 - Air Conditioning	No thermostatically controlled pilot and copilot heated floor mats installed.	No	No	A	A
	21 - Air Conditioning	Forced air foot-warming and windshield demist provided. Fan and electric heater controlled by CKPT HEAT switch on air conditioning panel.	No	No	A	A

FROM BASE AIRCRAFT: CL-605 TO RELATED AIRCRAFT: CL-604	DESIGN	REMARKS	FLT CHAR	PROC CHNG	TRAINING	CHECKING
	21 - Air Conditioning	Full foot warmer/full windshield vent control knob installed on copilot side panel removed.	No	No	A	A
	21 - Air Conditioning	Single CPAM installed, standby cabin altitude indicator provided beneath glareshield.	No	Yes	A	A
	21 - Air Conditioning	No cabin temperature control transfer switch on air conditioning control panel.	No	Yes	A	A
	22 - Autoflight	Optional Autothrottle.	No	Yes	A	A
	22 - Autoflight	Autopilot mistrim icons appear on PFD.	No	Yes	A	A
	23 - Communications	Radio tuning functions performed at RTU vice CCP/MFD.	No	Yes	B	A
	24 - Electrical Power	No AC/DC utility switch/light on Electrical Power panel and minor changes in electrical distribution.	No	Yes	A	A

FROM BASE AIRCRAFT: CL-605 TO RELATED AIRCRAFT: CL-604	DESIGN	REMARKS	FLT CHAR	PROC CHNG	TRAINING	CHECKING
	27 – Flight Controls	STALL annunciators on left and right glareshield, vice PFD.	No	Yes	A	A
	31 - Indicating/ Recording Systems	Pro Line 4 avionics suite installed vice Pro Line 21. Four displays replaced by six smaller displays ARP, DCP, Weather Radar Control Panel, EICAS Control Panel installed, vice CCP Non-standard FMS color conventions used for displays.	No	Yes	C	B
	31 - Indicating/ Recording Systems	EICAS - CAS messages displayed on two EICAS Displays same stacking philosophy although two stacks.	No	No	A	A
	31 - Indicating/ Recording Systems	EFIS - No Advisory AOA indicator on PFDs.	No	No	A	A

FROM BASE AIRCRAFT: CL-605 TO RELATED AIRCRAFT: CL-604	DESIGN	REMARKS	FLT CHAR	PROC CHNG	TRAINING	CHECKING
	31 - Indicating/ Recording Systems	Over Speed test (OVSP TEST) switch installed to facilitate testing during pre-flight.	No	Yes	A	A
	31 - Indicating/ Recording Systems	EICAS - Separate warning/caution switch/lights on glareshield (one warning and one caution per side).	No	No	A	A
	31 - Indicating/ Recording Systems	APU temperature and RPM display on MFD is different in format.	No	No	A	A
	31 - Indicating/ Recording Systems	Standby instruments, electro-pneumatic standby Altitude/Airspeed and Attitude instruments installed.	No	Yes	A	A
	31 - Indicating/ Recording Systems	Two Electronic clocks installed - no GPS interface.	No	No	A	A
	33 - Lights	Circuit breaker and integral cockpit panel lighting and switch/lights are incandescent.	No	No	A	A

FROM BASE AIRCRAFT: CL-605 TO RELATED AIRCRAFT: CL-604	DESIGN	REMARKS	FLT CHAR	PROC CHNG	TRAINING	CHECKING
	33 - Lights	Pulsating landing lights available as optional equipment only.	No	No	A	A
	34 - Navigation	Barometer knob functionality and location differs.	No	Yes	A	A
	34 - Navigation	IRS system not capable of in-flight navigation alignment.	No	Yes	A	A
	34 - Navigation	FMS Color convention on PFD differs.	No	No	A	A
	34 - Navigation	Larger FMS CDU- 6000 installed. Alpha-numeric key layout differs.	No	Yes	A	A
	34 - Navigation	TAWS altitude callouts available for radio altitude (DH) only.	No	Yes	A	A
	34 - Navigation	Radio Altitude, pilot initiated test function provided.	No	Yes	A	A
	49 - Airborne Auxiliary Power	APU GTCP-36-100E is standard.	No	Yes	A	A

CL-604 to CL-605^(SB)/CL-650

This Design Differences table, from the Challenger 604 to the Challenger 605^(SB)/Challenger 650, 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.

NOTE: This table denotes training and checking requirements for upgrading from a Challenger 604 to either a Challenger 605 with Avionics Upgrade Service Bulletins installed 605^(SB) or a Challenger 650.

An asterisk (*) denotes an upgraded or added Service Bulletin component to the Challenger 605.

N/A means Not Applicable.

FROM BASE AIRCRAFT: CL-604	DESIGN	REMARKS	FLT CHAR	PROC CHNG	TRAINING	CHECKING
TO RELATED AIRCRAFT: CL-605 ^(SB) / CL-650						
	Aircraft General	Passenger cabin windows increased in size and raised.	No	No	A	A
	Aircraft General	Over wing emergency exit raised.	No	No	A	A
	Aircraft General	Aerodynamic tail cone redesigned	No	No	A	A
	21 - Air Conditioning	Thermostatically controlled pilot and copilot heated floor mats installed	No	No	A	A

FROM BASE AIRCRAFT: CL-604 TO RELATED AIRCRAFT: CL-605^(SB)/ CL-650	DESIGN	REMARKS	FLT CHAR	PROC CHNG	TRAINING	CHECKING
	21 - Air Conditioning	Footwarmers and windshield heater and fan deleted.	No	No	A	A
	21 - Air Conditioning	Copilot demist handle and CKPT HEAT switch on air conditioning panel removed	No	No	A	A
	21 - Air Conditioning	2 nd CPAM installed, standby cabin altitude indicator removed.	No	Yes	A	A
	21 - Air Conditioning	Cabin temperature control transfer switch (CABIN TEMP CONT XFER) added to air conditioning control panel	No	Yes	A	A
	22 - Autoflight	Autothrottle is standard equipment	No	Yes	B	A
	22 - Autoflight	Autothrottle control panel and switches installed on left glareshield	No	Yes	B	A

FROM BASE AIRCRAFT: CL-604 TO RELATED AIRCRAFT: CL-605^(SB)/ CL-650	DESIGN	REMARKS	FLT CHAR	PROC CHNG	TRAINING	CHECKING
	22 - Autoflight	Optional 605*/650 ½ bank not available in Lateral Navigation (LNAV) mode below 31,600 feet.	No	Yes	B	B
	23 - Communications	RTU removed, tuning functions performed by CCP/MFD	No	Yes	B	A
	23 - Communications	Optional 605*/650 FANS 1A+ CPDLC plus ADS-C via FMS 6200 CDU.	No	Yes	B	B
	24 - Electrical Power	AC/DC utility switch/light added to Electrical Power panel and minor changes in electrical power distribution	No	Yes	A	A
	27 - Stall Protection	STALL annunciators removed from glareshield, replaced by STALL indications on PFD	No	Yes	A	A

FROM BASE AIRCRAFT: CL-604 TO RELATED AIRCRAFT: CL-605^(SB)/ CL-650	DESIGN	REMARKS	FLT CHAR	PROC CHNG	TRAINING	CHECKING
	31 - Indicating/ Recording Systems	Pro Line 21 replaces Pro Line 4 Six displays replaced by four large (10x12) displays ARP, DCP, Weather Radar Control Panel, EICAS Control Panel removed, replaced by Display Control Panel (DCP) (On-side PFD) and CCP (On-side MFD) Industry standard color convention for displays adopted.	No	Yes	C	B
	31 - Indicating/ Recording Systems	EICAS - CAS messages combined into single stack, same stacking philosophy.	No	No	A	A
	31 - Indicating/ Recording Systems	APU temperature and RPM display on MFD is different in format.	No	No	A	A
	31 - Indicating/ Recording Systems	EFIS - Advisory AOA indicator available on each PFD	No	No	A	A

FROM BASE AIRCRAFT: CL-604 TO RELATED AIRCRAFT: CL-605^(SB)/ CL-650	DESIGN	REMARKS	FLT CHAR	PROC CHNG	TRAINING	CHECKING
	31 - Indicating/Recording Systems	Optional 605*/650 Capable of supporting optional: Enhanced map displays, XM/Universal weather display, etc.	No	Yes	B	A
	31 - Indicating/Recording Systems	Over Speed test (OVSP TEST) switch removed. No pre-flight Over Speed test required.	No	Yes	A	A
	31 - Indicating/Recording Systems	EICAS - Single warning/caution switch/light on glareshield (one per side)	No	No	A	A
	31 - Indicating/Recording Systems	Standby instruments, electro-pneumatic standby Altitude/Airspeed and Attitude instruments replaced by an ISI	No	Yes	A	A
	31 - Indicating/Recording Systems	Electronic clocks (two) replaced with a single GPS-capable clock	No	No	A	A

FROM BASE AIRCRAFT: CL-604 TO RELATED AIRCRAFT: CL-605^(SB)/ CL-650	DESIGN	REMARKS	FLT CHAR	PROC CHNG	TRAINING	CHECKING
	31 - Indicating/ Recording Systems	Optional 605*/650 Synthetic Vision System (SVS) provides situational awareness (advisory) to the crew by adding Three-Dimensional (3D) terrain and runway data superimposed on the PFDs. SVS is pilot selectable.	No	No	B	B
	33 - Lights	Circuit breaker and integral cockpit panel lighting and some switch/lights changed to LEDs	No	No	A	A
	33 - Lights	Pulsating landing lights are standard equipment	No	No	A	A
	34 - Navigation	Barometer knob functionality and location is modified	No	Yes	A	A

FROM BASE AIRCRAFT: CL-604 TO RELATED AIRCRAFT: CL-605^(SB)/ CL-650	DESIGN	REMARKS	FLT CHAR	PROC CHNG	TRAINING	CHECKING
	34 - Navigation	Optional 605*/650 FMS 6200 new features: Auto Position Initialization PERF out of Range message Actual Landing Distance (ALD) operation with contaminated runway Remote (Data Base Unit (DBU)- Initiated) Database Dataload Manual Landing Factor Airway to Airway Transitions	No	Yes	B	A
	34 - Navigation	IRS system capable of in-flight navigation alignment	No	Yes	A	A
	34 - Navigation	FMS CDU. Smaller CDU-6200 installed. Alpha-numeric key layout differs.	No	Yes	A	A
	34 - Navigation	FMS Color convention on PFD differs	No	No	A	A

FROM BASE AIRCRAFT: CL-604 TO RELATED AIRCRAFT: CL-605^(SB)/ CL-650	DESIGN	REMARKS	FLT CHAR	PROC CHNG	TRAINING	CHECKING
	34 - Navigation	TAWS altitude callouts available for both DH and MDA	No	Yes	A	A
	34 - Navigation	Optional 605*/650 Required Navigation Performance - Authorization Required (RNP- AR) >0.3 capable. [Specialty training required]	Yes	Yes	D	D
	34 - Navigation	Optional 605*/650 Traffic Surveillance System TSS-4100 (Traffic Alert and Collision Avoidance System) (TCAS)/Transponder) installed.	No	Yes	A	A
	34 - Navigation	Provides future growth for Automatic Dependent Surveillance - Broadcast (ADS-B) Out and ADS-B In. (not evaluated)	(*)	(*)	(*)	(*)

FROM BASE AIRCRAFT: CL-604 TO RELATED AIRCRAFT: CL-605^(SB)/ CL-650	DESIGN	REMARKS	FLT CHAR	PROC CHNG	TRAINING	CHECKING
	34 - Navigation	Optional 605*/650 Satellite-Based Augmentation System (SBAS) Localizer Performance with Vertical Guidance (LPV) 0.3 approach with Radius-to-Fix (RF) legs capability.	No	Yes	B	A
	34 - Navigation	Optional 605*/650 SmartRunway™ and SmartLanding™ .	No	Yes	B	B

FROM BASE AIRCRAFT: CL-604 TO RELATED AIRCRAFT: CL-605^(SB)/ CL-650	DESIGN	REMARKS	FLT CHAR	PROC CHNG	TRAINING	CHECKING
	34 - Navigation	<p>Optional 605*/650</p> <p>Multiscan™ weather radar with turbulence detection</p> <p>Controlled at DCPs and Multiscan™ Radar Menu and annunciations</p> <p>Enhanced ground clutter suppression, allowing usable weather detection on ranges up to 300 NM.</p> <p>Provisions for predictive windshear detection growth.</p>	No	Yes	B	A

FROM BASE AIRCRAFT: CL-604 TO RELATED AIRCRAFT: CL-605^(SB)/ CL-650	DESIGN	REMARKS	FLT CHAR	PROC CHNG	TRAINING	CHECKING
	46 - Information Systems	Optional 605*/650 IFIS Version 7.0 upgrade. Enhances electronic charts display and satellite graphical weather: New XM weather capabilities for Canada and Puerto Rico. Enroute charts All new capabilities are available via commercial subscription service.	No	Yes	A	A
	49 - Airborne Auxiliary Power	APU Honeywell 36-150 is standard.	No	Yes	A	A

(*) - Not evaluated by the FSB.

CL-605 to CL-605^(SB)/CL-650

This Design Differences table, from the Challenger 605 to the Challenger 605^(SB)/Challenger 650, 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.

NOTE: This table denotes training and checking requirements when transitioning from a Challenger 605 without Avionics Upgrade Service Bulletins installed to a Challenger 605^(SB) or Challenger 650.

FROM BASE AIRCRAFT: CL-605	DESIGN	REMARKS	FLT CHAR	PROC CHNG	TRAINING	CHECKING
TO RELATED AIRCRAFT: CL-605 ^(SB) / CL-650						
	22 - Autoflight	½ bank is not available in LNAV mode below 31,600 feet.	No	Yes	B	B
	23 - Communications	FANS-1A+ CPDLC and ADS-C controlled via FMS 6200 CDU. Aeronautical Telecommunication Network (ATN)/Links 2000+ is optional.	No	Yes	B	B

FROM BASE AIRCRAFT: CL-605 TO RELATED AIRCRAFT: CL-605^(SB)/ CL-650	DESIGN	REMARKS	FLT CHAR	PROC CHNG	TRAINING	CHECKING
	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	No	B	B
	34 - Navigation	Traffic Surveillance System TSS-4100 (TCAS/Transponder) installed. New TCAS audio “Level Off, Level Off” replaces “Adjust Vertical Speed”.	No	Yes	A	A

FROM BASE AIRCRAFT: CL-605 TO RELATED AIRCRAFT: CL-605^(SB)/ CL-650	DESIGN	REMARKS	FLT CHAR	PROC CHNG	TRAINING	CHECKING
	34 - Navigation	<p>SBAS LPV 0.3 approach with RF legs capability (not Authorization Required (AR) or Special Aircraft and Aircrew Authorization Required (SAAAR) at this time).</p> <p>SBAS = Wide Area Augmentation System (WAAS) and European Geostationary Navigation Overlay Service (EGNOS).</p> <p>Not Applicable if base 605 already has Supplemental Type Certificate (STC) for WAAS LPV.</p>	No	Yes	B	A
	34 - Navigation	<p>FMS 6200 new features: Auto Position Initialization PERF out of Range message ALD operation with contaminated runway Remote (DBU-Initiated) Database Dataload Manual Landing Factor Airway to Airway Transitions</p>	No	Yes	B	A

FROM BASE AIRCRAFT: CL-605 TO RELATED AIRCRAFT: CL-605^(SB)/ CL-650	DESIGN	REMARKS	FLT CHAR	PROC CHNG	TRAINING	CHECKING
	34 - Navigation	Optional SmartRunway™ and SmartLanding™ .	No	No	B	B
	34 - Navigation	Multiscan™ weather radar with turbulence detection Controlled at DCPs and Multiscan™ Radar Menu and annunciations Enhanced ground clutter suppression, allowing usable weather detection on ranges up to 300 NM. Provisions for predictive windshear detection growth.	No	Yes	B	A
	34 - Navigation	Optional 605*/650 RNP AR >0.3 capable. [Specialty training required].	Yes	Yes	D	D

FROM BASE AIRCRAFT: CL-605 TO RELATED AIRCRAFT: CL-605^(SB)/ CL-650	DESIGN	REMARKS	FLT CHAR	PROC CHNG	TRAINING	CHECKING
	46 - Information Systems	<p>Optional</p> <p>IFIS Version 7.2 upgrade. Enhances electronic charts display and satellite graphical weather:</p> <p>New XM weather capabilities for Canada and Puerto Rico.</p> <p>Enroute charts</p> <p>All new capabilities are available via commercial subscription service.</p>	No	Yes	B	A

CL-605^(SB)/CL-650 to CL-604

This Design Differences table, from the Challenger 605^(SB)/Challenger 650 to the Challenger 604, 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.

NOTE: This table denotes training and checking requirements when transitioning from either a Challenger 605 with Avionics Upgrade Service Bulletins installed (605^(SB)) or a Challenger 650, to a Challenger 604.

FROM BASE AIRCRAFT: CL-605 ^(SB) / CL-650 TO RELATED AIRCRAFT: CL-604	DESIGN	REMARKS	FLT CHAR	PROC CHNG	TRAINING	CHECKING
	Aircraft General	Passenger cabin windows are smaller in size and situated lower.	No	No	A	A
	Aircraft General	Over wing emergency exit is situated lower.	No	No	A	A
	Aircraft General	Different aerodynamic tail cone.	No	No	A	A
	21 - Air Conditioning	No thermostatically controlled pilot and copilot heated floor mats installed.	No	No	A	A

FROM BASE AIRCRAFT: CL-605^(SB)/ CL-650 TO RELATED AIRCRAFT: CL-604	DESIGN	REMARKS	FLT CHAR	PROC CHNG	TRAINING	CHECKING
	21 - Air Conditioning	Forced air foot-warming and windshield demist provided. Fan and electric heater controlled by CKPT HEAT switch on air conditioning panel.	No	No	A	A
	21 - Air Conditioning	Full foot warmer/full windshield vent control knob installed on copilot side panel removed.	No	No	A	A
	21 - Air Conditioning	Single CPAM installed, standby cabin altitude indicator provided beneath glareshield.	No	Yes	A	A
	21 - Air Conditioning	No cabin temperature control transfer switch on air conditioning control panel.	No	Yes	A	A
	22 - Autoflight	Optional Autothrottle	No	Yes	A	A
	22 - Autoflight	Autopilot mistrim icons appear on PFD.	No	Yes	A	A

FROM BASE AIRCRAFT: CL-605^(SB)/ CL-650 TO RELATED AIRCRAFT: CL-604	DESIGN	REMARKS	FLT CHAR	PROC CHNG	TRAINING	CHECKING
	22 - Autoflight	½ bank selectable in LNAV mode below 31,600 feet.	No	Yes	A	A
	23 - Communications	Radio tuning functions performed at RTU vice CCP/MFD.	No	Yes	B	A
	23 - Communications	CL-604 FMS does not support: FANS 1A+ (CPDLC plus ADS-C) ATN/LINKS 2000+ (future upgrade).	No	No	A	A
	23 - Communications	CL-604 ^(SB) Only FANS 1A+ CPDLC plus ADS-C controlled via FMS 6000 CDU.	No	Yes	B	B
	24 - Electrical Power	No AC utility switch/light on Electrical Power panel and minor changes in electrical distribution.	No	Yes	A	A

FROM BASE AIRCRAFT: CL-605^(SB)/ CL-650 TO RELATED AIRCRAFT: CL-604	DESIGN	REMARKS	FLT CHAR	PROC CHNG	TRAINING	CHECKING
	27 - Flight Controls	STALL annunciators on left and right glareshield, vice PFD.	No	Yes	A	A
	31- Indicating/ Recording Systems	Pro Line 4 avionics suite installed vice Pro Line 21. Four displays replaced by six smaller displays. ARP, DCP, Weather Radar Control Panel, EICAS Control Panel installed, vice CCP. Non-standard FMS color conventions used for displays.	No	Yes	C	B
	31- Indicating/ Recording Systems	EICAS - CAS messages displayed on two EICAS Displays - same stacking philosophy although two stacks.	No	No	A	A
	31- Indicating/ Recording Systems	EFIS - No Advisory AOA indicator on PFDs.	No	No	A	A

FROM BASE AIRCRAFT: CL-605^(SB)/ CL-650 TO RELATED AIRCRAFT: CL-604	DESIGN	REMARKS	FLT CHAR	PROC CHNG	TRAINING	CHECKING
	31- Indicating/Recording Systems	Over Speed test (OVSP TEST) switch installed to facilitate testing during pre-flight.	No	Yes	A	A
	31- Indicating/Recording Systems	EICAS - Separate warning/caution switch/lights on glareshield (one warning and one caution per side).	No	No	A	A
	31- Indicating/Recording Systems	APU temperature and RPM display on MFD is different in format.	No	No	A	A
	31- Indicating/Recording Systems	Standby instruments, electro-pneumatic standby Altitude/Airspeed and Attitude instruments installed.	No	Yes	A	A
	31- Indicating/Recording Systems	Two electronic clocks installed - no GPS interface.	No	No	A	A
	31- Indicating/Recording Systems	No SVS.	No	No	A	A

FROM BASE AIRCRAFT: CL-605^(SB)/ CL-650 TO RELATED AIRCRAFT: CL-604	DESIGN	REMARKS	FLT CHAR	PROC CHNG	TRAINING	CHECKING
	33 - Lights	Circuit breaker and integral cockpit panel lighting and switch/lights are incandescent.	No	No	A	A
	33 - Lights	Pulsating landing lights available as optional equipment only.	No	No	A	A
	34 - Navigation	FMS 6000 does not support: Auto Position Initialization PERF out of Range message ALD operation with contaminated runway Equal Time Point (ETP) Point of No Return (PNR) Remote (DBU-Initiated) Database Dataload Manual Landing Factor Airway to Airway Transitions	No	Yes	B	A
	34 - Navigation	Barometer knob functionality and location differs.	No	Yes	A	A
	34 - Navigation	IRS system is not capable of in-flight navigation alignment.	No	Yes	A	A

FROM BASE AIRCRAFT: CL-605^(SB)/ CL-650 TO RELATED AIRCRAFT: CL-604	DESIGN	REMARKS	FLT CHAR	PROC CHNG	TRAINING	CHECKING
	34 - Navigation	FMS CDU alpha-numeric key layout differs.	No	No	A	A
	34 - Navigation	FMS Color convention on PFD differs.	No	No	A	A
	34 - Navigation	TAWS altitude callouts available for radio altitude DH only.	No	Yes	A	A
	34 - Navigation	No RNP AR >0.3 capability.	No	No	A	A
	34 - Navigation	No SBAS LPV capability.	No	No	A	A
	34 - Navigation	No SmartRunway™ and SmartLanding™.	No	No	A	A
	34 - Navigation	Radio Altitude, pilot initiated test function provided.	No	Yes	A	A
	34 - Navigation	Weather radar is not Multiscan™ capable.	No	Yes	A	A
	46 - Information Systems	No IFIS capability.	No	No	A	A

FROM BASE AIRCRAFT: CL-605^(SB)/ CL-650 TO RELATED AIRCRAFT: CL-604	DESIGN	REMARKS	FLT CHAR	PROC CHNG	TRAINING	CHECKING
	49 - Airborne Auxiliary Power	APU GTCP-36-100E is standard.	No	Yes	A	A

CL-605^(SB)/CL-650 to CL-605

This Design Differences table, from the Challenger 605^(SB)/Challenger 650 to the Challenger 605, 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.

NOTE: This table denotes training and checking requirements when transitioning from a Challenger 605^(SB) or Challenger 650 to a Challenger 605 without Avionics Upgrade Service Bulletins installed.

FROM BASE AIRCRAFT: CL-605 ^(SB) / CL-650 TO RELATED AIRCRAFT: CL-605	DESIGN	REMARKS	FLT CHAR	PROC CHNG	TRAINING	CHECKING
	22 - Autoflight	½ bank is selectable in LNAV mode below 31,600 feet.	No	Yes	B	B
	23 - Communications	No FANS-1A, CPDLC or ADS-C capable.	No	Yes	A	A
	31- Indicating/ Recording Systems	No SVS capability.	No	No	A	A

FROM BASE AIRCRAFT: CL-605^(SB)/ CL-650 TO RELATED AIRCRAFT: CL-605	DESIGN	REMARKS	FLT CHAR	PROC CHNG	TRAINING	CHECKING
	34 - Navigation	FMS 6000 does not support: Auto Position Initialization PERF out of Range message ALD operation with contaminated runway ETP PNR Remote (DBU-Initiated) Database Dataload Manual Landing Factor Airway to Airway Transitions	No	Yes	B	A
	34 - Navigation	Does not support Traffic Surveillance System TSS-4100 (TCAS/Transponder). TCAS audio “Adjust Vertical Speed Adjust Vertical Speed” “replaces “Level Off, Level Off”.	No	Yes	A	A
	34 - Navigation	No SBAS capability. LPV 0.3 approach not available.	No	Yes	A	A

FROM BASE AIRCRAFT: CL-605^(SB)/ CL-650 TO RELATED AIRCRAFT: CL-605	DESIGN	REMARKS	FLT CHAR	PROC CHNG	TRAINING	CHECKING
	34 - Navigation	No SmartRunway™ and SmartLanding™.	No	No	A	A
	34 - Navigation	No Multiscan™ weather radar with turbulence provisions and predictive windshear.	No	Yes	A	A
	34 - Navigation	No RNP AR > 0.3 capability.	No	No	A	A
	46 - Information Systems	No IFIS Version 7.2.	No	Yes	A	A

APPENDIX 4. HEAD-UP DISPLAY (HUD) SYSTEM

1 BACKGROUND

In August 2009, a Flight Standardization Board (FSB) was convened to determine operational suitability and evaluate training, checking, and currency requirements for the Rockwell Collins Model 6605 HUD in the Challenger 605 aircraft.

The FSB utilized a Challenger 605 Full Flight Simulator (FFS) and a Challenger 605 aircraft to validate the training at Bombardier's Flight Test facility in Wichita, KS. The FSB completed numerous HUD approaches at several different airports using Category I procedures during day and night.

2 PILOT TYPE RATING

Not applicable.

3 RELATED AIRCRAFT

- 3.1 Challenger 604.
- 3.2 Challenger 604^(SB).
- 3.3 Challenger 605.
- 3.4 Challenger 605^(SB).
- 3.5 Challenger 650.

4 PILOT TRAINING

Experience/prerequisite. Unless the HUD training is integrated with, or occurs prior to, an initial qualification proficiency check, a prerequisite to HUD training in a Challenger 605 airplane is prior training, qualification, and currency in the Challenger 605.

The HUD pilot training requirements consist of those related to initial and recurrent ground and flight training. It should be noted that the HUD training program focuses principally upon training events flown in the left seat by the Pilot in Command (PIC) as Pilot Flying (PF). Nevertheless, HUD training of Pilot Monitoring (PM) Second in Command (SIC) duties in the right seat is required where there are procedural differences for the PM and when the PF is heads up (compared to heads down). SIC HUD familiarization flown in the left seat is recommended.

Flightcrew member training must be accomplished using a Challenger 605 Level C FFS with a daylight visual display, or a Challenger 605 Level D FFS, or a Challenger 605 aircraft equipped with a HUD. The FSB has determined that each PIC should receive a minimum of 3 hours of HUD ground school training, followed by a minimum of 3 hours of HUD flight

training in the left seat in either an approved Challenger 605 Level C or D FFS or Challenger 605 aircraft. (The 3 hours of ground and 3 hours of flight training is an initial requirement only.)

A person who progresses satisfactorily through flight training, is recommended by an instructor, and successfully completes the appropriate HUD proficiency check by a person authorized by the Administrator need not complete the recommended 3 hours of flight training.

4.1 Special Emphasis Areas:

4.1.1 Ground Training:

- a) Crew Coordination.
- b) Crew Briefings and Callouts.
- c) Duties of PF and PM.
- d) Engine Indicating and Crew Alerting System (EICAS) messages and use of the Quick Reference Handbook (QRH) and checklists applicable to HUD operations.

4.1.2 Flight Training:

- a) HUD unique symbology with the autopilot and flight director both off and on (i.e., Flight Path Vector (FPV), Flight Path Acceleration Cue, speed error tape, low- and high-speed cues, Flight Mode Annunciator (FMA), use of non-conformal symbology, including the use of the FPV to recognize and recover from flight at high Angle of Attack (AOA), and excessive pitch chevrons).
- b) Use of the AOA Limit Indicator and the FPV for stall prevention and its use during a stall recovery.
- c) Use of the unusual attitude display, the Aircraft Reference symbol, the change to a normal display, and when to transition to the FPV during recoveries.
- d) Transitioning to Head-Down Displays (HDD) and the inclusion of HDDs in the crosscheck, including EICAS displays and other cockpit indications.
- e) Avoidance of fixation on HUD display and symbology elements, particularly during the landing flare maneuver and appropriate conditions to turn OFF the HUD display.
- f) Use of the Takeoff Reference Box and the Aircraft Reference symbol for the pitch rotation target on takeoff and go-around.
- g) Use of the Glideslope Reference Line and FPV for visual approaches and in crosswind landing technique.
- h) HUD brightness settings for different approach lighting systems.
- i) Use of HUD in conjunction with the sun-visor.

4.2 Ground Training:

4.2.1 Initial HUD ground training program should include the following elements:

- a) Classroom instruction covering HUD operational concepts, crew duties and responsibilities, and operational procedures, including preflight, normal, and abnormal operations, Glideslope angle modification in the FMS, EICAS messages, use of Airplane Flight Manual Supplement (AFMS), QRH, and checklists, miscompare, and failure flags.

- b) Classroom instruction or Computer-Based Training (CBT) on the HUD symbology set and its interrelationship with airplane aerodynamics, inertial factors, environmental conditions, and comparison to the Primary Flight Display (PFD).

4.2.2 Actual HUD video should be used to reinforce training in the following areas:

- a) Takeoff and Go-Around. Use of the Takeoff Reference Line Indicator (which is not immediately visible) and the Aircraft Reference symbol for takeoff and go-around rotation and the transition to the FPV and the Flight Director (FD) Guidance Cue.
- b) Unusual Attitudes. Transitions to and from the decluttered display and the use of the Aircraft Reference symbol during the recovery and when to transition back to the FPV.
- c) Stall Prevention and Stall Recovery. Use of the AOA Limit/Margin Indicator for stall prevention and its use with respect to the FPV during stall recoveries.
- d) Glideslope Reference Line. Use of the Glideslope Reference Line and the FPV as the sole final visual approach reference.

4.2.3 Head-Up Guidance Pilot Guide, HUD/Enhanced Vision System (EVS) AFMS, or equivalent materials (e.g., Flightcrew Operations Manual (FCOM)) which explain HUD limitations, modes of operation, descriptions of HUD symbology, limit conditions and failures, and which define crew procedures that delineate PF and PM duties, responsibilities, and call-outs during all phases of flight in which HUD operations are conducted.

4.2.4 Initial Pilot Ground Training Time: 3 hours.

4.2.5 Recurrent Training:

- a) Selected HUD related ground training subjects as outlined in paragraph 4 should be reviewed on a recurrent basis.

4.3 Flight Training:

4.3.1 Unless integrated with CL-605 initial type rating training, flight training dedicated to HUD familiarization and proficiency is in addition to other required training elements.

4.3.2 All required approaches, utilizing the HUD, should begin no closer than the final approach fix (FAF) for instrument approaches, and should begin no closer than approximately 1,000 feet Above Ground Level (AGL) (3–4 NM) to the runway threshold for visual approaches.

4.3.3 The following HUD flight training program is generic in nature and should be considered as a minimum training requirement only.

- a) Ground Operations:
 - i) Deployment of HUD and stowage, including installation and removal of the HUD sun-visor.
 - ii) Taxi using HUD under various lighting and visibility conditions.

b) Airwork:

- i) Straight and level flight, accelerations, and decelerations.
- ii) Normal and steep turns, climbs, and descents.
- iii) Wind Effects on HUD display.
- iv) Stall prevention and recovery.
- v) Recovery from unusual attitudes.

c) Visual Takeoffs, Approaches, and Landings:

- i) Crosswind takeoff and landing.
- ii) Visual approaches to runways at night with minimal lighting (“black hole” approaches) and use of FPV and Glideslope Reference Line to achieve desired descent angle.
- iii) Engine failure on takeoff.
- iv) One Engine Inoperative (OEI) landing.
- v) OEI go-around.

4.3.4 Instrument Approaches:

- a) Approaches to the lowest authorized minima including an approach and landing with OEI.
- b) Missed approach OEI.
- c) Non-precision and circling approaches (if applicable).

NOTE: It is desirable to fly visual and instrument approaches with different approach and lighting systems.

4.3.5 Abnormal/Emergency Operations: (as applicable):

- a) Wind shear escape.
- b) Terrain Awareness and Warning System (TAWS) escape.
- c) Traffic Alert and Collision Avoidance System (TCAS) Resolution Advisory (RA).
- d) HUD failure on approach and its effect on pilot workload and PF/PM duties and responsibilities.
- e) Approaches with the aircraft in a non-normal flap configuration.

4.3.6 Initial Pilot Qualification Flight Training Time: 3 hours.

4.4 Recurrent Flight Training:

4.4.1 As a minimum, HUD related flight training maneuvers listed below should be reviewed.

- a) Stall prevention, recognition, and recovery.
- b) Unusual attitude recovery from decluttered display.
- c) Takeoff with engine failure at V_1 .
- d) Approach, either precision or non-precision, with missed approach.
- e) Approach (with crosswind, if available) and landing.
- f) Selected abnormal/emergency maneuvers (e.g., HUD AFM procedures, approach and landing with OEI, TCAS Resolution Advisory, TAWS escape).

5 PILOT CHECKING

5.1 Initial Pilot Checking:

5.1.1 Upon completion of training, a PIC must be administered a proficiency check conducted in a Challenger 605 Level C FFS with a daylight visual display, or Challenger 605 Level D FFS, or on a HUD system equipped Challenger 605 aircraft. This proficiency check may be taken in conjunction with a pilot proficiency check conducted in accordance with 14 CFR parts 61 or 135 or may be administered as a separate test.

5.1.2 Maneuvers to be evaluated during the HUD proficiency check include, as a minimum:

- a) One takeoff.
- b) One departure procedure.
- c) One instrument approach procedure.
- d) One missed approach.
- e) One landing.

5.2 SICs should be checked on PM duties during HUD approaches and emergencies.

5.3 Recurrent Checking:

5.3.1 At least annually, in conjunction with a PIC proficiency check required by parts 61 or 135, a PIC must demonstrate proficiency using the HUD system by satisfactorily performing the maneuvers listed under paragraph 5.1.2.

5.3.2 At least annually, a SIC should be evaluated on Crew Resource Management (CRM) responsibilities and procedures as the PM when the PF is conducting HUD operations.

6 PILOT CURRENCY

PICs should have completed at least three takeoffs, approaches, and landings as the PF using the HUD system in the Challenger 605 airplane, or have completed three takeoffs, approaches, and landings as the PF using the HUD system in a Challenger 605 Level C FFS with a daylight visual display, or Challenger 605 Level D FFS, within the previous 90 days before acting as the PF using the HUD.

7 OPERATIONAL SUITABILITY

The FSB found the HUD operationally suitable for all phases of flight and for United States Category I operations. Low visibility takeoff and Category II operations using the HUD were not evaluated against parts 91 or 135 requirements.

APPENDIX 5. ENHANCED FLIGHT VISION SYSTEM (EFVS)

The content of this appendix has been removed. Refer to 14 CFR part 61, § 61.66 for training, recent flight experience, and proficiency requirements for EFVS operations.

EFVS installed on this aircraft has been deemed operationally suitable for EFVS operations defined under 14 CFR part 91, § 91.176(b) to 100 feet above touchdown zone elevation.

APPENDIX 6. CHALLENGER 650 AVIONICS UPGRADE VERSION 1.4.1.3

1 BACKGROUND

In 2015, Bombardier incorporated Rockwell Collins Proline 21 avionics upgrades into the Challenger 605 production configuration. New production aircraft with these new avionics upgrades installed are now marketed as the Challenger 650. (See below for the descriptions of avionics upgrades).

Most of the avionics upgrades listed in this report are offered via Service Bulletins to upgrade existing in-service Challenger 605 aircraft. For the purposes of this report only, a 605 aircraft with some or all of the avionics upgrades listed below is referenced as a 605^(SB). This differentiates a 605 with avionics upgrades from a 605 aircraft without avionics upgrades.

Currently, these avionics upgrades are not available for the Challenger 604.

The avionics upgrades to the CL-605^(SB)/650 (software version 1.4.1.3) include the following:

Flight Management System (FMS):

- Provides for automatic POS INIT using Global Positioning System (GPS) Position.
- Increases worldwide database memory size.
- Capable of Localizer Performance with Vertical Guidance (LPV) and Required Navigation Performance (RNP) basic Radius-to-Fix (RF) leg approaches.
- Capable of Required Navigation Performance Authorization Required (RNP AR) 0.3 approaches, with or without RF legs.
- Supports FANS 1/A (Controller-Pilot Data Link Communications (CPDLC) and Automatic Dependent Surveillance - Contract (ADS-C)).
- Provides Actual Landing Distance (ALD) calculations for contaminated runways.
- Provides for manual landing factor calculations on APPROACH REF page.
- Supports Airway to Airway transitions.

Primary Flight Display (PFD):

- Enlarges upper Attitude Deviation Indicator (ADI) display.
- Rescales pitch ladder.
- Permits selection of Flight Path Vector (FPV) on PFD.

Integrated Flight Information System (IFIS):

- Allows for splitting charts into Briefing, Minimums, and Profile sections on approach.

- Provides for automatic display of airport diagram charts upon landing.
- Adds increased coverage for XM Weather (optional).

Traffic Alert and Collision Avoidance System (TCAS) Processor (TSS-4100):

- Changes aural annunciation from “Adjust Vertical Speed” to “Level Off” during a Resolution Advisory (RA).

Synthetic Vision System (SVS):

- Allows for selection of SVS by the pilot.
- Provides Situational Awareness (SA) of surrounding terrain and obstructions for the aircrew during ground and flight operations.
- Supports SA only. SVS is not to be used for navigation (Ref. Limitations).

MultiScan™ Weather Radar Upgrade:

- Provides for an Automatic mode that controls: MultiScan™ beam control, ground clutter suppression, smart scan, overflight protection, path attenuation compensation, temperature compensation, and geographic weather correlation.
- Controls all weather radar functionally in Automatic mode from takeoff to landing.

SmartRunway™ and SmartLanding™:

- Provides aural and visual advisories to supplement aircrew awareness of aircraft position relative to an airport during ground and flight operations.
- Includes Runway Awareness Advisory System (RAAS), Stability Approach Monitor, Corrected Altitude Monitor, Takeoff Flap Configuration Monitor, and Long Landing Monitor.
- SmartRunway™ alerts are focused on runway/taxiway risks. SmartLanding™ alerts increase the probability of achieving a stabilized approach and minimizing landing risks and runway excursions.

2 PILOT TYPE RATING

Not applicable.

3 RELATED AIRCRAFT

3.1 Challenger 605.

3.2 Challenger 650.

4 PILOT TRAINING

4.1 Experience/prerequisite. Pilots undergoing training as defined in this appendix must already hold a CL-604 pilot type rating.

4.2 Special Emphasis Areas:

4.2.1 Ground Training:

- a) Procedures for Airway to Airway intercepts using the FMS 6200.
- b) Accepted abbreviations for textual inputs from pilot to FMS for CPDLC communications.
- c) Limitations on the use of SmartRunway™ and SmartLanding™ RAAS during normal or abnormal operations.
- d) Limitations on the use of SVS during flight and approaches.
- e) ½ bank application during single engine takeoffs (Heading vs. Lateral Navigation (LNAV)).

4.2.2 Flight Training:

- a) Procedures for Airway to Airway intercepts using the FMS 6200.
- b) Accepted abbreviations for textual inputs from pilot to FMS for CPDLC communications.
- c) Limitations on the use of SmartRunway™ and SmartLanding™ RAAS during normal or abnormal operations.
- d) Limitations on the use of SVS during flight and approaches.
- e) ½ bank application during single engine takeoffs (Heading vs. LNAV).

4.3 Ground Training:

4.3.1 When any combination of the CL-604, CL604^(SB), CL-605, CL-605^(SB), or CL-650 are flown, or if a pilot is upgrading/transitioning from one related aircraft to another, appropriate instruction in design differences consistent with Appendix 2 and Appendix 3 of this report is required.

4.4 Flight Training:

4.4.1 When any combination of the CL-604, CL604^(SB), CL-605, CL-605^(SB), or CL-650 are flown, or if a pilot is upgrading/transitioning from one related aircraft to another, appropriate instruction in design differences consistent with Appendix 2 and Appendix 3 of this report is required.

4.5 Differences. The FSB determined that the differences levels for this operation are:

4.5.1 Training: C.

4.5.2 Checking: B.

5 PILOT CHECKING

- 5.1 A check of knowledge must be completed once training has been completed. The check can be in the form of oral questioning, written or computer-based testing, or skill demonstration.

6 PILOT CURRENCY

- 6.1 Specific systems, when installed, will require periodic self-review of the following items when mixed fleet flying is conducted in the different Challenger variations:

6.1.1 CL-604 to CL-605^(SB)/CL-650CL:

- a) FANS 1A+/CPDLC plus ADS-C via FMS 6200 CDU.
- b) Enhanced map displays, XM/Universal weather display.
- c) FMS 6200 new features: Auto Position Initialization, PERF out of Range messages, ALD operation with contaminated runway, Remote (Data Base Unit (DBU)-Initiated) Database Dataload, Manual Landing Factor, and Airway to Airway Transitions.
- d) RNP AR > 0.3 capability.
- e) Satellite-Based Augmentation System (SBAS) LPV 0.3 approach with RF legs capability.
- f) SmartRunway™ and SmartLanding™.
- g) 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 NM. Provisions for predictive windshear detection growth.

6.1.2 CL-605 to CL-605^(SB)/CL-650:

- a) FANS-1A+/CPDLC and ADS-C controlled via FMS 6200 CDU.
- b) Aeronautical Telecommunication Network (ATN)/Links 2000+
- c) SBAS LPV 0.3 approach with RF legs capability - Not Applicable if base 605 already has Supplemental Type Certificate (STC) for Wide Area Augmentation System (WAAS) LPV.
- d) FMS 6200 new features: Auto Position Initialization, PERF out of Range messages, ALD operation with contaminated runway, Remote (DBU-Initiated) Database Dataload, Manual Landing Factor, and Airway to Airway Transitions.
- e) SmartRunway™ and SmartLanding™.
- f) Multiscan™ weather radar with turbulence detection controlled at DCPs and Multiscan™ Radar Menu and annunciations. Enhanced ground clutter suppression.
- g) RNP AR > 0.3 capability.
- h) IFIS Version 7.2 upgrade with enhanced electronic charts display and satellite graphical weather: New XM weather capabilities for Canada and Puerto Rico. Enroute charts.

- 6.2 If mixed fleet flying is not anticipated and only one variety of Challenger is flown, this requirement does not apply.

7 OPERATIONAL SUITABILITY

The FSB has determined that the avionics upgrades defined by software version 1.4.1.3 and denoted in paragraph 1 of this appendix (i.e., FMS, PFD, IFIS, TCAS Processor, SVS, MultiScan™ Weather Radar Upgrade, and SmartRunway™ and SmartLanding™) are deemed operationally suitable under 14 CFR parts 91 and 135*.

* An operational suitability determination does not constitute an operational authorization. Some of the avionics capabilities listed in paragraph 1 of this appendix may require Principal Operations Inspector (POI) approval.

APPENDIX 7. REQUIRED NAVIGATION PERFORMANCE 0.3 AUTHORIZATION REQUIRED (RNP AR)

1 BACKGROUND

In November 2015, a Flight Standardization Board (FSB) was convened to determine operational suitability and evaluate training, checking, and currency requirements for conducting RNP AR 0.3.

RNP AR 0.3 approach capability is integrated into the Rockwell Collins FMS 6200 and Avionics Upgrade version 1.4.1.3 software. This capability may be installed on existing Challenger 605 aircraft via Service Bulletin (CL-605^(SB)) or come installed in newly manufactured Challenger 650 aircraft.

This appendix only applies to CL-605^(SB) and CL-650 aircraft that have the avionics upgrades installed as defined in Appendix 6 and has RNP AR avionics capability for which pilot training, checking, and currency is sought.

2 PILOT TYPE RATING

Not applicable.

3 RELATED AIRCRAFT

3.1 Challenger 605^(SB).

3.2 Challenger 650.

4 PILOT TRAINING

4.1 Experience/prerequisite. The pilot must be qualified and current on the Challenger 604 aircraft and have met the requirements of Appendix 6 for qualification in CL-605^(SB) or CL-650 aircraft.

In conducting RNP AR approaches, specified duties and procedures are assigned to both the Pilot Flying (PF) and Pilot Monitoring (PM). Therefore, the requirement for initial and recurrent training as defined below is applicable to both Pilot in Command (PIC) and Second in Command (SIC).

4.2 Special Emphasis Areas:

4.2.1 Ground Training:

- a) Required equipment for RNP AR approaches (Minimum Equipment List (MEL) review).
- b) Missed approach procedures on Radius-to-Fix (RF) legs.
- c) Temperature compensation.

4.2.2 Flight Training:

- a) Manually flown approaches and missed approaches.
- b) Missed approach procedures on RF legs.
- c) Temperature compensation.
- d) In-flight equipment failure.

4.3 Ground Training:

4.3.1 Initial:

- a) CL-605^(SB) or CL-650 aircraft with RNP AR approach capability, training programs must fully comply with the requirements of the current edition of FAA Advisory Circular (AC) 90-101A, Approval Guidance for RNP Procedures with AR.
- b) Initial ground training must encompass all elements applicable to the CL-605^(SB) or CL-650 as defined in AC 90-101A, Appendix 4, Operational Considerations, and Appendix 5, Training.

4.4 Flight Training:

4.4.1 Initial flight training must encompass all elements applicable to the CL-605^(SB) or CL-650 as defined in AC 90-101A, Appendix 4, Operational Considerations, and Appendix 5, Training.

4.4.2 Initial flight training in a qualified Full Flight Simulator (FFS) or CL-605^(SB) or CL-650 aircraft must include:

- a) Four RNP AR approaches: two as PF and two as PM.
- b) Two of the four RNP AR approaches must be flown to the Decision Altitude (DA).
- c) Two of the four RNP AR approaches must be flown to a Required Navigation Performance (RNP) missed approach.
- d) One of the four RNP AR approaches must include an interrupt with vectors to resume the approach.
- e) One of the four RNP AR approaches must include a hold at an Initial Approach Fix (IAF) or transition fix.
- f) Two of the four approaches must have RF legs.

NOTE 1: RNP AR training in a CL-605^(SB) with RNP AR capability satisfies the RNP AR training requirement in a CL-650, and RNP AR training in a CL-650 satisfies the RNP AR training requirement in a CL-605^(SB) with RNP AR capability.

NOTE 2: Flight training when conducted in the aircraft must be in Visual Meteorological Conditions (VMC).

4.5 Recurrent Training:

4.5.1 Ground training must include, as a minimum, a review of “Pilot Procedures” and “Abnormals/Failures” as defined in the current edition of AC 90-101A, Appendix 5, Training.

4.5.2 Flight training in a qualified Flight Simulation Training Device (FSTD), CL-605^(SB) or CL-650 aircraft must include:

- a) Two RNP AR approaches: one as PF and one as PM.
- b) One of the two RNP AR approaches must be flown to the DA.
- c) One of the two RNP AR approaches must be flown to an RNP published missed approach.
- d) One of the two RNP AR approaches must include an interrupt with vectors to resume the approach or a hold at an IAF or transition fix.
- e) One of the two approaches must have RF legs.

NOTE 1: Recurrent RNP AR training in a CL-605^(SB) with RNP AR capability satisfies the recurrent RNP AR training requirement in a CL-650 and recurrent RNP AR training in a CL-650 satisfies the recurrent RNP AR training requirement in a CL-605^(SB) with RNP AR capability.

NOTE 2: An RNP AR procedure may be substituted for any precision or non-precision approach in a recurrent training program required under 14 CFR part 135, § 135.351.

5 PILOT CHECKING

5.1 While conducting an RNP AR approach, specific duties and procedures are assigned to the PF and PM. Therefore, the requirement for initial and recurrent checking is applicable to both PIC and SIC.

5.2 Initial and recurrent RNP AR checking in a qualified FFS or CL-605^(SB) or CL-650 aircraft must include:

5.2.1 Two RNP AR approaches: (flown as PF).

5.2.2 One takeoff with an RNP AR approach flown to an RNP published missed approach.

5.2.3 One RNP AR approach flown to a landing.

5.2.4 One of the two RNP AR approaches must have RF legs.

5.3 Proficiency Check Requirements for 14 CFR part 61, § 61.58 and § 135.297:

5.3.1 PICs qualified and authorized to conduct RNP AR approaches, at least one RNP AR approach with RF legs must be demonstrated.

5.4 The PM must be RNP AR current and qualified in accordance with this appendix for all checks with the exception of an initial qualification check conducted on a flightcrew.

NOTE 1: An RNP AR approach may be substituted for any required precision or non-precision approach on any recurrent or proficiency check required under parts 61 or 135.

NOTE 2: RNP AR initial or recurrent checking in a CL-605^(SB) with RNP AR capability satisfies the initial or recurrent checking requirement in a CL-650, and initial or recurrent RNP AR checking in a CL-650 satisfies the initial and recurrent RNP AR checking requirement in a CL-605^(SB) with RNP AR capability.

6 PILOT CURRENCY

6.1 While conducting an RNP AR approach, specific duties and procedures are assigned to the PF and PM. Therefore, the currency requirement is applicable to both PIC and SIC.

6.2 PF and PM must have accomplished at least one RNP AR approach to either a missed approach or landing within the preceding 6 months.

6.3 The RNP AR approach must have been accomplished in either an appropriately qualified FFS, CL-605^(SB) with RNP AR capability, or CL-650 aircraft.

6.4 Any checking under parts 61 or 135 that requires a demonstration of RNP AR approach competency that was accomplished within the preceding 6 months satisfies this currency requirement.

6.5 If RNP AR approach currency is lost, currency may be reestablished by completing the RNP AR training in paragraph 4.5 and checking elements in paragraph 5.2 of this appendix.

7 OPERATIONAL SUITABILITY

The FSB has determined that RNP AR approach capability installed in the CL-605^(SB) or CL 650 aircraft is operationally suitable under 14 CFR parts 91 and 135.

* An operational suitability determination and completion of RNP AR training and checking does not constitute an operational authorization. Operators should reference the current edition of AC 90-101A for RNP AR application preparation and processing.

APPENDIX 8. STEEP APPROACH LANDING OPERATIONS

1 BACKGROUND

In January 2017, a Flight Standardization Board (FSB) was convened in conjunction with a Transport Canada Civil Aviation Operational Evaluation Board to determine operational suitability and evaluate training, checking, and currency requirements for conducting steep approach landing operations in the CL-604 aircraft into London City Airport (EGLC), United Kingdom.

NOTE: The term CL-604 applies to all variations of the CL-600-2B16 and is used in this appendix for brevity.

Steep approach landing operations are defined as those glide paths greater than 4.5 degrees and less than or equal to 6.0 degrees. CL-604 aircraft modification for steep approach operation is accomplished through applicable Service Bulletin incorporation and operated in accordance with the Airplane Flight Manual Supplement (AFMS) 20 and is limited to 5.5 degrees.

The FSB evaluation included numerous steep approach operations in the actual aircraft flown on a modified Instrument Landing System (ILS) glide path of 5.5 degrees. All Engines Operative (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 CL-604 aircraft must be conducted with AEO, the FSB evaluated piloting skills required to perform an OEI extraction should an engine fail at or below Decision Altitude (DA).

2 PILOT TYPE RATING

Not applicable.

3 RELATED AIRCRAFT

- 3.1 Challenger 604.
- 3.2 Challenger 604^(SB).
- 3.3 Challenger 605.
- 3.4 Challenger 605^(SB).
- 3.5 Challenger 650.

4 PILOT TRAINING

4.1 Experience/prerequisite. The Pilot Flying (PF) must be qualified and current on the CL-604 aircraft.

4.1.1 The Pilot Monitoring (PM) must be:

- a) A qualified and current CL-604 aircraft pilot; or
- b) Another pilot being trained in the same initial or recurrent course.

NOTE 1: Steep approach operations training may be delivered as an integral part of the initial or recurrent CL-604 aircraft training curriculum. However, steep approach operations training certificate of completion must be issued only upon successful completion of the initial/recurrent training.

NOTE 2: 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 callout strapping and its effect on perceived descent rate.
- b) Glide slope interception illustrating difference between normal and steep approach pitch angle and glide slope descent rate.

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) Approach below 4.5 degrees supplement information contained in the Airplane Flight Manual (AFM), Operating Manual (OM) or Flightcrew Operating Manual (FCOM), and Quick Reference Handbook (QRH). Review to include: Limitations, Emergency Procedures, Normal Procedures, Abnormal Procedures, and Performance.
- b) FAA Steep Approach into EGLC supplement information contained in the AFM, OM or FCOM, and QRH. Review to include: Limitations, Emergency Procedures, Normal Procedures, Abnormal Procedures, and Performance.
- c) Stabilized approach concept as a key to success.
- d) Visual differences between 3.0 and 5.5-degree sight picture.
- e) Illusions to include: runway dimension on height perception, crosswind condition perception, ground rush illusion, and black hole.
- f) United Kingdom Aeronautical Information Publication information and authorization for EGLC operations.
- g) Lighting aids available at EGLC.
- h) Converted meteorological visibility calculations.

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

4.3.2 Training Time. Ground training segment: 1.0 hour.

4.4 Flight Training:

4.4.1 Flight training must be conducted in a Full Flight Simulator (FFS) Level C or D or the aircraft. FFS must have 14 CFR part 60 Class I or II EGLC airport modeling. Aircraft training must have an acceptable means to replicate 5.5-degree glideslope.

4.4.2 Autopilot, Autothrottle, and Head-Up Display (HUD) use is NOT permitted during steep approach operations.

4.4.3 Flight training must contain the following and is appropriate to duties as the PF, PM, or Both (B) as indicated:

- a) One approach following a 5.5-degree glideslope to full stop using normal procedures. (PF)
- b) One approach following a 5.5-degree glideslope to go-around using normal procedures. (B)
- c) One approach following a 5.5-degree glideslope with an engine failure during approach to a single engine go-around using abnormal procedures. (PF)
- d) One approach following a 5.5-degree glideslope with an engine failure below 200 feet to a landing. (PF)
- e) One approach following a 5.5-degree glideslope in night time conditions to a full stop using normal procedures. (PF)

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.

4.4.6 Training Time. Flight Training Segment: 2.0 hours (1.5 PF, 0.5 PM).

NOTE 1: The ground and flight training times above are considered the minimums under the assumption that all the training elements have been properly addressed. Such durations may be extended as per pilot's performance, training platform employed (FFS or airplane), Training Center Program Manager (TCPM) or

Principal Operations Inspector (POI) direction, or other reasons deemed necessary to ensure efficient training.

NOTE 2: Both crewmembers, regardless of their crew assignment (PIC or SIC), must undergo the complete steep approach operations training as PF.

5 PILOT CHECKING

- 5.1 There is no checking requirement for CL-604 steep approach operation qualification. Documented satisfactory completion of steep approach operation training is sufficient.

6 PILOT CURRENCY

- 6.1 If no steep approach operations have been conducted in the previous 3 calendar-months, the pilot will conduct a self-review of the steep approach applicable information in the AFM, OM or FCOM, QRH, and any other operator identified material.
- 6.2 The FSB recommends, regardless of the number of steep approaches operationally completed, recurrent training be accomplished every 12 calendar-months. No minimum training times are established for recurrent training.
- 6.2.1 The ground training segment must cover the items listed in Ground Training above and may be abbreviated as deemed adequate by the instructor.
- 6.2.2 The flight training will include a minimum of three steep approach operations which must include the following:
- a) One steep approach to a landing.
 - b) One steep approach to a missed approach.
 - c) One steep approach at night.

7 OPERATIONAL SUITABILITY

- 7.1 The FSB requires ground and flight training for competency in conducting steep approach operations into EGLC. 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 CL-604 is operationally suitable.
- 7.2 Any PIC/SIC who has been properly qualified in the CL-604 aircraft under 14 CFR parts 61, 91 subpart K (part 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 regard to steep.