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Manufacturer
Boeing

Type Certificate Data Sheet (TCDS)	TCDS Identifier	Marketing Name	Pilot Type Rating
A20WE	B-747-400	Boeing 747-400	B-747-4
A20WE	B-747-8	Boeing 747-8	B-747-4

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TABLE OF CONTENTS

Section	Page
1. RECORD OF REVISIONS	3
2. INTRODUCTION	3
3. HIGHLIGHTS OF CHANGE	3
4. BACKGROUND	3
5. ACRONYMS.....	4
6. DEFINITIONS.....	5
7. PILOT TYPE RATING	6
8. RELATED AIRCRAFT.....	6
9. PILOT TRAINING.....	6
10. PILOT CHECKING.....	8
11. PILOT CURRENCY	9
12. OPERATIONAL SUITABILITY.....	9
13. MISCELLANEOUS	9
APPENDIX 1. DIFFERENCES LEGEND	11
APPENDIX 2. MASTER DIFFERENCES REQUIREMENTS (MDR) TABLE.....	13
APPENDIX 3. DIFFERENCES TABLES	14

1 RECORD OF REVISIONS

Revision Number	Sections(s)	Page(s) Affected	Date
1	Original	All	09/19/2002
2	Appendix 1		06/14/2007
3	All	All	09/27/2011
4	Sections 1, 5, 6, Appendices 4, 6		10/04/2013
5	Appendix 8, Appendix 9, Deleted		02/26/2014
6	All	All	08/22/2018

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 change to a new format and has been completely modified from the previous revision. Major modifications include the deletion of currency levels depicted in the Master Differences Requirements table, renaming of Operator Differences Tables to Differences Tables, and deleting regulatory repetitive information.

4 BACKGROUND

The Transport Aircraft Seattle Branch formed a Flight Standardization Board (FSB) that evaluated the B-747-400, B-747-8 as defined in FAA Type Certificate Data Sheet (TCDS) #A20WE. The evaluation was conducted 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. All previous evaluations of the B-747-400 series aircraft evaluated at the time of certification are included in this report.

5 ACRONYMS

14 CFR	Title 14 of the Code of Federal Regulations
AC	Advisory Circular
ACS	Airman Certification Standards
AEG	Aircraft Evaluation Group
AFDS	Autopilot Flight Director System
ATC	Air Traffic Control
ATP	Airline Transport Pilot
AVS	Alternate Ventilation System
ECL	Electronic Checklist
EFB	Electronic Flight Bag
EGPWS	Enhanced Ground Proximity Warning System
EICAS	Engine Indicating and Crew Alerting System
FAA	Federal Aviation Administration
FADEC	Full-Authority Digital Engine Control
FANS	Future Air Navigation System
FD	Flight Director
FFS	Full Flight Simulator
FMCS	Flight Management Computer System
FMS	Flight Management System
FSB	Flight Standardization Board
FSTD	Flight Simulation Training Device
GE	General Electric
GLS	Global Navigation Satellite Landing System
GPS	Global Positioning System
MDR	Master Differences Requirements
NAS	National Airspace System
NDB	Non-Directional Beacon
NGS	Nitrogen Generation System
POI	Principal Operations Inspector
PTS	Practical Test Standards
QRH	Quick Reference Handbook
RR	Rolls-Royce
TCDS	Type Certificate Data Sheet
TCPM	Training Center Program Manager

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.** 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 B-747-400 and B-747-8 type rating designation is “B-747-4”.

7.2 Common Type Ratings.

Not applicable.

7.3 Military Equivalent Designations.

Military aircraft that qualify for the B-747-4 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-747-400, B-747-8 are related aircraft. As used in this report, series groups are identified as B-747-400, B-747-8.

8.2 Related Aircraft on Different TCDS.

Not applicable.

9 PILOT TRAINING

9.1 Airman Experience.

The provisions of this section apply to all B-747-400, B-747-8 training programs and assume the training will be given to airmen with previous experience. Examples of applicable previous experience may include any of the following: experience in parts 121 or 135 air carrier operations, former military, commuter, or corporate pilots with turbine powered aircraft experience, etc. Pilots without this experience may require additional training.

9.2 Special Emphasis Areas.

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

- Electronic checklist (ECL). Paper quick reference handbook (QRH) backup for the ECL.
- Electronic Flight Bag (EFB).
- Tuning control pane.
- Display management.
- Engine (General Electric (GE) or Rolls-Royce (RR)) if in the same variation.

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

- Flight control modes.
- Envelope protection. Aircraft response to bank angle indications and protection, thrust asymmetry protection, enhanced underspeed (stall), and overspeed protection.

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) for airplane, as applicable, and/or part 121 appendix F.

There are no specific flight characteristics.

9.4 Seat Dependent Tasks.

There are no seat dependent tasks.

9.5 Regulatory Training Requirements which are Not Applicable to the B-747-400, B-747-8 Aircraft Series.

Part 121 appendix E.

Tuck and Mach buffet training. B-747-400, B-747-8 do not exhibit any Mach tuck tendency; therefore, no training is required for this maneuver. Demonstration of the aircraft's overspeed protection capabilities is an acceptable substitute.

9.6 Flight Simulation Training Devices (FSTD).

There are no specific systems, procedures, or maneuvers that are unique to the B-747-400 and B-747-8 that require a specific FSTD for training.

9.7 Training Equipment.

There are no specific systems, procedures, or maneuvers that are unique to the B-747-400, and B-747-8 that require a specific FSTD for training.

9.8 Differences Training Between Related Aircraft.

Pilots must receive differences training between the B-747-400 and B-747-8.

The level of training is specified in Appendix 3, Differences Tables.

10 PILOT CHECKING

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

The probability of flap extension failure on the B-747-400, B-747-8 is extremely remote due to system design. Therefore, demonstration of a partial flap approach and landing during pilot certification or a 14 CFR part 61, § 61.58 proficiency check, part 91, § 91.1065 competency check, part 121, § 121.441 proficiency check, and part 125, § 125.287 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 for airplane, as applicable, and/or part 121 appendix F.

There are no specific flight characteristics.

10.3 Seat Dependent Tasks.

There are no seat dependent tasks.

10.4 Other Checking Items.

- a) Proficiency with manual and automatic flight must be demonstrated during initial, upgrade, and recurrent training.
- b) Proper outside visual scans without prolonged fixation on flight management system (FMS) operation should be demonstrated and failure of component(s) of the FMS should be addressed.
- c) Proper selection and use of map displays, raw data, flight director (FD), and Autopilot Flight Director System (AFDS) should be demonstrated, particularly during instrument approaches.
- d) Demonstrations of FMS/Global Positioning System (GPS) navigation (departures and approaches) proficiency if these type operations are approved for the operator.
- e) Demonstration on the use of ECL during normal and nonnormal procedures.
- f) Understanding of speed and attitude stability characteristics of B-747-400, B-747-8 flight controls in normal operations.
- g) Proper use and knowledge of the Look-Ahead Terrain Function of the Enhanced Ground Proximity Warning System (EGPWS) (if installed).
- h) Proper use and knowledge of the Predictive Windshear System (if installed).
- i) Proper use of the EFB/Flight Deck Video Security System.

10.5 FSTDs.

There are no specific systems, procedures, or maneuvers that are unique to the B-747-400 and B-747-8 that require a specific FSTD for training.

10.6 Equipment.

There are no specific systems or procedures that are unique to the B-747-400 and B-747-8 that require specific equipment.

10.7 Differences Checking Between Related Aircraft.

Pilots must receive differences checking between the B-747-400 and B-747-8. The level of checking is specified in Appendix 3.

11 PILOT CURRENCY

There are no additional currency requirements for the B-747-400 and B-747-8 other than those already specified in parts 61, 121, and 125.

11.1 Differences Currency Between Related Aircraft.

Not applicable.

12 OPERATIONAL SUITABILITY

The B-747-400, B-747-8 are operationally suitable for operations under parts 91, 121, 125, and 137. The FSB determined operational compliance by conducting an evaluation of aircraft serial number 23982 on 1/10/1989. The list of operating rules evaluated is on file at the Transport Aircraft Seattle Branch.

13 MISCELLANEOUS

13.1 Flightcrew Rest Facilities (14 CFR Part 117)/Flightcrew Sleeping Quarters (Part 121 Subpart R).

The B-747-400, B-747-8, have flightcrew sleeping quarters, as installed by TCDS #A20WE, which have been evaluated and determined to meet requirements of parts 117, 121, and 125, the current editions of AC 117-1, Flightcrew Member Rest Facilities, and 121-31, Flightcrew Sleeping Quarters and Rest Facilities, and FAA Order 8900.1.

13.2 Forward Observers Seat.

The B-747-400, B-747-8 have two forward observer seats in the cockpit, as installed by TCDS #A20WE, which have been evaluated and determined to meet the requirements of §§ 121.581(a) and 125.317(b) and the current edition of AC 120-83, Flight Deck Observer Seat and Associated Equipment.

13.3 Landing Minima Categories (Reference 14 CFR Part 97, § 97.3).

The B-747-400, B-747-8 is considered Category D aircraft for the purposes of determining “straight-in landing weather minima.”

13.4 Emergency Evacuation.

The B-747-400 configuration has successfully been demonstrated by a combination of earlier B-747-100, -200, and -300 simulated emergency evacuations, credited under FAA Order 8900.1 with 550 passengers and 14 crew. The evacuation included simulated evacuation of three additional children, each less than 2 years of age (laps), which are not shown in the total count of 550 passengers. Accordingly, a § 121.291 full scale evacuation is not necessary for aircraft configurations consistent with previously approved tests. Passenger capacity less than or equal to the previously demonstrated capacity of 550, and crew complement greater than or equal to 14 may be authorized.

13.5 Normal Landing Flaps.

The B-747-400 and B-747-8 normal “final landing flap setting” is either flaps 25 or flaps 30.

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 →	B-747-400	B-747-8
B-747-400		A/A	C/C
B-747-8		C/C	A/A

Fleets with different engine types. Mixed flying of B-747-400 fleets with different engine types (e.g., General Electric (GE) or Rolls-Royce (RR) engines) may require additional training. Although not explicitly addressed by Master Differences Requirements (MDR), a minimum of A/A is designated for such operations, unless otherwise approved by the Flight Standardization Board (FSB).

APPENDIX 3. DIFFERENCES TABLES

This Design Differences table, from the B-747-400 to the B-747-8, was proposed by Boeing and validated by the Flight Standardization Board (FSB). It lists the minimum differences levels operators must use to conduct differences training and checking of flightcrew members.

FROM BASE AIRCRAFT: B-747-400 TO RELATED AIRCRAFT: B-747-8	DESIGN	REMARKS	FLT CHAR	PROC CHNG	TRAINING	CHECKING
	Airplane Configuration	Body Extension “220” Length 250 feet, 2 inches	Yes	No	B	B
	Airplane Configuration	Wing Tip Extension “139” Wingspan 224 feet, 7 inches	Yes	No	B	B
	Airplane Configuration	NO WINGLET	Yes	No	B	B
	Panel Layout	Changes for MFD Control/and Switch Realignment	No	Yes	C	C
	Panel Layout	Added Overspeed, EFB, and ECL Controls	No	No	C	C
	Panel Layout	Display Select Panel	No	No	C	C
	Panel Layout	System Advancement/Automation	No	No	B	B
	Weights	Increased to: MTW - 978,000 lbs MTOW - 975,000 lbs MLW - 749,000 lbs MZFW -709,000 lbs	No	No	B	B
	ATA 21 Air Conditioning	ECS and Bleed Air Control Panel Revision	No	Yes	B	B

FROM BASE AIRCRAFT: B-747-400	DESIGN	REMARKS	FLT CHAR	PROC CHNG	TRAINING	CHECKING
TO RELATED AIRCRAFT: B-747-8						
	ATA 21 Air Conditioning	Alternate Ventilation System	No	Yes	B	B
	ATA 23 Communications	Keypad Entry - Radio Tuning Panels/ARINC 781 SATCOM System	No	No	B	B
	ATA 23 Communications	ATC Data Link Block on EICAS Display	No	No	B	B
	ATA 23 Communications	777 Style Accept/Cancel/Reject ATC Data Link Switches on Glareshield	No	Yes	B	B
	ATA 23 Communications	Cursor Control Panels (CCP) which Provide Interface with ECL "Tabbers"	No	Yes	C	C
	ATA 23 Communications	Main Deck Alert	No	Yes	B	B
	ATA 23 Communications	Communication Messages	No	Yes	C	C
	ATA 24 Electrical Power	Power Outlets for Pilots	No	No	B	B
	ATA 25 Equipment/Furnishings	Full Format Printer	No	No	B	B

This Design Differences table, from the B-747-400 to the B-747-8 was proposed by the Boeing Company 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: B-747-400 TO RELATED AIRCRAFT: B-747-8	MANEUVER	REMARKS	FLT CHAR	PROC CHNG	TRAINING	CHECKING
	ATA 26 Fire Protection	LAV smoke EICAS Message - Enable	No	Yes	B	B
	ATA 27 Flight Controls	FBW Outboard Ailerons, Aileron Droop Function, FBW Spoilers	Yes	No	B	B
	ATA 27 Flight Controls	Inboard Double-Slotted and Outboard Single-Slotted Flaps	Yes	No	B	B
	ATA 27 Flight Controls	Leading Edge Flaps	Yes	No	B	B
	ATA 27 Flight Controls	Leading Edge Failure Indication System (LEFI)	No	No	B	B
	ATA 27 Flight Controls	Add PACS Functionality	Yes	No	B	B
	ATA 27 Flight Controls	Spudder	Yes	No	B	B
	ATA 27 Flight Controls	Maneuver Load Alleviation	No	No	B	B
	ATA 27 Flight Controls	Dedicated Flight Controls Synoptic Display	No	No	B	B
	ATA 27 Flight Controls	Stab Trim Information on EICAS Display	No	No	B	B

FROM BASE AIRCRAFT: B-747-400	MANEUVER	REMARKS	FLT CHAR	PROC CHNG	TRAINING	CHECKING
TO RELATED AIRCRAFT: B-747-8						
	ATA 28 Fuel	Capacity Increase	No	Yes	B	B
	ATA 28 Fuel	Tank Configuration Reserve Logic	No	Yes	B	B
	ATA 28 Fuel	Nitrogen Generation System	No	Yes	B	B
	ATA 28 Fuel	Fuel Panel Jettison	No	Yes	B	B
	ATA 29 Hydraulic Power	Ram Air Turbine	Yes	Yes	B	B
	ATA 29 Hydraulic Power	Hydraulic Control Panel - Pump Configuration and Function Revisions	No	Yes	B	B
	ATA 30 Ice and Rain Protection	Wing Anti-Ice	No	Yes	B	B
	ATA 30 Ice and Rain Protection	Window Heat	No	No	B	B
	ATA 31 Indicating/Recording Systems	Integrated Approach Navigation (IAN)	No	No	C	C
	ATA 31 Indicating/Recording Systems	Global Navigation Satellite Landing System (GLS)	No	No	B	B

FROM BASE AIRCRAFT: B-747-400 TO RELATED AIRCRAFT: B-747-8	MANEUVER	REMARKS	FLT CHAR	PROC CHNG	TRAINING	CHECKING
	ATA 31 Indicating/Recording Systems	Navigation Performance Scales (NPS)	No	No	B	B
	ATA 31 Indicating/Recording Systems	Vertical Situation Display (VSD)	No	No	B	B
	ATA 31 Indicating/Recording Systems	Clock Functionality Display on ND (UTC and Chrono)	No	No	B	B
	ATA 31 Indicating/Recording Systems	Electronic Checklist (ECL)	No	Yes	C	C
	ATA 31 Indicating/Recording Systems	FMCS - Display of Vertical Bearing, Flight Path Angles, and Vertical Speed - Enabled	No	No	B	B
	ATA 31 Indicating/Recording Systems	Airport Map	No	No	B	B
	ATA 31 Indicating/Recording Systems	777 Style Display Select Panel (DSP) Includes ECL, MFD Switching, FTCL Switches	No	Yes	C	C
	ATA 31 Indicating/Recording Systems	777 Style Display Inboard Display (ND) Selector	No	Yes	B	B

FROM BASE AIRCRAFT: B-747-400 TO RELATED AIRCRAFT: B-747-8	MANEUVER	REMARKS	FLT CHAR	PROC CHNG	TRAINING	CHECKING
	ATA 31 Indicating/Recording Systems	777 Style Display Select Panel (DSP) Includes ECL, MFD Switching, FTCL Switches	No	Yes	C	C
	ATA 31 Indicating/Recording Systems	777 Style Display Inboard Display (ND) Selector	No	Yes	B	B
	ATA 32 Landing Gear	Two Position Landing Gear Lever	No	Yes	B	B
	ATA 33 Lights	Passenger Signs - Deletion of "NO SMOKING" Switch	No	Yes	B	B
	ATA 34 Navigation	EFB Provision, EFB Optional	No	Yes	C	C
	ATA 34 Navigation	Flight Management Computer Quiet Climb FANS-2 Data Link GLS Approaches GPS Approaches with Vertical Angles Enabled	No	Yes	C	C
	ATA 34 Navigation	ADIRU Configuration	No	Yes	B	B
	ATA 34 Navigation	CTR Air Data Switch	No	Yes	B	B
	ATA 34 Navigation	ADF Removal (Dual System Option)	No	Yes	B	B

FROM BASE AIRCRAFT: B-747-400 TO RELATED AIRCRAFT: B-747-8	MANEUVER	REMARKS	FLT CHAR	PROC CHNG	TRAINING	CHECKING
	ATA 34 Navigation	FMCS - NDB Approaches - Enabled	No	Yes	B	B
	ATA 73, 74, 77, 80 Powerplant	GENX-2B7 Engines	Yes	Yes	B	B
	ATA 73, 74, 77, 80 Powerplant	Engine Start Panel - Deletion of Igniter Switches and Optional Autostart Switch	No	Yes	C	C
	ATA 73, 74, 77, 80 Powerplant	Engine Inoperative 10 Minute Takeoff Thrust Operation	No	Yes	B	B