U.S. Department of Transportation
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Washington, DC

Flight Standardization Board (FSB) Report

Revision: 17
Date: XX/XX/XXXX

Manufacturer
Boeing

Type Certificate Data Sheet (TCDS)	TCDS Identifier	Marketing Name	Pilot Type Rating
A16WE	737-100 737-200 737-200C	Boeing 737	B-737
A16WE	737-300 737-400 737-500	Boeing 737 Classic (CL)	B-737
A16WE	737-600 737-700 737-700C 737-800 737-900 737-900ER	Boeing 737 Next Generation (NG), Boeing 737-800BCF, Boeing Business Jet (BBJ 1, BBJ 2, BBJ 3)	B-737
A16WE	737-7 737-8 737-8200 737-9	Boeing 737 MAX, BBJ MAX 8	B-737

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1 RECORD OF REVISIONS

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14	All	07/05/2017
15	Cover Page, Table of Contents, Record of Revisions, 3, 4, 8–13, Appendices 2–6	01/02/2018
16	Cover Page, Table of Contents, Record of Revisions, 3, 4, 5, 8, 9, 10, 12, 13, Appendix 3	10/17/2018
17	Cover Page, Table of Contents, Record of Revisions, 3, 4, 5, 8, 9, Appendix 3	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

The purpose of this revision is to add the B-737-7, B-737-8200, and Maneuvering Characteristics Augmentation System (MCAS). In Appendix 3, the Design Differences Table from the Boeing 737-800 to the Boeing 737-8 is revised to include ATA 27 Flight Controls addition of MCAS.

4 BACKGROUND

The Transport Aircraft Seattle Branch formed a Flight Standardization Board (FSB) that evaluated the B-737-8 aircraft as defined in FAA Type Certificate Data Sheet (TCDS) #A16WE. The evaluation was conducted during August 2016 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.

In March through June 2017, the FSB conducted flight evaluations of the B-737-8 initial type rating training course and B-737-8 to B-737-800 aircraft differences training. The initial B-737-8 type rating course and the B-737-8 to B-737-800 differences training were found to be operationally suitable.

In September 2017, the FSB conducted a flight evaluation of the B-737-9 aircraft. The aircraft was evaluated for B-737-8 aircraft equivalence. The B-737-9, as well as the associated Airplane Flight Manual (AFM) change, were found to be operationally suitable.

In February 2018, the FSB conducted an analysis of the changes introduced for the B-737-800 Boeing Converted Freighter (BCF). The analysis identified that the B-737-800BCF is functionally equivalent to the B-737-800. The B-737-800BCF is incorporated into the NG family aircraft in the MDR Table. The B-737-800BCF, as well as the associated AFM change, was found to be operationally suitable.

In April 2018, the FSB conducted flight evaluations of the Rockwell Collins right seat HUD installation. The FSB found the right seat HUD and the use of dual HUD operations to be operationally suitable. The FSB report has been revised to add the optional equipment training requirements where necessary.

In April 2018, the FSB conducted an analysis of the changes introduced for the Boeing Business Jet (BBJ) MAX 8. The analysis identified that the BBJ MAX 8 is functionally equivalent to the BBJ 2 aircraft. The BBJ MAX 8 is incorporated into the MAX family aircraft in Appendix 2, Master Differences Requirements (MDR) Table. The BBJ MAX 8, as well as the associated AFM change, was found to be operationally suitable.

In September 2018, the FSB conducted analysis of the changes introduced for the B-737-7 and B-737-8200. The analysis identified that the B-737-7 and B-737-8200 are functionally equivalent to the B-737-8. The B-737-7 and B-737-8200 are incorporated into the MAX series aircraft group. The B-737-7 and B-737-8200, as well as the associated Airplane Flight Manuals (AFM) changes, were found to be operationally suitable.

In March 2019, the FSB conducted an evaluation of the modified Maneuvering Characteristics Augmentation System (MCAS) for training and checking differences determination. The system enhancement is incorporated on all MAX series aircraft. The MCAS system was found to be operationally suitable.

5 ACRONYMS

14 CFR	Title 14 of the Code of Federal Regulations
AC	Advisory Circular
ADV	Advanced
AEG	Aircraft Evaluation Group

AEW&C	Airborne Early Warning and Control
AFCS	Automatic Flight Control System
AFM	Airplane Flight Manual
AP	Autopilot
APU	Auxiliary Power Unit
AT	Autothrottles
BCF	Boeing Converted Freighter
CAT I/II/III	Category I/II/III Instrument Approach
CBT	Computer-Based Training
CDU	Control Display Unit
DH	Decision Height
DU	Display Unit
EDFCS	Enhanced Digital Flight Control System
EFIS	Electronic Flight Instrument Systems
EFVS	Enhanced Flight Visual System
ER	Extended Range
ETOPS	Extended Range Operations
EVS	Enhanced Vision System
FAA	Federal Aviation Administration
FD	Flight Director
FFS	Full Flight Simulator
FMA	Flight Mode Annunciator
FMS	Flight Management System
FSB	Flight Standardization Board
FSTD	Flight Simulation Training Device
FTD	Flight Training Device
GLS	Global Positioning System Landing System
GS	Glideslope
HCP	HGS Control Panel
HGS	Head-Up Guidance System
HUD	Head-Up Display
ILS	Instrument Landing System
IMC	Instrument Meteorological Conditions
IS&S	Innovative Solutions & Support
ISFD	Integrated Standby Flight Display
LAM	Landing Attitude Modifier
LOC	Localizer
LOFT	Line-Oriented Flight Training
LOS	Line-Operational Simulation
MCAS	Maneuvering Characteristics Augmentation System
MCDU	Multifunction Control Display Unit
MDR	Master Differences Requirements
MDS	MAX Display System
NAS	National Airspace System
NAV	Navigation
ND	Navigation Display

OE	Operating Experience
OpSpecs	Operations Specifications
PC	Proficiency Check
PF	Pilot Flying
PFD	Primary Flight Display
PIC	Pilot in Command
PM	Pilot Monitoring
PMS	Performance Management Systems
POI	Principal Operations Inspector
RCAS	Roll Command Alerting System
RSAT	Runway Situational Awareness Tools
RVR	Runway Visual Range
SFP	Short Field Performance
SIC	Second in Command
SLF	Supervised Line Flying
TCAS	Traffic Alert and Collision Avoidance System
TCDS	Type Certificate Data Sheet
TCPM	Training Center Program Manager
VOR	Very High Frequency Omnidirectional Range

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 determination of 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, 125, 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 Boeing 737 type rating designation is B-737. The Navy P-8 and the Airborne Early Warning and Control (AEW&C) were not evaluated by the FSB and no type rating determination was made.

7.2 Common Type Ratings. Not applicable.

7.3 Military Equivalent Designations. Military aircraft that qualify for the B-737 type rating can be found on the faa.gov 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. The B-737-100, -200, -200C, -300, -400, -500, -600, -700, -700C, -800, -800BCF, -800SFP, -900, -900ER, -7, -8, -8200, and -9 are related aircraft. Series aircraft groups are identified as:

- B-737-100/-200/-200C or B-737.
- B-737-300/-400/-500 or B-737-CL.
- B-737-600/-700/-700C/-800/-800BCF/-900/-900ER or B-737-NG.
- B-737-7/-8/-8200/-9 or B-737-MAX.

NOTE: B-737, B-737-CL, B-737-NG, and B-737-MAX are used throughout this report to identify series aircraft and is the default for terminology. When one of those series needs further clarification, the specific series number (e.g., B-737-600) is used.

NOTE: The B737-700C includes the Boeing -700 Convertible and the Navy C-40A. The BBJ 1

is a -700 series with primary flight display (PFD)/navigation display (ND) and HUD. The BBJ 2 is a -800 series with PFD/ND and HUD. The BBJ 3 is a -900ER series with PFD/ND and HUD. The BBJ MAX 8 is a -8 series with HUD.

8.2 Related Aircraft on Different TCDS. Not applicable.

9 PILOT TRAINING

9.1 Airman Experience.

Airmen receiving initial, differences, upgrade, or transition training are assumed to have previous airman experience. Examples of applicable previous experience may include any of the following: experience in part 121 or 125 air carrier operations, former military, commuter, or corporate pilots with turbine powered aircraft experience, etc. For airmen not having such experience (e.g., recent "ab initio" program graduates), additional requirements may be necessary as determined by the Principal Operations Inspector (POI), Training Center Program Manager (TCPM), FSB, and the Air Transportation Division.

9.2 Special Emphasis Areas.

Pilots must receive special emphasis on the following areas during ground training, as applicable to an operator's fleet of aircraft:

- Automatic Landings. When an operator is authorized for autoland operations, ground training is required during a preflight briefing prior to flight training. This item must be included in initial, upgrade, transition, differences, and recurrent training. The B-737-NG and B-737-MAX autoland systems are identical and do not require differences training unless transitioning between the Fail Passive system and the Fail Operational system.

- Enhanced Digital Flight Control System (EDFCS). When an EDFCS that supports Fail Operational autoland operations with a Fail Passive Rollout system is used, ground training is required during a preflight briefing prior to flight training. This item must be included in initial, upgrade, transition, differences, and recurrent training. The B-737-NG and B-737-MAX autoland systems are identical and do not require differences training unless transitioning between the Fail Passive system and the Fail Operational system.

- B-737-MAX Flight Control System. The Elevator Jam Landing Assist system and the Landing Attitude Modifier (LAM) ground training must address the system functions and associated flight spoiler deployments. These items must be included in initial, upgrade, transition, differences, and recurrent training.

- B-737-MAX Maneuvering Characteristics Augmentation System (MCAS). The Speed Trim System (STS) provides speed and pitch augmentation. Speed stability augmentation is provided by the Speed Trim function of STS. Pitch stability augmentation is provided by the MCAS function of STS. MCAS ground training must

address system description, functionality, associated failure conditions, and flight crew alerting. These items must be included in initial, upgrade, transition, differences, and recurrent training.

- HUD. Training must address appropriate ground training elements for both HUD and non-HUD operations as specified in Appendix 5, Head-Up Guidance Training. This item must be included in initial, upgrade, transition, differences, and recurrent training.

Pilots must receive special emphasis on the following areas during flight training, as applicable to an operator's fleet of aircraft:

- Automatic Landings. When an operator is authorized for autoland operations, flight training must occur with the appropriate autopilot (AP) autoland systems (e.g., Fail Operational vs. Fail Passive). This training can occur in either a full flight simulator (FFS) or airplane. Flight training must ensure appropriate AFM limitations are addressed and complied with. This item must be included in initial, upgrade, transition, differences, and recurrent training. The B-737-NG and B-737-MAX autoland systems are identical and do not require differences training unless transitioning between the Fail Passive system and the Fail Operational system.

- EDFCS. When an EDFCS that supports Fail Operational autoland operations with a Fail Passive Rollout system is used, flight training can occur in either an FFS or airplane and should address both single and dual channel AP approaches. This item must be included in initial, upgrade, transition, differences, and recurrent training. The B-737-NG and B-737-MAX autoland systems are identical and do not require differences training unless transitioning between the Fail Passive system and the Fail Operational system.

- HUD. When HUD is installed and an operator is authorized HUD operations, training must address appropriate flight training elements for both HUD and non-HUD operations as specified in Appendix 5. This item must be included in initial, upgrade, transition, differences, and recurrent training.

9.3 Specific Flight Characteristics. There are no specific flight characteristics.

9.4 Seat Dependent Tasks. Pilots must receive initial, transition, upgrade, and recurrent training in these seat dependent tasks.

- HUD (left seat, right seat, when installed).
- Nosewheel steering (left seat, right seat, when installed).

9.5 Regulatory Training Requirements which are Not Applicable to the B-737. Part 121 Appendix E:

- Tuck and Mach Buffet Training: The B-737, B-737-CL, B-737NG, and B-737-MAX do not exhibit any Mach Tuck tendency and therefore no training is required for this flight maneuver. Demonstration of the aircraft's overspeed protection capabilities is an acceptable substitute.

- Fuel Jettisoning: The B-737, B-737-CL, B-737-NG, and B-737-MAX do not have fuel jettisoning capability.

9.6 Flight Simulation Training Devices (FSTD). Special device or simulator characteristics are described for training, checking, and reestablishing currency as follows:

- Enhanced flight visual system (EFVS) must be trained in a Level C or higher FFS in both day and night conditions.

9.7 Training Equipment. There are no specific systems or procedures that are unique to the Boeing 737 that require specific training equipment.

9.8 Differences Training between Related Aircraft. Pilots must receive differences training when operating in mixed fleet B-737 aircraft (as applicable) operations as specified in this FSB report.

9.8.1 B-737-CL (electronic flight instrument systems (EFIS) and non-EFIS) aircraft to B-737-NG PFD/ND differences aircraft only.

PFD/ND differences require a minimum of 12 hours in an interactive computer-based training (CBT), 6 programmed hours in a Level 6 flight training device (FTD), and supervised line flying (SLF) as described in Appendix 4, Supervised Line Flying (SLF) Table. Pilots must be trained in accordance with Appendix 2. ND is an expansion of MAP, and the CBT need only demonstrate the differences in display selections and capabilities (e.g., Center Map). The following elements should be included in the training program:

- Flight Mode Annunciator (FMA) differences.
- Autopilot Flight Director System (AFDS) status annunciator.
- Vertical speed display.
- Airspeed bugs and flap maneuvering speeds.
- Compass rose.
- Pitch limit indicator.
- Airspeed trend vector.
- Minimum and maximum speeds.
- Landing altitude reference bar.
- Altimeter setting.
- Localizer (LOC) and glideslope (GS) deviation.
- Selected altitude indication (BUG).
- Ground speed display.
- Radio altitude display.
- Traffic Alert and Collision Avoidance System (TCAS) resolution advisories.
- Time critical warnings.
- Approach reference area.
- Marker beacon indication.
- System failures and flags.
- No “compact display” (display unit (DU) switching only).

9.8.2 Blended, Split Scimitar, Advanced Technology Winglet. Operators engaged in mixed fleet flying B-737 aircraft with and without winglets must address differences at the A/A/A level, including:

- Physical/dimensional differences, with emphasis on lower strake clearance considerations during ground operations.
- Takeoff crosswind guidelines.
- Landing crosswind guidelines.
- Ground contact angles for normal landings.

9.8.3 Roll Command Alerting System (RCAS).

RCAS consists of a ROLL/YAW ASYMMETRY alert, ROLL AUTHORITY alert and a Roll Command Arrow. RCAS is optional equipment on the B-737-NG and standard on the B-737-MAX. The FSB found Level B training to be sufficient for initial, transition, and upgrade training in that series aircraft.

9.8.4 Runway Situational Awareness Tools (RSAT) System.

RSAT consists of On-Ground Overrun Warning, In-Air Overrun Warning, and a Speedbrake Warning. RSAT is optional equipment on the B-737-NG and B-737-MAX. The FSB found Level B training to be sufficient for initial, transition, and upgrade training in that series aircraft.

9.8.5 Rockwell Collins HGS-6000 Head-Up Guidance System (HGS) with HGS Control Panel (HCP) or multifunction control display unit (MCDU) interface.

The HGS-6000 is optional equipment on the B-737-NG and B-737-MAX. The FSB found Level A differences training to be sufficient for pilots already qualified on the Rockwell Collins HGS-4000.

9.8.6 Training for integrated standby flight display (ISFD) may be satisfied with Level A training for all B-737 aircraft. No flight training required.

9.8.7 Universal avionics flat panel display/flight management system (FMS) installations (STC ST03355AT/ST03356AT) into B-737-300 series or Innovative Solutions & Support (IS&S) flat panel display installation (ST03125NY) into the B-737-400 series. The FSB found Level D differences training to be sufficient.

9.8.8 Universal avionics FMS installations (STC ST03362AT) into the B-737-200 series. The FSB found Level C differences training to be sufficient.

9.8.9 The FSB found Level B training to be sufficient for initial, transition, and upgrade training between the B-737-NG and B-737-MAX series aircraft. Ground training for the B-737-NG to the B-737-MAX must include the following special emphasis areas:

a) Maneuvering Characteristic Augmentation System function of the Speed Trim System.
b) Flight control system to address the Elevator Jam Landing Assist system.
c) Landing Attitude Modifier (LAM) to address the two LAM system functions and associated flight spoiler deployments.
d) Gear handle operation to address normal and non-normal procedures.
e) Flightcrew alerting

10 PILOT CHECKING

10.1 Landing from a No-Flap or Nonstandard Flap Approach.

The probability of flap extension failure on the B-737, B-737-CL, B-737-NG, and B-737-MAX aircraft is extremely remote due to system design; therefore, demonstration of a no-flap approach and landing is not required. However, a partial flap approach and landing, using fully extended leading edge devices, and trailing edge flaps less than 15, is required during pilot certification. During a 14 CFR part 61, § 61.58 proficiency check, part 91, § 91.1065 competency check, part 121, § 121.441 proficiency check, part 125, § 125.287 competency check, or a part 135, § 135.293 competency check, this task may be required. Refer to FAA Order 8900.1, Volume 5 when the test or check is conducted in an aircraft versus an FFS.

10.2 Specific Flight Characteristics. There are no specific flight characteristics.

10.3 Seat Dependent Tasks. During initial, transition, and upgrade checking, pilots must be checked in these seat dependent tasks:

- HUD (left seat, right seat when installed).
- Nosewheel steering (left seat, right seat when installed).

10.4 Other Checking Items.

Precision approach using HUD and EFVS. When HUD and/or EFVS use is approved, checking must include suitable demonstration of HUD and/or EFVS use for modes and phases of flight authorized.

HUD vs. flight director (FD) and raw data. When HUD and/or EFVS is installed, Proficiency Check (PC) maneuvers, Line-Oriented Flight Training (LOFT), Line-Operational Simulation (LOS), or other demonstrations may be completed using HUD at the check pilot/inspector's discretion. However, periodic assessment of non-HUD skills should be demonstrated, and at any time a check pilot/inspector may, at their discretion, request that authorized maneuvers be performed without use of HUD (e.g., if manual Category (CAT) I FD operations are authorized, the airman being checked may be requested to perform the maneuver without HUD).

10.5 FSTDs. EFVS must be checked in minimum of a Level C FFS in both day and night conditions.

10.6 Equipment. There are no specific systems or procedures that are unique to the B-737 aircraft that require specific equipment.

10.7 Differences Checking between Related Aircraft.

10.7.1 Alternating PC for B-737, B-737-CL, B-737-NG, and B-737-MAX series groups.

For mixed fleet flying between series groups, PC should alternate, but are not required to alternate, each 6 months for pilots in command (PIC) and annually for other flightcrew members. When such alternating checks are accomplished, the differences checking of other series within the series group being checked may be satisfied by ground training, written questionnaire, oral review, or other method approved by the POI or TCPM. However, such simplified programs may not be approved if they result in progressive loss of knowledge or skills related to particular differences over successive recurrent periods.

10.7.2 FMS demonstration of competency. FMS checks.

Checking for differences related to a series having FMS must include a demonstration of competency covering both an oral/written exam and demonstration of proficiency with both normal and non-normal procedures. FMS proficiency should be demonstrated with “hands-on” operation and address each applicable FMS mode or function. Specific items and flight phases to be checked may include initialization, takeoff, departure, cruise, arrival, precision and non-precision approach, missed approach, holding, diversion to an alternate or route re-clearance, and pertinent non-normal scenarios. Scenarios used should include routes, airports, air traffic control (ATC) situations, and other factors which are representative of, or present equivalent complexity to, those anticipated for that operator. FMS competency may be demonstrated in conjunction with other checking.

11 PILOT CURRENCY

There are no additional currency requirements for the B-737, B-737-CL, B-737-NG, or B-737-MAX series aircraft other than those already specified in parts 61, 121, 125, and 135.

11.1 Differences Currency between Related Aircraft. Not applicable.

12 OPERATIONAL SUITABILITY

The B-737, B-737-CL, B-737-NG, and B-737-MAX series aircraft are operationally suitable for operations under parts 91, 121, 125, and 135. The list of operating rules evaluated is on file at the Transport Aircraft Seattle Branch.

13 MISCELLANEOUS

13.1 Extended Operations (ETOPS).

- B-737-200 and B-737-CL aircraft are approved for 120-minute ETOPS operations.
- B-737-NG aircraft are approved for 180-minute ETOPS operations.*
- B-737-MAX aircraft are approved for 180-minute ETOPS operations.

* The 737-800BCF is not approved for ETOPS.

13.2 Forward Observer Seat.

The B-737, B-737-CL, B-737-NG, and B-737-MAX series aircraft forward center observer seat has been evaluated and determined to meet the requirements of §§ 121.581(a), 125.317(b), and 135.75(b), and AC 120-83, Flight Deck Observer Seat and Associated Equipment.

13.3 Landing Minima Categories.

All operators should reference 14 CFR part 97, § 97.3 and use an approach category appropriate to the speed of V_{REF}. Air carriers may be further restricted by their operations specifications (OpSpecs) for circling approaches. Approach Category for B-737, B-737-CL, B-737-NG, and B-737-MAX series aircraft is as follows:

Aircraft	Category
B-737	C
B-737-CL	C
B-737-600/700	C
B-737-800/900/900ER	C or D
B-737-MAX	C or D

Due to the numerous maximum landing weight options among the B-737-NG series group and the B-737-MAX series group, determining an aircraft approach category may be done using the certificated maximum flap setting of FLAPS 40 and the particular airplane's AFM maximum certificated landing weight.

13.4 Normal Landing Flaps.

The B-737, B-737-CL, B-737-NG, and B-737-MAX series aircraft normal "final landing flap setting" per § 91.126(c) is Flaps 15, 30, and 40. Flaps 15 is primarily used for non-normal situations (e.g., engine out approach) or atypical operations (e.g., high altitude airport operations).

APPENDIX 1. DIFFERENCES LEGEND

Training Differences Legend

Differences Level	Type	Training Method Examples	Conditions
A	Self-Instruction	• Operating manual revision (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 self-test (TCBI)	• 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.

Related Aircraft ↓	**Base Aircraft** →	**B-737**	**B-737-CL (NON-EFIS)**	**B-737-CL (EFIS)**	**B-737-NG**	**B-737-MAX**
B-737		A/A NAV - B/B PMS - C/B AFCS - C/B (1) ADV-B/A	C*/C*	C*/C*	D/D	Not evaluated
B-737-CL (NON-EFIS)		C*/C (2) LIMITED FMS - C/B	A/A	C/B	(3) C/B	Not evaluated
B-737-CL (EFIS)		C*/C* (2) LIMITED FMS - C/B	C/B	A/A	(3) C/B PFD/ND - D/C	Not evaluated
B-737-NG		D/D	(3) C/B PFD/ND – D/C	(3) C/B PFD/ND – D/C	A/A (3) EFIS to PFD/ND- C/B PFD/ND to EFIS– D/C EDFCS – C/C	B/B
B-737-MAX		Not evaluated	Not evaluated	Not evaluated	B/B	A/A

C* - Level C training or checking, which requires use of a Level 5 FSTD or higher.

(1) All Model B-737-200 series airplanes having serial numbers 20492 and on are of the -200 advanced (B-737-200 ADV) series airplane and require Level B differences training when transitioning from the B-737-100/-200. All earlier airplanes can be kit modified to the advanced configuration.
(2) Limited FMS pertains to B-737-CL airplanes, which retain partial FMS functions.
(3) Level C training requirement may be satisfied by interactive CBT.

APPENDIX 3. DIFFERENCES TABLES

This Design Differences table, from the Boeing 737-800 to the Boeing 737-8, was proposed by Boeing and validated by the FSB on 08/16/2016. It lists the minimum differences levels operators must use to conduct differences training and checking of flightcrew members.

FROM BASE AIRCRAFT: B-737-800 TO RELATED AIRCRAFT: B-737-8	DESIGN	REMARKS	FLT CHAR	PROC CHNG	TRAINING	CHECKING
	Configuration	Nose Landing Gear Lengthened 8 inches Dual Tail Anti-Collision/Position Lights	No	No	A	A
	Panel Layout	New MAX DISPLAY SYSTEM (MDS)	No	No	B	B
	Panel Layout	New Two-Position Landing Gear Control Lever	No	Yes	B	B
	Limitations	Size/type/system limitations	No	No	A	A
	Limitations	Ground wind operating envelope	No	No	A	A

FROM BASE AIRCRAFT: B-737-800 TO RELATED AIRCRAFT: B-737-8	DESIGN	REMARKS	FLT CHAR	PROC CHNG	TRAINING	CHECKING
	Weights	Increased to: • Max Taxi Weight - 181,700 lbs • Max Takeoff Weight - 181,200 lbs • Max Landing Weight - 152,800 lbs • Max Zero Fuel Weight - 145,400 lbs	No	No	A	A
	ATA 21 Air Conditioning	PACKS: Electronic Pack Flow Control System	No	No	B	B
	ATA 21 Air Conditioning	PACKS: Revised PACK light logic	No	Yes	A	A
	ATA 21 Air Conditioning	EQUIPMENT COOLING: EQUIP SMOKE light and Detection System	No	Yes	B	B

FROM BASE AIRCRAFT: B-737-800 TO RELATED AIRCRAFT: B-737-8	DESIGN	REMARKS	FLT CHAR	PROC CHNG	TRAINING	CHECKING
	ATA 24 Electrical Power	Relocated four circuit breakers from aisle stand to P-6	No	No	A	A
	ATA 27 Flight Controls	FLIGHT CONTROL SYSTEMS Fly-by-Wire Spoiler System	No	No	B	B
	ATA 27 Flight Controls	FLIGHT CONTROL SYSTEMS Maneuver Load Alleviation	No	No	B	B
	ATA 27 Flight Controls	FLIGHT CONTROL SYSTEMS Landing Attitude Modifier (LAM)	No	No	B	B
	ATA 27 Flight Controls	FLIGHT CONTROL SYSTEMS Elevator Jam Landing Assist	No	No	B	B
	ATA 27 Flight Controls	FLAPS/SLATS Position indicator relocated to MDS	No	No	B	B

FROM BASE AIRCRAFT: B-737-800 TO RELATED AIRCRAFT: B-737-8	DESIGN	REMARKS	FLT CHAR	PROC CHNG	TRAINING	CHECKING
	ATA 27 Flight Controls	SPEEDBRAKES/SPOILERS Emergency Descent Speedbrakes (EDS)	No	No	B	B
	ATA 27 Flight Controls	SPEEDBRAKES/SPOILERS SPEEDBRAKE EXTENDED light logic	No	No	B	B
	ATA 27 Flight Controls	SPEEDBRAKES/SPOILERS SPOILERS light added	No	Yes	B	B
	ATA 27 Flight Controls	SPEEDBRAKES/SPOILERS ASSIST ON light added	No	Yes	B	B
	ATA 27 Flight Controls	STABILIZER TRIM: Stab Trim cutout switches panel nomenclature	No	No	B	B

FROM BASE AIRCRAFT: B-737-800 TO RELATED AIRCRAFT: B-737-8	DESIGN	REMARKS	FLT CHAR	PROC CHNG	TRAINING	CHECKING
	ATA 27 Flight Controls	STABILIZER TRIM: Maneuvering Characteristics Augmentation System (MCAS)	No	No	B	B
	ATA 28 Fuel	CONTROLS AND INDICATORS: Additional System Alerts (see section Navigation)	No	Yes	B	B
	ATA 28 Fuel	CONTROLS AND INDICATORS: Revised fuel FILTER BYPASS light logic	No	Yes	B	B
	ATA 29 Hydraulic Power	CONTROLS AND INDICATORS: System indications relocated to MDS Systems Page	No	No	A	A

FROM BASE AIRCRAFT: B-737-800 TO RELATED AIRCRAFT: B-737-8	DESIGN	REMARKS	FLT CHAR	PROC CHNG	TRAINING	CHECKING
	ATA 30 Ice and Rain Protection	ENGINE ANTI-ICE ADDITIONAL ENG ANTI-ICE alert	No	Yes	B	B
	ATA 30 Ice and Rain Protection	ENGINE ANTI-ICE REVISED COWL VALVE NOMENCLATURE AND COLOR (AMBER)	No	Yes	B	B
	ATA 30 Ice and Rain Protection	WING ANTI-ICE L/R VALVE ALERTS COLOR (AMBER)	No	Yes	B	B
	ATA 31 Indicating/Recording Systems	Incorporation of MAX DISPLAY SYSTEM (MDS) Four Large Display LCD Units	No	No	B	B
	ATA 31 Indicating/Recording Systems	LIGHTING CONTROLS Updated And Relocated Engine Display Control Panel	No	Yes	B	B

FROM BASE AIRCRAFT: B-737-800 TO RELATED AIRCRAFT: B-737-8	DESIGN	REMARKS	FLT CHAR	PROC CHNG	TRAINING	CHECKING
	ATA 31 Indicating/Recording Systems	LIGHTING CONTROLS Revised Display Brightness, Display Select Switch Panels, Master Dim and Test	No	No	B	B
	ATA 31 Indicating/Recording Systems	ENGINE DISPLAY CONTROL PANEL Added Engine Transfer Switch	No	No	B	B
	ATA 31 Indicating/Recording Systems	ENGINE DISPLAY CONTROL PANEL Added MFD Info Switch	No	Yes	B	B
	ATA 31 Indicating/Recording Systems	ENGINE DISPLAY CONTROL PANEL Revised N_1 and Speed Set Selectors	No	No	B	B

FROM BASE AIRCRAFT: B-737-800 TO RELATED AIRCRAFT: B-737-8	DESIGN	REMARKS	FLT CHAR	PROC CHNG	TRAINING	CHECKING
	ATA 31 Indicating/Recording Systems	PFD Expanded Sky Ground and Compass Display	No	No	B	B
	ATA 31 Indicating/Recording Systems	EFIS CONTROL PANEL Dedicated VSD switch	No	No	B	B
	ATA 31 Indicating/Recording Systems	EFIS CONTROL PANEL ND/WXR Range Selector - revised functionality	No	No	B	B
	ATA 31 Indicating/Recording Systems	STANDBY FLIGHT INSTRUMENTS INTEGRATED STANDBY FLIGHT INSTRUMENT (ISFD) basic	No	No	B	B
	ATA 31 Indicating/Recording Systems	AUX DISPLAY Added Information Displayed	No	No	B	B

FROM BASE AIRCRAFT: B-737-800 TO RELATED AIRCRAFT: B-737-8	DESIGN	REMARKS	FLT CHAR	PROC CHNG	TRAINING	CHECKING
	ATA 31 Indicating/Recording Systems	AUX DISPLAY Added Flight number, Transponder, Selcal, UTC, Date, and Elapsed time	No	No	B	B
	ATA 31 Indicating/Recording Systems	AUX DISPLAY Added Clock start/stop switches relocated to glareshield	No	No	B	B
	ATA 31 Indicating/Recording Systems	MAINT LIGHT (replaces PSEU light)	No	Yes	B	B
	ATA 32 Landing Gear	NOSE WHEEL STEERING switch relocated	No	No	B	B
	ATA 32 Landing Gear	Brake accumulator pressure indicator relocated	No	No	B	B
	ATA 32 Landing Gear	Autobrake switch relocated	No	No	B	B

FROM BASE AIRCRAFT: B-737-800 TO RELATED AIRCRAFT: B-737-8	DESIGN	REMARKS	FLT CHAR	PROC CHNG	TRAINING	CHECKING
	ATA 32 Landing Gear	Landing Gear Warning Cutout switch relocated	No	No	B	B
	ATA 32 Landing Gear	Revised landing gear lock override switch	No	No	B	B
	ATA 34 Navigation	FLIGHT MANAGEMENT SYSTEM FMC SOFTWARE U13 basic	No	No	B	B
	ATA 34 Navigation	FLIGHT MANAGEMENT SYSTEM Variable Takeoff Rating function	No	No	B	B
	ATA 34 Navigation	FLIGHT MANAGEMENT SYSTEM Fuel Alerting and Fuel Management	No	No	B	B
	ATA 34 Navigation	CDU Pages New or Revised: Perf Init page 1/2	No	No	B	B

FROM BASE AIRCRAFT: B-737-800 TO RELATED AIRCRAFT: B-737-8	DESIGN	REMARKS	FLT CHAR	PROC CHNG	TRAINING	CHECKING
	ATA 34 Navigation	CDU Pages New or Revised: N_1 Limit	No	No	B	B
	ATA 34 Navigation	CDU Pages New or Revised: Fuel Progress page 5/5	No	Yes	B	B
	ATA 34 Navigation	FMC and Engine Display Alert Messages: USING RSV FUEL	No	Yes	B	B
	ATA 34 Navigation	FMC and Engine Display Alert Messages: FUEL DISAGREE	No	Yes	B	B
	ATA 34 Navigation	FMC and Engine Display Alert Messages: INSUFFICIENT FUEL	No	Yes	B	B
	ATA 34 Navigation	FUEL FLOW (engine display only)	No	Yes	B	B

FROM BASE AIRCRAFT: B-737-800 TO RELATED AIRCRAFT: B-737-8	DESIGN	REMARKS	FLT CHAR	PROC CHNG	TRAINING	CHECKING
	ATA 36 Pneumatic	BLEED AIR CONTROL PANEL Removed RAM DOOR FULL OPEN lights	No	No	A	A
	ATA 36 Pneumatic	BLEED AIR CONTROL PANEL Revised BLEED TRIP OFF nomenclature to BLEED	No	Yes	A	A
	ATA 36 Pneumatic	BLEED AIR CONTROL PANEL Revised BLEED light logic	No	Yes	B	B
	ATA 49 Airborne Auxiliary Power	SYSTEM OPERATION Removed APU MAINT light	No	No	A	A
	ATA 49 Airborne Auxiliary Power	SYSTEM OPERATION Removed APU EGT gauge	No	No	A	A
	ATA 49 Airborne Auxiliary Power	SYSTEM OPERATION Added retractable door	No	No	B	B

FROM BASE AIRCRAFT: B-737-800 TO RELATED AIRCRAFT: B-737-8	DESIGN	REMARKS	FLT CHAR	PROC CHNG	TRAINING	CHECKING
	ATA 49 Airborne Auxiliary Power	SYSTEM OPERATION Added APU DOOR light	No	Yes	B	B
	ATA 72, 73, 77, 78, 80 Powerplant	ENGINES: New LEAP-1B engines	No	Yes	B	B
	ATA 72, 73, 77, 78, 80 Powerplant	EEC SYSTEM Removal of Overboost rating	No	No	B	B
	ATA 72, 73, 77, 78, 80 Powerplant	EEC SYSTEM Addition of Icing Idle speed	No	No	B	B
	ATA 72, 73, 77, 78, 80 Powerplant	INDICATORS Revised Display Format	No	No	B	B
	ATA 72, 73, 77, 78, 80 Powerplant	INDICATORS Compact engine display removed	No	No	A	A

FROM BASE AIRCRAFT: B-737-800 TO RELATED AIRCRAFT: B-737-8	DESIGN	REMARKS	FLT CHAR	PROC CHNG	TRAINING	CHECKING
	ATA 72, 73, 77, 78, 80 Powerplant	INDICATORS Added THRUST alert	No	Yes	B	B
	ATA 72, 73, 77, 78, 80 Powerplant	INDICATORS Added MOTORING indication for bowed rotor logic	No	No	B	B
	ATA 72, 73, 77, 78, 80 Powerplant	THRUST REVERSER SYSTEM Added REVERSER COMMAND and REVERSER AIR/GND alerts	No	Yes	B	B
	ATA 72, 73, 77, 78, 80 Powerplant	THRUST REVERSER SYSTEM Replaced REVERSER alert with REVERSER LIMITED	No	Yes	B	B

This Maneuver Differences table, from the Boeing 737-800 to the Boeing 737-8, was proposed by Boeing and validated by the FSB on 08/16/2016. It lists the minimum differences levels operators must use to conduct differences training and checking of flightcrew members.

FROM BASE AIRCRAFT: B-737-800 TO RELATED AIRCRAFT: B-737-8	MANEUVER	REMARKS	FLT CHAR	PROC CHNG	TRAINING	CHECKING
	Preflight Inspection	Optional installation of two-position tailskid	No	Yes	A	A
	Climb	After takeoff checklist - Landing gear handle	No	Yes	B	B
	Non-Normal	Read and do Checklist changes due to annunciation and system changes listed in DESIGN difference tables	No	Yes	B	B

This Design Differences table, from the Boeing 737-800 to the Boeing 737-800BCF, was proposed by Boeing and validated by the FSB in January 2018. It lists the minimum differences levels operators must use to conduct differences training and checking of flightcrew members.

FROM BASE AIRCRAFT: B-737-800 TO RELATED AIRCRAFT: B-737-800BCF	DESIGN	REMARKS	FLT CHAR	PROC CHNG	TRAINING	CHECKING
	General	Added Main Deck Cargo capability	No	No	A	A
	Configuration	Added Main Deck Cargo door control panel Added Rigid Cargo Barrier and Supernumerary area	No	Yes	A	A
	ATA 21 Air Conditioning	Removed Recirculation Fans	No	Yes	A	A
	ATA 26 Fire Protection	Added Main Deck smoke detectors Added Main Deck indications and controls to Cargo Fire Control Panel	No	Yes	A	A

FROM BASE AIRCRAFT: B-737-800 TO RELATED AIRCRAFT: B-737-800BCF	DESIGN	REMARKS	FLT CHAR	PROC CHNG	TRAINING	CHECKING
	ATA 29 Hydraulic Power	Added Main Deck Cargo Door to System A	No	No	A	A
	ATA 33 Lights	Added Main Deck Cargo Door not secure to takeoff configuration warning	No	Yes	A	A
	ATA 35 Oxygen	Added Supernumerary Masks	No	No	A	A
	ATA 52 Doors	Added Main Deck Cargo Door flight deck indication Flight Deck door removed All overwing Type III emergency exits deactivated Both flight deck #2 windows can be opened from outside the aircraft	No	No	A	A

This Design Differences table, from the Boeing 737-8 to the Boeing 737-800, was proposed by Boeing and validated by the FSB on 09/13/2017. It lists the minimum differences levels operators must use to conduct differences training and checking of flightcrew members.

FROM BASE AIRCRAFT: B-737-8 TO RELATED AIRCRAFT: B-737-800	DESIGN	REMARKS	FLT CHAR	PROC CHNG	TRAINING	CHECKING
	Configuration	Nose Landing Gear 8 inches shorter Single Tail Anti-Collision/Position Light	No	No	A	A
	Panel Layout	New MAX DISPLAY SYSTEM (MDS)	No	No	B	B
	Panel Layout	New Two Position Landing Gear Control Lever	No	Yes	B	B
	Limitations	Size/type/system limitations	No	No	A	A
	Limitations	Ground wind operating envelope removed	No	No	A	A

FROM BASE AIRCRAFT: B-737-8 TO RELATED AIRCRAFT: B-737-800	DESIGN	REMARKS	FLT CHAR	PROC CHNG	TRAINING	CHECKING
	Weights	Decreased to: • MTW - 174,700 lbs • MTOW - 174,200 lbs • MLW - 144,000 lbs • MZFW - 136,000 lbs	No	No	A	A
	ATA 21 Air Conditioning	PACKS: Simplified Electronic Pack Flow Control System	No	No	B	B
	ATA 21 Air Conditioning	PACKS: Revised PACK light logic	No	Yes	A	A
	ATA 21 Air Conditioning	EQUIPMENT COOLING: EQUIP SMOKE light and Detection System removed	No	Yes	B	B
	ATA 24 Electrical Power	Relocated four circuit breakers from P-6 to aisle stand	No	No	A	A

FROM BASE AIRCRAFT: B-737-8 TO RELATED AIRCRAFT: B-737-800	DESIGN	REMARKS	FLT CHAR	PROC CHNG	TRAINING	CHECKING
	ATA 27 Flight Controls	FLIGHT CONTROL SYSTEMS Mechanical Spoiler System	Yes	No	B	B
	ATA 27 Flight Controls	FLIGHT CONTROL SYSTEMS Maneuver Load Alleviation removed	Yes	No	B	B
	ATA 27 Flight Controls	FLIGHT CONTROL SYSTEMS Landing Attitude Modifier (LAM) removed	Yes	No	B	B
	ATA 27 Flight Controls	FLIGHT CONTROL SYSTEMS Elevator Jam Landing Assist System removed	Yes	No	B	B
	ATA 27 Flight Controls	FLAPS/SLATS Fixed position mechanical indicator	No	No	B	B

FROM BASE AIRCRAFT: B-737-8 TO RELATED AIRCRAFT: B-737-800	DESIGN	REMARKS	FLT CHAR	PROC CHNG	TRAINING	CHECKING
	ATA 27 Flight Controls	SPEEDBRAKES/SPOILERS Emergency Descent Speedbrakes (EDS) removed	Yes	No	B	B
	ATA 27 Flight Controls	SPEEDBRAKES/SPOILERS SPEEDBRAKE EXTENDED light logic	No	Yes	B	B
	ATA 27 Flight Controls	SPEEDBRAKES/SPOILERS SPOILERS light removed	No	Yes	B	B
	ATA 27 Flight Controls	SPEEDBRAKES/SPOILERS ASSIST ON light removed	No	Yes	B	B
	ATA 27 Flight Controls	STABILIZER TRIM: Stab Trim cutout switches panel nomenclature	No	No	B	B

FROM BASE AIRCRAFT: B-737-8 TO RELATED AIRCRAFT: B-737-800	DESIGN	REMARKS	FLT CHAR	PROC CHNG	TRAINING	CHECKING
	ATA 28 Fuel	CONTROLS AND INDICATORS: Fewer System Alerts (see section Navigation)	No	Yes	B	B
	ATA 28 Fuel	CONTROLS AND INDICATORS: Revised fuel FILTER BYPASS light logic	No	Yes	B	B
	ATA 29 Hydraulic Power	CONTROLS AND INDICATORS: System indications relocated to Lower Display Unit (DU)	No	No	A	A
	ATA 30 Ice and Rain Protection	ENGINE ANTI-ICE ENG ANTI-ICE alert removed	No	Yes	B	B

FROM BASE AIRCRAFT: B-737-8 TO RELATED AIRCRAFT: B-737-800	DESIGN	REMARKS	FLT CHAR	PROC CHNG	TRAINING	CHECKING
	ATA 30 Ice and Rain Protection	ENGINE ANTI-ICE REVISED COWL VALVE NOMENCLATURE AND COLOR (BLUE)	No	Yes	B	B
	ATA 30 Ice and Rain Protection	WING ANTI-ICE L/R VALVE ALERTS COLOR (BLUE)	No	Yes	B	B
	ATA 31 Indicating/Recording Systems	COMMON DISPLAY SYSTEM Six Display Units	No	No	B	B
	ATA 31 Indicating/Recording Systems	LIGHTING CONTROLS Updated and Relocated Engine Display Control Panel	No	Yes	B	B
	ATA 31 Indicating/Recording Systems	LIGHTING CONTROLS Revised Display Brightness, Display Select Switch Panels, Master Dim, and Test	No	No	B	B

FROM BASE AIRCRAFT: B-737-8 TO RELATED AIRCRAFT: B-737-800	DESIGN	REMARKS	FLT CHAR	PROC CHNG	TRAINING	CHECKING
	ATA 31 Indicating/Recording Systems	ENGINE DISPLAY CONTROL PANEL Engine Transfer Switch removed	No	No	A	A
	ATA 31 Indicating/Recording Systems	ENGINE DISPLAY CONTROL PANEL MFD Info Switch removed	No	Yes	B	B
	ATA 31 Indicating/Recording Systems	ENGINE DISPLAY CONTROL PANEL Revised N_1 and Speed Set Selectors	No	No	B	B
	ATA 31 Indicating/Recording Systems	ENGINE DISPLAY CONTROL PANEL Dedicated VSD switch removed	No	No	B	B
	ATA 31 Indicating/Recording Systems	PFD Sky Ground and Compass Display changes	No	No	B	B

This Maneuver Differences table, from the Boeing 737-8 to the Boeing 737-800, was proposed by The Boeing Company and validated by the FSB on 09/13/2017. It lists the minimum differences levels operators must use to conduct differences training and checking of flightcrew members.

FROM BASE AIRCRAFT: B-737-8 TO RELATED AIRCRAFT: B-737-800	MANEUVER	REMARKS	FLT CHAR	PROC CHNG	TRAINING	CHECKING
	Preflight Inspection	Optional installation of two-position tailskid	No	Yes	A	A
	Climb	After takeoff checklist - Landing gear handle	No	Yes	B	B
	Non-Normal	Read and do Checklist changes due to annunciation and system changes listed in DESIGN difference tables	No	Yes	B	B

This Design Differences table, from the BBJ 2 to the BBJ MAX 8, was proposed by Boeing and validated by the FSB in February 2018. It lists the minimum differences levels operators must use to conduct differences training and checking of flightcrew members.

FROM BASE AIRCRAFT: BBJ 2 TO RELATED AIRCRAFT: BBJ MAX 8	DESIGN	REMARKS	FLT CHAR	PROC CHNG	TRAINING	CHECKING
	General	Height: 41 feet, 2 inches (12.55 meters)	No	No	A	A
	ATA 28 Fuel	Auxiliary fuel controls and indications	No	No	A	A
	ATA 32 Landing Gear	Combined Tire Pressure Indication and Brake Temperature Monitoring System	No	No	A	A
	ATA 33 Lights	Flashing landing lights	No	No	A	A
	ATA 34 Navigation	Alternate Navigation System (ANS) Overrun Warnings (ORW) Perspective Runway Indications (HUD)	No	No	A	A

This Design Differences table, from the Boeing 737-8 to the Boeing 737-9, was proposed by Boeing and validated by the FSB on 09/9/2017. It lists the minimum differences levels operators must use to conduct differences training and checking of flightcrew members.

FROM BASE AIRCRAFT: B-737-8 TO RELATED AIRCRAFT: B-737-9	DESIGN	REMARKS	FLT CHAR	PROC CHNG	TRAINING	CHECKING
	General	Turning radius and passenger capacity	No	No	A	A
	Configuration	Two- position tailskid standard	No	No	A	A
	Dimensions	Length: 138 feet, 2 inches (42.11 meters)	No	No	A	A
	Limitations	Revised flap placard speeds	No	No	A	A
	Weights	Increased to: • Max Taxi Weight - 195,200 lbs • Max Takeoff Weight - 194,700 lbs • Max Landing Weight - 163,900 lbs • Max Zero Fuel Weight - 156,500 lbs	No	No	A	A

FROM BASE AIRCRAFT: B-737-8 TO RELATED AIRCRAFT: B-737-9	DESIGN	REMARKS	FLT CHAR	PROC CHNG	TRAINING	CHECKING
	ATA 52 Doors	Added Mid Exit Doors and flight deck indications and associated Non-Normal Checklist	No	No	A	A

This Maneuver Differences table, from the Boeing 737-8 to the Boeing 737-9, was proposed by Boeing and validated by the FSB on 09/09/2017. It lists the minimum differences levels operators must use to conduct differences training and checking of flightcrew members.

FROM BASE AIRCRAFT: B-737-8 TO RELATED AIRCRAFT: B-737-9	MANEUVER	REMARKS	FLT CHAR	PROC CHNG	TRAINING	CHECKING
	Preflight Inspection	Installation of two-position tailskid	No	Yes	A	A
	Preflight Inspection	Over-wing Exit	No	Yes	A	A

This Design Differences table, from the Boeing 737-8 to the Boeing 737-7, was proposed by The Boeing Company and validated by the FSB in September of 2018. It lists the minimum differences levels operators must use to conduct differences training and checking of flightcrew members.

FROM BASE AIRCRAFT: B-737-8 TO RELATED AIRCRAFT: B-737-7	DESIGN	REMARKS	FLT CHAR	PROC CHNG	TRAINING	CHECKING
	General	Turning radius and passenger capacity	No	No	A	A
	Configuration	Tail Skid Removed	No	Yes	A	A
	Dimensions	Overall length: 116 feet 8 inches Fuselage length: 115 feet 6 inches Wheel base: 43 feet 10 inches	No	No	A	A
	Weights	Changed to: MTW 177,500 lbs. MTOW 177,000 lbs. MLW 145,600 lbs. MZFW 138,700 lbs.	No	No	A	A
	ATA 27 Flight Controls	Revised LE Slats extension sequence	No	No	A	A

This Maneuver Differences table, from the Boeing 737-8 to the Boeing 737-7, was proposed by The Boeing Company and validated by the FSB in September of 2018. It lists the minimum differences levels operators must use to conduct differences training and checking of flightcrew members.

FROM BASE AIRCRAFT: B-737-8 TO RELATED AIRCRAFT: B-737-7	MANEUVER	REMARKS	FLT CHAR	PROC CHNG	TRAINING	CHECKING
	Preflight Inspection	Tail skid removed	No	Yes	A	A

This Design Differences table, from the Boeing 737-8 to the Boeing 737-8200, was proposed by The Boeing Company and validated by the FSB in September of 2018. It lists the minimum differences levels operators must use to conduct differences training and checking of flightcrew members.

FROM BASE AIRCRAFT: B-737-8 TO RELATED AIRCRAFT: B-737-8200	DESIGN	REMARKS	FLT CHAR	PROC CHNG	TRAINING	CHECKING
	ATA 52 Doors	Added Mid Exit Doors and flight deck indications and associated Non Normal Checklist	No	No	A	A

This Maneuver Differences table, from the Boeing 737-8 to the Boeing 737-8200, was proposed by The Boeing Company and validated by the FSB in September of 2018. It lists the minimum differences levels operators must use to conduct differences training and checking of flightcrew members.

FROM BASE AIRCRAFT: B-737-8 TO RELATED AIRCRAFT: B-737-8200	MANEUVER	REMARKS	FLT CHAR	PROC CHNG	TRAINING	CHECKING
	Preflight Inspection	Over-wing Exit	No	Yes	A	A

APPENDIX 4. SUPERVISED LINE FLYING (SLF) TABLE

Operating Experience (OE) for flying multiple series may be accomplished in any B737. Additional SLF must be accomplished in accordance with the table below for those flightcrews flying the series listed. When differences training relates to qualification for flight management system (FMS), SLF must also include use of FMS. Such FMS required SLF pertinent to each flightcrew member must be obtained while serving in a flightcrew position and include FMS operation. However, Line-Oriented Flight Training (LOFT) involving FMS operation in an appropriately configured Level C or Level D full flight simulator (FFS) may be substituted.

When differences training relates to qualification for primary flight display (PFD)/navigation display (ND), SLF must also include use of PFD/ND. Such PFD/ND required SLF pertinent to each flightcrew member must be obtained while serving in a flightcrew position and includes PFD/ND operation. For flightcrew members with previous Electronic Flight Information Systems (EFIS) experience, a 4-hour LOFT session involving PFD/ND operation in an appropriately configured flight simulation training device (FSTD) (minimum of a Level 5 flight training device (FTD)), may be substituted for two SLF legs as specified below.

SUPERVISED LINE FLYING

Related Aircraft ↓	**Base Aircraft →**	**B-737**	**B-737-CL (NON-EFIS)**	**B-737-CL (EFIS)**	**B-737-NG**	**B-737-MAX**
B-737		Not Required	2/5	2/5	2/5	Not Evaluated
B-737-CL (NON-EFIS)		2/5	Not Required	2/5	2/5	Not Evaluated
B-737-CL (EFIS)		2/5	2/5	Not Required	2*	Not Evaluated
B-737-NG		2/5	2/5	2*	Not Required	Not Required
B-737-MAX		Not Evaluated	Not Evaluated	Not Evaluated	Not Required	Not Required

1) * Legs of LOFT in a Level 5 FTD or higher may be substituted.
2) SLF must be accomplished by a flight instructor or check pilot.
3) 2/5 = minimum of 5 hours of SLF, which includes two flight segments.

APPENDIX 5. HEAD-UP GUIDANCE TRAINING

The Head-Up Display (HUD) pilot training requirements consist of those related to initial and recurrent ground and flight training. Unless covered concurrently during an initial or transition type rating course, a prerequisite to beginning this course of training is prior training, qualification, and currency in the B-737 airplane.

1 HUD General.

1.1. INITIAL GROUND TRAINING. For all operators, the initial ground training program should include the following elements:

1.1.1. Classroom instruction covering HUD operational concepts, crew duties and responsibilities, and operational procedures including preflight, normal, and non-normal pilot procedures. For operators wishing credit for low visibility operations predicated on use of the HUD, information should be provided on the operational characteristics, capabilities, and limitations of the ground facilities (surface movement guidance control system) and airborne Category (CAT) III system. Air carrier policies and procedures concerning low visibility operations should include a reporting process, minimum equipment list (MEL) issues, operation following a missed approach, Operating Experience (OE), and currency requirements.

1.1.2. Classroom instruction (or computer-based training (CBT)) on the HUD symbology set and its interrelationship with airplane aerodynamics, inertial factors, and environmental conditions.

1.1.3. A HUD pilot training manual or equivalent material in the operations manual which explains all modes of operation, the use of various HUD controls, clear descriptions of HUD symbology, including limit conditions and failures, and incorporating a crew procedures guide clearly delineating pilot flying (PF) and pilot monitoring (PM) duties, responsibilities, and procedural callouts and responses 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). This would include:

1.1.3.1. Procedures for unexpected deterioration of conditions to less than minimum Runway Visual Range (RVR) encountered during approach, flare, and rollout.

1.1.3.2. Demonstration of expected visual references with weather at minimum conditions.

1.1.3.3. Expected sequence of visual cues during an approach in which visibility is at or above landing minima.

1.1.4. A video demonstrating all modes of operation complete with sound. For operators wishing credit for low visibility operations predicated on use of the HUD, this should include narrative descriptions and several low weather approach demonstrations with procedural callouts and responses. All critical procedural callout possibilities should be covered.

1.1.5. If the HUD is used to conduct CAT II/III landings, emphasis on the need for rigorous crew discipline, coordination, and adherence to procedural guidelines is required.

1.2. INITIAL FLIGHT TRAINING. Unless integrated with initial or transition type rating training, flight training dedicated to HUD familiarization and proficiency is in addition to other required elements. When a full flight simulator (FFS) is used, only an FAA-approved B-737 FFS with both a visual and the Head-Up Guidance System (HGS) installed may be used. For FFS training, all required approaches should be flown from no closer than the final approach fix (FAF) for instrument approaches and from no closer than approximately 1,000 feet above ground level (AGL) (3–4 nautical miles (NM)) to the runway threshold for visual approaches.

1.2.1. Flight training should include at least the following:

1.2.1.1. Air work. Air work should include:

- Straight and level flight, accelerations, and decelerations.
- Normal and steep turns, climbs, and descents.
- Stall prevention and recovery and unusual attitudes.
- Vectors to intercept and track selected very high frequency omnidirectional range (VOR) courses.

NOTE: Emphasis should be placed on HUD unique symbology (i.e., flight path, flight path acceleration, airspeed error tape, angle of attack (AOA) limit bracket, and excessive pitch chevrons). When this training is complete, the trainee should have a thorough understanding of the relationship between aircraft flight path parameters and the HUD symbology.

1.2.1.2. Visual approaches (Visual Meteorological Conditions (VMC) mode):

- Perform one approach showing deviations above and below glideslope (GS) for symbology/runway relationship.
- Straight-in landings, no wind, repeat with 10-knot crosswind, and at night.
- Circling approaches and landing with 10-knot crosswind, if applicable.

NOTE: It is desirable to fly half of these approaches at different airports that have dissimilar approach and runway lighting systems. Special emphasis should be placed on optimizing circling approach techniques and procedures.

Approaches with the aircraft in a non-normal flap configuration should be included.

1.2.2. Instrument approaches.

1.2.2.1. For all operators:

- Perform a CAT I approach to 200-foot DH, 2400 RVR, wind calm.
- Demonstrate failures and incorrect settings on approach (i.e., misset runway elevation, airspeed, selected course).
- Illustrate unique characteristics of symbology in windshear conditions (i.e., erratic wind speed and direction, flight path, flight path acceleration, and speed error).
- Non-precision approach, VOR approach, 600-2 RVR, 15-knot crosswind.

1.2.2.2. For operators wishing credit for low visibility operations predicated on use of the HUD:

- Perform a CAT II approach to 100-foot DH, 1200 RVR, 5–10-knot crosswind.
- Perform a CAT IIIa instrument landing system (ILS) approach and landing starting on a 30-degree intercept to the ILS, below GS, weather clear and calm.
- CAT IIIa ILS with 700 RVR, wind calm, and another ILS with a 10-knot crosswind.
- CAT IIIa ILS with various reasons for a missed approach (system downgrade, “APCH WARN”, etc.).
- CAT IIIa ILS with various RVRs and crosswinds, include light turbulence.

NOTE: Several of the instrument approaches should include a variety of ground and airborne system failures requiring pilot recognition and appropriate procedural actions. Demonstrate system/component failures could include flap asymmetry problems, engine out operations, HGS sensor failures, etc. Demonstration how HUD failure modes can reduce precision and increase pilot workload unless PF/PM duties and responsibilities are clearly delineated and understood.

1.2.3. Takeoff. For operators wishing credit for low visibility takeoff operations predicated on use of the HUD:

- Normal takeoff, clear and calm, repeated with gusty winds.
- Takeoff, 600-foot RVR, 5-knot crosswind.
- Takeoff, 300-foot RVR, 5-knot crosswind, engine failure prior to V_1.
- Takeoff, 300-foot RVR, 5-knot crosswind, engine failure after V_1.
- Takeoff with HGS failure, 300-foot RVR.

1.2.4. For 14 CFR part 121 operators, pilots who have completed HUD training as part of an initial, transition, or upgrade course should complete their OE for HUD CAT II/IIIa operations within 60 days. Seconds in command (SIC) should be certified to perform CAT II/IIIa PM duties upon satisfactory completion of the HUD training program.

1.2.5. Check pilots must certify the satisfactory completion of OE for pilots in command (PIC) completing initial, transition, and upgrade training. This requirement should include three HUD assisted takeoffs, one visual approach, and three instrument approaches in conditions not less than RVR 1800.

1.2.6. For all operators, prior to utilizing the HUD in instrument meteorological conditions (IMC) conditions below RVR 1800, each PIC must accomplish at least 25 manually flown HUD approaches to Category II/IIIa minima in VMC conditions. Each approach must terminate in a manually controlled HUD assisted landing or HUD assisted go-around. In addition, each PIC must accomplish at least 25 HUD assisted takeoffs in VMC conditions prior to using the HUD mode in IMC conditions. Upon completion of this requirement, the HUD qualified pilot would then be observed to conduct HUD approaches to company authorized minima as set forth in their operations specifications (OpSpecs).

1.3. RECURRENT TRAINING AND CHECKING. For operators wishing credit for low visibility operations on use of the HUD, during the 6-month recurrent training and Proficiency Check (PC), the following low visibility operations should be performed in addition to regular requirements:

- Approach and landing, 700-foot RVR, 10-knot crosswind.
- Approach, 700-foot RVR, 10-knot crosswind, light turbulence with missed approach.
- Takeoff, 300-foot RVR, 10-knot crosswind.
- Takeoff, 300-foot RVR, engine failure either before or after V_1.
- Selected ground training subjects should be reviewed annually.

2. HGS 4000 Enhanced Flight Vision System (EFVS) Training: Installed on Boeing Business Jet (BBJ) Aircraft—Not for Landing Credit.

2.1. Initial Ground School Required (4 Hours).

NOTE: Completing the HGS 4000 EFVS computer-based training (CBT) completes the basic ground school. CBT learning material will be summarized during the Familiarization Flight briefing.

- General.
- Infrared (IR) theory.
- EFVS system architecture.
- Enhanced Vision System (EVS) HUD Display symbology.
- EVS HUD display format.
- EVS videos of flight scenarios.

- Runway markings and lighting.
- EVS operating procedures and limitations.
- Title 14 CFR part 91, § 91.175(c)(2).
- Noise and “blooming”.
- Roman candle effect – rain.
- Burlap effect.
- Burn in – how to eliminate.
- Non-Uniformity Correction Calibration (NUUC).
- Weather conditions (fog and visual reference).
- Flightcrew qualification and training.
- Transition from EVS imagery to non-EVS, visual conditions.
- Crew briefings and callouts.
- Duties of PF and PM.
- Crew coordination.

2.2. Familiarization Flight Training Events - Required Familiarization Flight (Left Seat) (2 Hours).

2.2.1. EFVS equipment:

- System use, checks, and tests.
- Displays, modes, annunciations.
- Design eye position.
- Use of on/off switch and “clear” mode.

2.2.2. Transition from EVS imagery to non-EVS, visual conditions, and runway acquisition.

2.2.3. Crew briefings and callouts.

2.2.4. Instrument failures and warning systems.

2.2.5. Various daylight and night takeoffs and landings including the following:

- VMC takeoff and landing.
- Precision approach and landing (any one of these):
  - ILS, Global Positioning System Landing System (GLS), wide area augmentation system (WAAS)/lateral approach procedures with vertical guidance (LPV).
- Precision approach and missed approach (any one of these):
  - ILS, GLS, WAAS/LPV.
- Non-precision approach and landing. (Localizer (LOC) only to minimum descent altitude (MDA)).
- Required Navigation Performance (RNP) approach and landing – if applicable.

APPENDIX 6. ALTERNATE GO-AROUND FLAPS TRAINING

Alternate go-around flaps operations require a separate Airplane Flight Manual (AFM) Appendix, a supplementary procedure defining flightcrew actions, and operational approval. Alternate go-around flaps for B-737-NG and B-737-MAX aircraft certified to conduct Flaps 30 approaches using Flaps 5 during go-around requires flightcrew training. The Flight Standardization Board (FSB) conducted an operational suitability evaluation and found no handling quality differences between the B-737-NG and the B-737-MAX when conducting the alternate go-around flaps operations in accordance with the AFM Appendix. A flightcrew member who completed training on either the B-737-NG or the B-737-MAX does not need to repeat training in the other series aircraft.

The use of Flaps 5 for go-around creates a substantial increase in approach climb weights in hot and/or high environments. The Flaps 30 approach speeds for Flaps 5 go-around operations require minor model specific speed additives to the standard Flaps 30 V_{REF} speeds in order to maintain the performance requirements of 14 CFR part 25, § 25.121(d). Operators are encouraged to develop an approach review and briefing card for use by flightcrews when conducting any alternate go-around flaps operation.

Ground training for flightcrews current in the B-737-NG or the B-737-MAX aircraft is established at Level B. Training may be administered via computer-based training (CBT), stand-up lectures, or video and should include performance requirements, speed additive use, and effect on maneuver margins, alternate go-around procedures, flightcrew callouts, and engine failure procedures. This item must be included in initial, upgrade, transition, differences, and recurrent training.

Flight training for flightcrews current in the B-737-NG or the B-737-MAX aircraft is established at Level D. Training must be included in initial, upgrade, transition, differences, and recurrent training. Training should include the following:

i. A two-engine Flaps 30 approach to a Flaps 5 go-around;
ii. A two-engine Flaps 30 approach to an engine failure during a Flaps 5 go-around; and
iii. A two-engine Flaps 30 approach in icing conditions to an engine failure during a Flaps 5 go-around.