



NATIONAL TRANSPORTATION SAFETY BOARD

Office of Aviation Safety
Washington, D.C. 20594

January 30, 2015

Group Chairman's Factual Report

STRUCTURES

DCA13MA081

Attachment 14

**Federal Aviation Administration
Type Certificate Data Sheet A20WE**

**DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION**

A20WE BOEING Revision 55 747-100 Series 747-200B Series 747-200F Series 747-200C Series 747SR Series 747SP Series 747-100B Series 747-300 Series 747-100B SUD Series 747-400 Series 747-400D Series 747-400F Series 747-8F Series 747-8 Series July 25, 2014
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TYPE CERTIFICATE DATA SHEET NO. A20WE

This data sheet, which is a part of Type Certificate No. A20WE, prescribes conditions and limitations under which the product for which the Type Certificate was issued meets the airworthiness requirements of the Federal Aviation Regulations.

Type Certificate Holder: The Boeing Company
 1901 Oakesdale Avenue SE, M/C OA1-37
 Seattle, WA 98057-2623

I - 747-100 (Approved December 30, 1969) Transport Aircraft

Engines: 4 Pratt and Whitney JT9D-3, JT9D-3A, or JT9D-7, JT9D-7A, JT9D-7F, JT9D-7J.
 See NOTE 5 regarding intermixing of engines.

Fuel: See NOTE 3.

Engine Limits: See data pertinent to all models.

Airspeed Limits: VMO/MMO 375/0.92 (KEAS) For other airspeed limits see the appropriate FAA Approved
 Airplane Flight Manual.

C.G. Range: See the appropriate FAA Approved Airplane Flight Manual.

Maximum Weights: See the appropriate FAA Approved Airplane Flight Manual.

Maximum Baggage/Cargo: See the appropriate Weight and Balance Control and Loading Manual.

Fuel and Oil Capacity: See the appropriate Weight and Balance Control and Loading Manual.
 FAA Approved Weight and Balance Control and Loading Manual: D6-13700
 FAA Approved Airplane Flight Manual: D6-13703

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I. 747-100 (cont'd)

<u>Model</u>	<u>Eligible Serial Numbers</u>
747-1D1	20208
747-121	19637-19661, 20235, 20347-20354
747-122	19753-19757, 19875-19883, 19925-19928
747-123	20100-20109, 20323-20326, 20390, 20391
747-124	19733-19735, 20305
747-127	20207
747-128	19749-19752, 20355, 20376-20378, 20541-20543, 20798-20800, 20954, 21141
747-129	20401, 20402
747-130	19746-19748
747-131	19667-19678, 20080-20083, 20320-20322
747-132	19896-19898, 20246, 20247
747-133	20013-20015, 20767, 20881
747-135	19918, 19919
747-136	19761-19766, 20269-20273, 20284, 20708, 20809, 20810, 20952, 20953, 21213
747-143	19729, 19730
747-146	19725-19727, 20332, 20528, 20531, 20532, 21029
747-148	19744, 19745
747-151	19778-19787
747-156	19957, 19958

II - 747-200B (Approved December 23, 1970) Transport Aircraft

The 747-200B is an extended-range passenger version of the basic 747-100 series aircraft. The exterior geometry of the 747-200B is identical to the 747-100 and aircraft systems are essentially unchanged except for differences resulting from changes outlined below. The principal differences involve the following:

Increased strength wing structure, local body and empennage changes for increased strength, increased center wing tank fuel capacity, increased strength landing gear, modified nacelle and engine acoustic treatment, increased gross weight, and modified balance limits.

Engines: 4 Pratt and Whitney JT9D-3A, JT9D-7, JT9D-7A, JT9D-7F, JT9D-7J, JT9D-70A, JT9D-7Q, JT9D-7Q3, JT9D-7R4G2
 4 General Electric CF6-50E, CF6-50E1, CF6-50E2, CF6-80C2B1
 4 Rolls Royce RB211-524B2-19, RB211-524C2-19, RB211-524D4-19, RB211-524D4-39.
 See NOTE 5 regarding intermixing of engines.

Fuel: See NOTE 3.

Engine Limits: See data pertinent to all models.

Airspeed Limits: VMO/MMO 375/0.92 (KEAS) For other airspeed limits see the appropriate FAA approved Airplane Flight Manual.

C.G. Range: See the appropriate FAA Approved Airplane Flight Manual.

Maximum Weights: See the appropriate FAA Approved Airplane Flight Manual.

Maximum Baggage/Cargo: See the appropriate Weight and Balance Control and Loading Manual.

Fuel and Oil Capacity: See the appropriate Weight and Balance Control and Loading Manual.

FAA Approved Weight and Balance Control and Loading Manual: D6-13700, 1E-4A-5, 1E-4B-5
 FAA Approved Airplane Flight Manuals: D6-13703, D6-33747, D6-34747, D6-35747

II. 747-200B (cont'd)

<u>Model</u>	<u>Eligible Serial Numbers</u>
747-206B	19922-19924, 20398-20400, 20427, 21110, 21111, 21549, 21550, 21659, 21660, 21848, 22376, 22379, 22380
747-209B	21454, 21843, 22446, 22447
747-211B	21516, 21517
747-212B	20712, 20713, 20888, 21048, 21162, 21316, 21439, 21683, 21684, 21935-21944
747-217B	20801, 20802, 20927, 20929
747-219B	22722-22725, 22791
747-222B	23736, 23737
747-227B	21682, 21991, 22234
747-228B	21326, 21429, 21537, 21731, 21745, 21982, 22272, 22427, 22428, 22794, 23611, 23676, 24067
747-230B	20372, 20527, 21220, 21221, 21380, 21588-21591, 21643, 21644, 22363, 22669-22671, 23286, 23287, 23393, 23407, 23509, 23622
747-233B	20977, 21627
747-236B	21238-21241, 21350, 21351, 21536, 21635, 21830, 21831, 22303-22305, 22442, 23711, 23735, 23799, 24088
747-237B	19959, 19960, 20459, 20558, 21182, 21446, 21473, 21829, 21993-21995
747-238B	20009-20012, 20534, 20535, 20841, 20842, 20921, 21054, 21140, 21237, 21352-21354, 21657, 21658, 21977, 22145, 22614-22616
747-240B	21825, 22077
747-243B	19731, 19732, 20520, 22506-22508, 22510-22513, 22969, 23300, 23301, 23476
747-244B	20237-20239, 20556, 20557, 22170, 22171
747-246B	19823-19825, 20333, 20503-20505, 20529, 20530, 20924, 21030, 21031, 21678-21680, 22064, 22065, 22478, 22479, 22745, 22746, 22990, 22991, 23389
747-247B	22378
747-251B	20356-20360, 21704-21709, 22389, 23111, 23112, 23547-23549
747-256B	20137, 22238, 22239, 22454, 22455, 22764, 24071
747-257B	20116, 20117
747-258B	20135, 20274, 20704, 22254
747-259B	21730
747-267B	21746, 21966, 22149, 22429, 22530, 22872, 23048, 23120
747-269B	21541-21543, 22740
747-281B	23501, 23502, 23698, 23813, 24399
747-282B	20501, 20502, 20928, 21035
747-283B	20120, 20121, 21381, 21575, 22381, 22496
747-284B	20742, 20825
747-286B	21217, 21218
747-287B	21189, 21725-21727, 22297, 22592, 22593
747-2B2B	21614
747-2B3B	22514, 22515
747-2B4B	21097-21099
747-2B5B	20770, 20771, 21772, 21773, 22482, 22485
747-2B6B	21615
747-2D3B	21251, 21252, 22579
747-2D7B	21782-21784, 22337, 22471, 22472
747-2F4B	20493, 20559
747-2F6B	21832-21834, 22382
747-2G4B	23824, 23825
747-2J6B	23071, 23461, 23746
747-2L5B	22105-22107
747-2Q2B	21468
747-2U3B	22246-22249, 22768, 22769
747-E4A	20682-20684
747-E4B	20949

III - 747-200F (Approved March 7, 1972) Transport Aircraft

The 747-200F is a freighter version of the basic 747-200B series aircraft. The exterior geometry of the 747-200F is identical to the 747-200B and aircraft systems are essentially unchanged except for differences resulting from the changes outlined below. The principal differences involve the following:

Upward opening nose cargo door.
 Redesigned interior for freight handling.
 Revised upper deck layout for additional crew members.
 Increased strength of main deck floor and keel beam.
 Increased strength of center wing section.
 Deletion of main deck windows and passenger doors 1 through 5 right side and 2 through 4 left side.
 T.E. flap two position load relief system.
 Revised air conditioning system to suit freight requirements.
 Main deck smoke detection system.
 Optional main deck smoke detection system.
 Optional side cargo door.

Engines: 4 Pratt and Whitney JT9D-3A, JT9D-7, JT9D-7A, JT9D-7F, JT9D-7J, JT9D-70A, JT9D-7Q, JT9D-7Q3, JT9D-7R4G2
 4 General Electric CF6-50E, CF6-50E1, CF6-50E2
 4 Rolls Royce RB211-524B2-19, RB211-524C2-19, RB211-524D4-19, RB211-524D4-39.
 See NOTE 5 regarding intermixing of engines.

Fuel: See NOTE 3.

Engine Limits: See data pertinent to all models.

Airspeed Limits: VMO/MMO 375/0.92 (KEAS) For other airspeed limits see the appropriate FAA Approved Airplane Flight Manual.

C.G. Range: See the appropriate FAA Approved Airplane Flight Manual.

Maximum Weights: See the appropriate FAA Approved Airplane Flight Manual.

Maximum Baggage/Cargo: See the appropriate Weight and Balance Control and Loading Manual.

Fuel and Oil Capacity: See the appropriate Weight and Balance Control and Loading Manual.
 FAA Approved Weight and Balance Control and Loading Manual: D6-13700
 FAA Approved Airplane Flight Manuals: D6-13703, D6-33747, D6-35747, D6-34747

<u>Model</u>	<u>Eligible Serial Numbers</u>
747-209F	22299, 24308
747-212F	24177
747-221F	21743, 21744
747-228F	20887, 21255, 21576, 21787, 22678, 22939, 24158, 24735, 24879, 25266
747-230F	20373, 21592, 22668, 23348, 23621, 24138
747-236F	22306
747-243F	22545
747-245F	20826, 20827, 21764, 21841, 22150, 22151
747-246F	21034, 21681, 22063, 22477, 22989, 23391, 23641
747-249F	21827, 21828, 22237, 22245
747-251F	21120-21122, 21321, 22388, 23887, 23888
747-258F	21737
747-267F	23864, 24568
747-268F	24359
747-281F	23138, 23139, 23350, 23919, 24576, 25171
747-2B3F	21515, 21835
747-2B5F	22480, 22481, 22486, 24195, 24196
747-2J6F	24960
747-2J9F	21486, 21487, 21507, 21514, 21668
747-2R7F	21650, 22390
747-2S4F	22169

IV - 747-200C (Approved April 17, 1973) Transport Aircraft

The 747-200C is a convertible version of the basic 747-200B series aircraft. The exterior geometry of the 747-200C is identical to the 747-200B and aircraft systems are essentially unchanged except for differences resulting from the changes outlined below. The principal differences involve the following:

Upward opening nose cargo door.
 Redesigned interior permitting all passenger, all cargo, or mixed passenger/cargo configurations.
 Increased strength of main deck floor and keel beam.
 Increased strength of center wing section.
 T.E. flap two position load relief system.
 Main deck smoke detection system.
 Optional side cargo door.

Engines:	4 Pratt and Whitney JT9D-3A, JT9D-7, JT9D-7A, JT9D-7F, JT9D-7J, JT9D-70A, JT9D-7Q, JT9D-7Q3, JT9D-7R4G2 4 General Electric CF6-50E, CF6-50E1, CF6-50E2 4 Rolls Royce RB211-524B2-19, RB211-524C2, RB211-524D4. See NOTE 5 regarding intermixing of engines.
Fuel:	See NOTE 3.
Engine Limits:	See data pertinent to all models.
Airspeed Limits:	VMO/MMO 375/0.92 (KEAS) For other airspeed limits see the appropriate FAA Approved Airplane Flight Manual.
C.G. Range:	See the appropriate FAA Approved Airplane Flight Manual.
Maximum Weights:	See the appropriate FAA Approved Airplane Flight Manual.
Maximum Baggage/ Cargo:	See the appropriate Weight and Balance Control and Loading Manual.
Fuel and Oil Capacity:	See the appropriate Weight and Balance Control and Loading Manual. FAA Approved Weight and Balance Control and Loading Manual: D6-13700 FAA Approved Airplane Flight Manuals: D6-13703, D6-33747

<u>Model</u>	<u>Eligible Serial Numbers</u>
747-21AC	23652, 24134
747-258C	21190, 21594
747-270C	21180, 21181, 22366
747-271C	21964, 21965, 22403
747-273C	20651-20653

V - 747SR (Approved September 26, 1973) Transport Aircraft

The 747SR is basically a 747-100 series airplane with certain modifications to improve the fatigue life.

Engines:	4 General Electric CF6-45A, CF6-45A2, CF6-50E2 4 Pratt and Whitney JT9D-7, JT9D-7A. See NOTE 5 regarding intermixing of engines.
Fuel:	See NOTE 3.
Engine Limits:	See data pertinent to all models.
Airspeed Limits:	VMO/MMO 375/0.92 (KEAS) For other airspeed limits see the appropriate FAA Approved Airplane Flight Manual.
C.G. Range:	See the appropriate FAA Approved Airplane Flight Manual.
Maximum Weights:	See the appropriate FAA Approved Airplane Flight Manual.

V. 747SR (cont'd)

Maximum Baggage/Cargo: See the appropriate Weight and Balance Control and Loading Manual.

Fuel and Oil Capacity: See the appropriate Weight and Balance Control and Loading Manual.
 FAA Approved Weight and Balance Control and Loading Manual: D6-13700
 FAA Approved Airplane Flight Manuals: D6-13703, D6-33747

<u>Model</u>	<u>Eligible Serial Numbers</u>
747SR-46	20781-20784, 20923, 21032, 21033
747SR-81	21604-21606, 21922-21925, 22291-22294, 22594, 22595, 22709-22712

VI - 747SP (Approved February 4, 1976) Transport Aircraft

The 747SP (Special Performance) is basically a long-range derivative of the 747-100. The exterior geometry of the 747SP has been changed from the 747-100. Aircraft systems are essentially unchanged except for differences resulting from changes outlined below.

The principal differences involve the following:

- Overall airplane length is 47'1" shorter.
- Body is 48'5" shorter.
- Overall airplane height is approximately 2'11" higher.
- Vertical tail has been extended 5 feet.
- Horizontal tail has been extended on each end.
- Flaps have been modified to a single variable pivot flap.
- Main deck doors are reduced to 4 on each side.

Engines: 4 Pratt and Whitney JT9D-3, JT9D-3A, JT9D-7, JT9D-7A, JT9D-7F, JT9D-7J
 4 Rolls Royce RB211-524B2-19, RB211-524C2-19, RB211-524D4-19, RB211-524D4-39.
 See NOTE 5 regarding intermixing of engines.

Fuel: See NOTE 3.

Engine Limits: See data pertinent to all models.

Airspeed Limits: VMO/MMO 375/0.92 (KEAS) For other airspeed limits see the appropriate FAA Approved Airplane Flight Manual.

C.G. Range: See the appropriate FAA Approved Airplane Flight Manual.

Maximum Weights: See the appropriate FAA Approved Airplane Flight Manual.

Maximum Baggage/Cargo: See the appropriate Weight and Balance Control and Loading Manual.

Fuel and Oil Capacity: See the appropriate Weight and Balance Control and Loading Manual.
 FAA Approved Weight and Balance Control and Loading Manual: D6-33800
 FAA Approved Airplane Flight Manuals: D6-34047, D6-36747

<u>Model</u>	<u>Eligible Serial Numbers</u>
747SP-09	21300, 22298, 22547, 22805
747SP-21	21022-21026, 21441, 21547, 21548, 21648, 21649
747SP-27	21785, 21786, 21992, 22302
747SP-31	21961-21963
747SP-38	22495, 22672
747SP-44	21132-21134, 21253, 21254, 21263
747SP-68	21652, 22503, 22750
747SP-70	22858
747SP-86	20998, 20999, 21093, 21758
747SP-94	21174, 21175
747SP-B5	22483, 22484
747SP-J6	21932-21934
747SP-Z5	23610

VII - 747-100B (Approved August 1, 1979) Transport Aircraft

The 747-100B is basically a 747SR series airplane with certain modifications to permit increases in maximum permissible operating weights.

Engines:	4 Pratt and Whitney JT9D-7A, JT9D-7F 4 Rolls Royce RB211-524B2-19, RB211-524C2-19, RB211-524D4-19, RB211-524D4-39. See NOTE 5 regarding intermixing of engines.
Fuel:	See NOTE 3.
Engine Limits:	See data pertinent to all models.
Airspeed Limits:	VMO/MMO 375/0.92 (KEAS) For other airspeed limits see the appropriate FAA Approved Airplane Flight Manual.
C.G. Range:	See the appropriate FAA Approved Airplane Flight Manual.
Maximum Weights:	See the appropriate FAA Approved Airplane Flight Manual.
Maximum Baggage/Cargo:	See the appropriate Weight and Balance Control and Loading Manual.
Fuel and Oil Capacity:	See the appropriate Weight and Balance Control and Loading Manual. FAA Approved Weight and Balance Control and Loading Manual: D6-13700 FAA Approved Airplane Flight Manuals: D6-13703, D6-35747
<u>Model</u>	<u>Eligible Serial Numbers</u>
747-146B	22066, 22067, 23150
747-168B	22498-22502, 22747-22749
747-186B	21759
See NOTE 7.	

VIII - 747-300 (Approved March 1, 1983) Transport Aircraft

The 747-300 is basically a 747-200 series airplane with a stretched upper deck.

Engines:	4 Pratt and Whitney JT9D-7R4G2 4 General Electric CF6-50E2, CF6-80C2B1 4 Rolls Royce RB211-524B2-19, RB211-524C2-19, or RB211-524D4-19, RB211-524D4-39. See NOTE 5 regarding intermixing of engines.
Fuel:	See NOTE 3.
Engine Limits:	See data pertinent to all models.
Airspeed Limits:	VMO/MMO 375/0.92 (KEAS) For other airspeed limits see the appropriate FAA Approved Airplane Flight Manual.
C.G. Range:	See the appropriate FAA Approved Airplane Flight Manual.
Maximum Weights:	See the appropriate FAA Approved Airplane Flight Manual.
Maximum Baggage/Cargo:	See the appropriate Weight and Balance Control and Loading Manual.
Fuel and Oil Capacity:	See the appropriate Weight and Balance Control and Loading Manual.
FAA Approved Weight and Balance Control and Loading Manual:	D6-13700
FAA Approved Airplane Flight Manuals:	D6-13703, D6-33747, D6-35747

VIII – 747-300 (cont'd):

<u>Model</u>	<u>Eligible Serial Numbers</u>
747-306	23056, 23137, 23508
747-312	23026-23033, 23243-23245, 23409, 23410, 23769
747-329	23439, 24837
747-337	24159, 24160
747-338	23222-23224, 23408, 23688, 23823
747-341	23394, 23395, 24106-24108
747-344	22970, 22971
747-346	23067, 23068, 23149, 23151, 23482, 23638-23640, 23967-23969, 24018, 24019, 24156
747-357	22704, 22705, 22995, 22996, 23751
747-366	24161, 24162
747-367	23221, 23392, 23534, 23709, 23920, 24215
747-368	23262-23271
747-3B3	22870, 23413, 23480
747-3B5	22487, 22489, 24194
747-3D7	23721, 23722
747-3G1	23070
747-3H6	23600

IX - 747-100B SUD (Approved March 24, 1986) Transport Aircraft

The 747-100B SUD is basically a 747-100B series airplane with a stretched upper deck.

Engines:	4 Pratt and Whitney JT9D-7A See NOTE 5 regarding intermixing of engines.
Fuel:	See NOTE 3.
Engine Limits:	See data pertinent to all models.
Airspeed Limits:	VMO/MMO 375/0.92 (KEAS) For other airspeed limits see the appropriate FAA Approved Airplane Flight Manual.
C.G. Range:	See the appropriate FAA Approved Airplane Flight Manual.
Maximum Weights:	See the appropriate FAA Approved Airplane Flight Manual.
Maximum Baggage/Cargo:	See the appropriate Weight and Balance Control and Loading Manual.
Fuel and Oil Capacity:	See the appropriate Weight and Balance Control and Loading Manual.
	FAA Approved Weight and Balance Control and Loading Manual: D6-13700 FAA Approved Airplane Flight Manual: D6-13703

<u>Model</u>	<u>Eligible Serial Numbers</u>
747-146B SUD	23390, 23637

DATA PERTINENT TO ALL MODELS, EXCEPT MODEL 747-400 AND 747-8 SERIES

Engine Limits: (Pratt & Whitney)	<u>JT9D-3</u>	<u>JT9D-3A</u>	<u>JT9D-7</u>	<u>JT9D-7A</u>	<u>JT9D-7F</u>	<u>JT9D-7J</u>
Takeoff static thrust standard day, sea level conditions (in pounds); Dry (5 min) (Ideal)	43,500 lbs.	43,500 lbs.	45,500 lbs.	46,150 lbs.	46,750 lbs.	48,650 lbs.
With water injection (2 1/2 min.)	43,500 lbs.	45,000 lbs.	47,000 lbs.	47,670 lbs.	48,650 lbs.	

DATA PERTINENT TO ALL MODELS, EXCEPT MODEL 747-400 AND 747-8 SERIES (cont'd):

	<u>JT9D-3</u>	<u>JT9D-3A</u>	<u>JT9D-7</u>	<u>JT9D-7A</u>	<u>JT9D-7F</u>	<u>JT9D-7J</u>
Maximum continuous static thrust, standard day, sea level condition: (Ideal)	36,400 lbs.	36,400 lbs.	39,650 lbs.	40,080 lbs.	39,200 lbs.	40,200 lbs.

Engine Limits:
(Pratt & Whitney)
Takeoff static thrust standard day, sea level conditions (in pounds) Dry (5 min) (Ideal)

	<u>JT9D-70A</u>	<u>JT9D-7Q</u>	<u>JT9D-7Q3</u>	<u>JT9D-7R4G2</u>
Takeoff static thrust standard day, sea level conditions (in pounds) Dry (5 min) (Ideal)	51,140 lbs.	51,100 lbs.	51,100 lbs.	54,750 lbs.

Maximum continuous static thrust: standard day, sea level condition: (Ideal)

Maximum continuous static thrust: standard day, sea level condition: (Ideal)	44,290 lbs.	44,290 lbs.	44,290 lbs.	50,200 lbs.
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Engine Limits
(General Electric)

	CF6-50E		
	CF6-50E1	CF6-45A	
	<u>CF6-50E2</u>	<u>CF6-45A2</u>	<u>CF6-80C2B1</u>

Engine thrust ratings:
(Ideal)

Takeoff (5 min)	51,800 lbs.	45,600 lbs.	55,980 lbs.
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Maximum continuous

Maximum continuous	46,300 lbs.	43,250 lbs.
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Engine Limits:
(Rolls Royce)
Rated takeoff thrust (5 min.)

	<u>RB211-524B2-19</u>
Rated takeoff thrust (5 min.)	49,120 lbs.

Sea level static conditions (Ideal)
Rated Maximum continuous thrust

Rated Maximum continuous thrust	44,780 lbs.
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Engine Limits:
(Rolls Royce)
Rated takeoff thrust (5 min.)

	<u>RB211-524C2-19</u>	<u>RB211-524D4-19</u>	<u>RB211-524D4-39</u>
Rated takeoff thrust (5 min.)	50,600 lbs.	51,980 lbs.	

Sea level static conditions (Ideal)
Rated Maximum continuous thrust

Rated Maximum continuous thrust	46,120 lbs.	47,230 lbs.
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For engine operating limits see the FAA Approved Airplane Flight Manual under the serial numbers section of this data sheet or the appropriate engine type certificate data sheet:

Pratt & Whitney	E3NE and E20EA
General Electric	E23EA and E13NE
Rolls Royce	E12EU

Thrust Setting:

The appropriate EPR or N1 thrust setting curve in Section 4 of the Airplane Flight Manual must be used for control of engine thrust.

Maximum Operating Altitude:

The maximum operating altitude is 45,100 feet.

DATA PERTINENT TO ALL MODELS, EXCEPT MODEL 747-400 AND 747-8 SERIES (cont'd):

Minimum Crew: For all flights, 3 persons (pilot, copilot, flight engineer). When passengers are being carried, one attendant is required at each No. 3 over-wing exit. At least one flight attendant is required on the upper deck during taxi, takeoff and landing when passengers occupy the upper deck.

Maximum Passengers: For 747SR and 747-100, -100B, -200B, -200C airplanes the total passenger capacity is limited to:
 550 with 5 pair of Type "A" exits on main deck
 440 with 4 pair of Type "A" exits on main deck
 Upper deck passenger capacity is limited to:
 8 with one exit on the upper deck 16 with one exit, improved slide and smoke barrier
 24 with one exit, straight stairway, smoke barrier, and escape slide capable of operation in 25 kt. wind
 32 if in compliance with the requirements of Special Condition No. 25-61-NW-1
 45 if in compliance with the requirements of Special Condition No. 25-71-NW-3
 5 persons on upper deck per Exemption 1870D.
 (747-100 and 747-200)
 For 747SP the total passenger capacity is limited to:
 400 passengers with the same upper deck limits as listed above.
 For 747-200F the total passenger capacity is limited to:
 19 passengers on upper deck with 2 doors, 25 knot slides, C.G. Limitation, and compliance shown with AD 93-07-15; or 19 persons on upper deck equipped with emergency descent reels and harnesses, 2 doors and 25 knot slides.
 5 persons on upper deck per Exemption 1870D.
 For 747-300 and 747-100B SUD the total passenger capacity is limited to:
 660 passengers with 5 pair of Type "A" exits on the main deck plus one pair of Type "A" exits on the upper deck. Main deck limited to 550 and upper deck limited to 110 if in compliance with the requirements of modified Special Condition No. 25-71-NW-3, transmitted to Boeing by FAA letter dated August 3, 1981.) See NOTE 9.
 550 passengers with 4 pair of Type "A" exits on the main deck limited to 440 and upper deck limited to 110 if in compliance with the requirements of modified Special Condition No. 25-71-NW-3, transmitted to Boeing by FAA letter dated August 3, 1981.

Required Equipment: The basic required equipment as prescribed in the applicable airworthiness regulations (See Certification Basis) must be installed in the aircraft for certification. The required equipment is noted in the Type Design Data.

Datum: Balance Arm Datum corresponds to Body Station 0 and is 90 inches (290 inches on SP) forward of nose. All production stations coincide numerically with arms except on 747SP.

Horizontal distance of datum to nose gear jack points in 384.7 inches. (584.7 inches on 747SP)

Mean Aerodynamic Chord (MAC): MAC length is 327.8 inches. Leading edge of MAC is 1258 inches aft of datum.

Level Means: A plumb-bob attachment and leveling provision scale are provided in the R.H. body wheel well at BS 1444.0. They are referred to as ARM on the 747SP and are a true measure in inches aft of a forward reference datum which is located 290 inches ahead of the airplane nose.

Balance ARMS have the following relationship with Body Stations on the 747SP:

BODY STATION INCHES	ADJUSTMENT INCHES	ARM INCHES
90 to 800 (800 to 1,000 Section removed)	+200	290 to 1,000
1,000 to 1,480 (1,480 to 1,640 Section removed)	0	1,000 to 1,480
1,640 to 2,140 (2,140 to 2,360 Section removed)	-160	1,480 to 1,980
2,360 to 2,792	-380	1,980 to 2,412

DATA PERTINENT TO ALL MODELS, EXCEPT MODEL 747-400 AND 747-8 SERIES (cont'd):

Control Surface

Movements:

To insure proper operation of the airplane, the movement of the various control surfaces must be carefully controlled by proper rigging of the flight control systems. The airplane must, therefore, be rigged according to the following FAA-approved data:

Boeing Drawing Numbers

65B04001	Control Installation	Aileron and Spoiler
65B04002	Control Installation	Elevator
65B04003	Control Installation	Rudder
65B04004	Control Installation	Stabilizer Trim
65B04006	Control Installation	Rudder Trim
65B04007	Control Installation	Wing Flap
65B04016	Control Installation	Speed Brakes

Service Information:

Boeing Reports D6-13592, "Structural Repair Manual", (except for 747SP) is FAA-Approved.
Boeing Reports D6-34024, "Structural Repair Manual", is FAA-Approved for the 747SP. Service Bulletins and other service information, when FAA-Approved, will carry a statement to the effect.

Certification Basis:

FAR Part 1, FAR Part 21, FAR Part 36, FAR Part 25 effective February 1, 1965, Amendments 25-1 through 25-8 plus 25-15, 25-17, 25-18, 25-20, and Amendment 25-39 transmitted by FAA letter dated February 4, 1977, and special conditions summarized for record purposes as enclosed with FAA letter to The Boeing Company dated February 20, 1970. Special Condition 4A, revised to apply to airplanes with the landing gear load evener system deleted, was recorded as attachment to an FAA letter to The Boeing Company dated May 12, 1971.

Based on 14 CFR § 21.101(g) for changes to TC's, applicable provisions of 14 CFR part 26 are included in the certification basis. For any future 14 CFR part 26 amendments, the holder of this TC must demonstrate compliance with the applicable sections.

Compliance has been found for the following regulations at Amendment 26-0: §26.11

Compliance has been found for the following regulations at Amendment 26-1: §26.49

Compliance has been found for the following regulations at Amendment 26-4: §26.43, §26.45

Compliance has been found for the following regulations at Amendment 26-6: §26.21

Amendment 25-46, Section 25.803(d) transmitted by FAA letter to The Boeing Company dated September 2, 1983. This is limited to all passenger configurations and 6/7 pallet combi configurations for Model 747-100, -200, and -300 series airplanes.

Exemptions from 14 CFR part 25:

1. Exemption from 14 CFR 25.807(c)(1), 25.807(c)(5), 25.809(f)(1), 25.813(b), Allowance of non crew members on the upper deck of 747-200F, 747-200C and certain 747-100 airplanes when in the main deck cargo configuration. (Exemption No. 1870 dated September 14, 1973, No. 1870A dated March 10, 1977, No. 1870B dated October 26, 1981, No. 1870C dated June 2, 1986, and No. 1870D dated April 3, 1991)

Special Condition No. 25-61-NW-1 for occupancy not to exceed 32 passengers on the upper deck of airplanes with spiral staircase was transmitted to The Boeing Company by FAA letter dated February 26, 1975.

Special Condition No. 25-71-NW-3 for occupancy not to exceed 45 passengers on the upper deck of airplanes with straight segmented stairway was transmitted to The Boeing Company by FAA letter dated September 8, 1976.

Modification of Special Condition No. 25-71-NW-3 for occupancy not to exceed 110 passengers on the upper deck of airplanes with straight segmented stairway was transmitted to The Boeing Company by FAA letter dated August 3, 1981.

RB211 engine oil filter system complies with FAR 25.1019 and 25.1305(c)(7) of Amendment 25-36.

Special Condition No. 25-77-NW-4 (modification of the autopilot system to approve the airplane for use of the system under category IIIb landing conditions) was transmitted to The Boeing Company by FAA letter dated July 8, 1977.

Special Condition No. 25-ANM-16 for installation of an overhead crew rest area, occupancy not to exceed 10 crewmembers. FAA approved procedures required for compliance with paragraph 3 of the Special Condition are located in Boeing Document D926U303, Appendix D.

DATA PERTINENT TO ALL MODELS, EXCEPT MODEL 747-400 AND 747-8 SERIES (cont'd):

Special Condition No. 25-ANM-16A for installation of an overhead crew rest area with hard partitions and a curtain, occupancy not to exceed 10 crewmembers. FAA approved procedures required for compliance with paragraph 2 and 13(e) of the Special Condition are located in Boeing Document D926U303, Appendix D and E.

Compliance with the following optional requirements has been established:

Ditching Provisions	FAR 25.801
Ice Protection Provisions	FAR 25.1419

Equivalent Safety Findings exist with respect to the following Regulations:

For Model 747-100, -200B, -200F, -200C, 747SR, 747SP, -100B, -300, -100B SUD:
 25.1415(d) Emergency Locator Transmitter (ELT)
 25.561(b)(3)(ii) Passenger (and non-crewmember) seat track bending calculations only per FAA Memorandum TD6633SE-T-C-1, dated January 26, 2004.

For 747-300 only:
 25.812(k)(2)
 25.815

For Model 747-100, -200, -300 Series:
 25.773(b)(2)(i), Amendments 25-1 through 25-67
 25.811(f) Emergency Exit Marking

Production Basis: Production Certificate No. 700.

Equipment: The basic required equipment as prescribed in the applicable airworthiness regulations (See Certification Basis) must be installed.

X - 747-400 (Approved January 10, 1989) Transport Aircraft

The 747-400 is basically 747-300 series airplane with wing extension and winglets, additional fuel tank in the horizontal stabilizer, additional auxiliary fuel tank in the forward section of the cargo bay and reconfigured cockpit for two man crew and associated automation and advanced avionics.

Engines: 4 Pratt and Whitney PW4000 Series
 General Electric CF6-80C2B1F, CF6-80C2B5F
 Rolls Royce RB211-524G2-19, RB211-524G3-19, RB211-524H2-19, RB211-524G2-T-19, RB211-524G3-T-19, RB211-524H2-T-19.
WARNING: To prevent unsafe airplane handling characteristics, PW4000 series engines with electronic Engine control (EEC) part number 791100-14-102 (Pratt & Whitney part number 54D043) must not be installed on the same airplane as PW4000 series engines that have the ring case compressor configuration. This combination of engine configurations is not approved because of a significant difference in engine acceleration rates and the effect of that difference on airplane handling characteristics. Ring case compressor equipped engines were approved with the same engine model number as previously approved PW4000 configurations, and must be identified by the presence of a "/A5" marked at the end of the "INSTL ARR" block on the engine data plate.
 SEE NOTE 5 for further information regarding intermixing engines

Engine Thrust Limits: See data pertinent to all Model 747-400's

Fuel: See NOTE 3.

Airspeed Limits: VMO/MMO 365/0.92 (KCAS) For other airspeed limits see the appropriate FAA Approved Airplane Flight Manual.

X. 747-400 (cont'd):

C.G. Range: See the appropriate FAA Approved Airplane Flight Manual.
 Maximum Weights: See the appropriate FAA Approved Airplane Flight Manual.

Maximum Baggage/Cargo: See the appropriate Weight and Balance Control and Loading Manual.

Fuel/Oil Capacity: See the appropriate Weight and Balance Control and Loading Manual.

FAA Approved Weight and Balance Control and Loading Manual: D043U540 and D043U541

FAA Approved Airplane Flight Manuals: D6U10001, D6U10002, and D6U10003

<u>Model</u>	<u>Eligible Serial Numbers</u>
747-406	23982, 23999-24001, 24201, 24202, 24517, 24518, 25086, 25087, 25356, 25413, 26372-26374, 27202, 28195, 28196, 28459, 28460, 30454, 30455
747-409	24309-24313, 27965, 28709-28712, 29030, 29031, 29219, 29906, 33734-33737
747-412	24061-24066, 24226, 24227, 24975, 25068, 25127, 25128, 26547-26552, 26554-26557, 26562, 27066-27071, 27132-27134, 27137, 27178, 27217, 28022, 28023, 28025, 28028, 28029, 28031, 29950
747-419	24386, 24855, 25605, 26910, 29375
747-422	24322, 24363, 24380-24385, 25158, 25224, 25278, 25279, 25379, 25380, 25395, 26875-26881, 26890, 26892, 26899-26903, 26906, 26908, 28715-28717, 28810-28813, 29166-29168, 30023
747-428	24969, 24990, 25238, 25302, 25344, 25599-25602, 25628-25630, 32868, 32869, 32871
747-430	23816, 23817, 24285-24288, 24715, 24740, 24741, 24761, 24966, 24967, 25045-25047, 26425-26427, 28086, 28284-28287, 29101, 29492, 29493, 29868-29872, 32445
747-433	24998, 25074, 25075
747-436	23908-23911, 24047-24058, 24447, 24629, 24630, 25406, 25427, 25432, 25434, 25435, 25809, 25810-25814, 25817-25824, 27090-27092, 27349, 27350, 27478, 28700, 28848-28859, 27078, 27164, 27165, 27214, 28094, 28095
747-437	24354, 24373, 24406, 24481-24483, 24779, 24806, 24887, 24974, 25067, 25151, 25245, 25315, 25544-25547, 25564-25566, 32909-32914
747-441	24956, 24957
747-443	30885, 32337-32340
747-444	24976, 25152, 26637, 26638, 28468, 29119
747-446	24423-24427, 24777, 24784, 24870, 24885, 24886, 25064, 25212, 25260, 25308, 26341-26344, 26346, 26350, 26353, 26355, 26356, 26359-26362, 27099, 27100, 27645, 27646, 27648, 27650, 29899
747-451	23719, 23720, 23818-23821, 24222-24225, 26473, 26474, 26477, 30267-30269, 33001, 33002
747-458	26055, 26056, 27915, 29328
747-467	23814, 23815, 24631, 24850, 24851, 24925, 24955, 25082, 25211, 25351, 25869-25874, 27117, 27230, 27595
747-468	28339-28343
747-469	27338, 27663
747-475	24883, 24895, 24896, 25422
747-481	24801, 24833, 24920, 25135, 25207, 25641, 25645, 28282, 28283, 29262, 29263, 30322
747-41R	29406, 32745, 32746
747-45E	26062, 27062, 27063, 27141, 27142, 27154, 27173, 27174, 27898, 27899, 28092, 28093, 29061, 29111, 29112
747-47C	24730, 24731
747-48E	25405, 25452, 25777-25780, 25782, 25784, 28551, 28552
747-4B3	24154, 24155
747-4B5	24198-24200, 24619, 24621, 25205, 25275, 26392-26398, 26400, 26402-26405, 26407, 26409, 26412, 27072, 27177, 27341, 27662, 28096, 28335
747-4D7	24458, 24459, 24993, 25366, 26609, 26610, 26615, 26616, 27093, 27723- 27725, 28705, 28706, 32369-32370 , 33770, 33771
747-4F6	27261, 27262, 27602, 27827, 27828, 28959-28961
747-4H6	24315, 24405, 24836, 25126, 25699-25703, 27042-27044, 27672, 28426-28428, 28432, 28433, 28435, 29900, 29901, 30158
747-4J6	24346-24348, 25879-25883, 28754-28756, 29070, 29071, 30158
747-4P8	33684
747-4Q3	29486
747-4Q8	24958, 26255, 26326, 28194, 28757
747-4U3	25704, 25705

X. 747-400 (cont'd):

For engine operating limits see the FAA Approved Airplane Flight Manual referenced under Section X of this data sheet or the appropriate engine type certificate data sheet:

Pratt and Whitney:	E24NE
General Electric:	E13NE
Rolls Royce:	E30NE

Thrust Setting: The appropriate EPR or N1 thrust setting curves in Section 4 of the Airplane Flight Manual (AFM) must be used for control of engine thrust.

Maximum Operating Altitude: 45,100 feet

Minimum Crew: For all flights, 2 persons (pilot, copilot). When passengers are being carried, one attendant is required at each No. 3 over-wing exit. At least one flight attendant is required on the upper deck during taxi, takeoff, and landing when passengers occupy the upper deck.

Maximum Passengers: For 747-400 the total passenger capacity is limited to: 660 passengers with 5 pair of Type "A" exits on main deck plus one pair of Type "A" exits on the upper deck. (Main deck limited to 550 and upper deck limited to 110 if in compliance with the requirements of modified Special Condition Number 25-71-NW-3, transmitted to Boeing by FAA letter dated August 3, 1981.) See NOTE 9.

Required Equipment: The basic required equipment as prescribed in the applicable airworthiness regulations (See Certification Basis) must be installed in the aircraft for certification. The required equipment is noted in the Type Design Data.

Datum: Balance Arm Datum corresponds to Body Station 0 and is 90 inches forward of nose. All production stations coincide numerically with arms. Horizontal distance of datum to nose gear jack points is 384.7 inches.

MAC: MAC length is 327.8 inches. Leading edge of MAC is 1258 inches aft of datum.

Level Means: A plumb-bob attachment and leveling provision scale are provided in the R.H. body wheel well at BS 1444.0.

Control Surface Movements: To insure proper operation of the airplane, the movement of the various control surfaces must be carefully controlled by proper rigging of the flight control systems. The airplane must, therefore, be rigged according to the following FAA-approved data:

Boeing Drawing Numbers:

251U1001	Rigging Procedures Aileron and Spoiler
251U2001	Rigging Procedures Elevator
251U3002	Rigging Procedures Rudder
251U4001	Rigging Procedures Stabilizer Trim
253U5001	Rigging Procedure - Control Stand (Includes flap control assembly)
256U2001	Rigging Procedures Leading Edge Flaps
256U3001	Rigging Procedures Trailing Edge Flaps
251U1003	Rigging Procedures Speed Brakes

Service Information: Boeing Report D634U102, "Structural Repair Manual," is FAA-approved. Service Bulletins and other Service information, when FAA-approved, will carry a statement to that effect.

Certification Basis: Part 25 of the FAR, effective February 1, 1965, as amended by Amendments 25-1 through 25-59 with the following exceptions:

<u>SECTION NO.</u>	<u>TITLE</u>	<u>THRU AMDT.25-</u>
25.107	Takeoff speeds	41
25.109	Accelerate-stop distance	41
25.149	Minimum control speed	41

X. 747-400 (cont'd):

25.251	Vibration and buffeting	22
25.305	Strength and deformation	22
25.331	General	45
25.351	Yawing conditions	45
25.365	Pressurized cabin loads	53
25.571	Damage-tolerance and fatigue evaluation of structure	9
25.607	Fasteners	22
25.631	Bird Strike damage	(NA)**
25.657	Hinges	22
25.675	Stops	37
25.683	Operation tests	22
25.772	Pilot compartment doors	46
25.773(b)(2)(ii)	Pilot Compartment View	72
25.783	Doors	53
25.785	Seats, berths, safety belts, harnesses	50
25.787	Stowage Compartments	31
25.789	Retention of items of mass in passenger and crew compartments	45
25.809	Emergency exit arrangement	45
25.812	Emergency lighting	31
25.832	Cabin ozone concentration	(NA)**
25.858	Cargo compartment fire detections systems	(NA)**
25.1103	Induction system ducts and air duct systems	45
25.1401	Anticollision light system	26
25.1438	Pressurization and pneumatic systems	(NA)**
25.1529	Instructions for continued airworthiness	(NA)**

**Not applicable - The requirements of this section do not apply to this type design because the original certification basis, which did not include this section, has been determined to be adequate.

Based on 14 CFR § 21.101(g) for changes to TC's, applicable provisions of 14 CFR part 26 are included in the certification basis. For any future 14 CFR part 26 amendments, the holder of this TC must demonstrate compliance with the applicable sections.

Compliance has been found for the following regulations at Amendment 26-0: §26.11
 Compliance has been found for the following regulations at Amendment 26-1: §26.49
 Compliance has been found for the following regulations at Amendment 26-4: §26.43, §26.45
 Compliance has been found for the following regulations at Amendment 26-6: §26.21

Certification Basis for §14 CFR 25.981 at Amendment 25-125, and Equivalent Safety Finding P-2, dated May 25, 2010, for the Flammability Reduction System (FRS), is applied if fuel tank inerting is installed as a modification on existing in service aircraft per Boeing Service Bulletin 747-47-2006. Airworthiness Limitations for the FRS are contained in Section 9 of the applicable Maintenance Planning Document.

Part 36 of the FAR as amended by Amendments 36-1 through 36-15, and any later amendments in existence at the time of certification.

Special Federal Aviation Regulation (SFAR) 27, as amended by Amendments 27-1 through 27-6 and any later amendments in existence at the time of type certification.

The following special conditions, exemptions; and equivalent safety findings, which are part of the Model 747-300 certification basis, are also part of the certification basis for the Model 747-400. The special conditions include those enclosed with FAA letter to The Boeing Company dated February 20, 1970, and the following:

1. Special Condition 4A, revised to apply to airplanes with the landing gear load evener system deleted, was recorded as an enclosure to an FAA letter to The Boeing Company dated May 12, 1971.
2. Special Condition No. 25-61-NW-1 for occupancy not to exceed 32 passengers on the upper deck of airplanes with spiral staircase was transmitted to The Boeing Company by FAA letter dated February 26, 1975.

X. 747-400 (cont'd):

3. Special Condition No. 25-71-NW-3 for occupancy not to exceed 45 passengers on the upper deck of airplanes with straight segmented stairway was transmitted to The Boeing Company by FAA letter dated September 8, 1976.
4. Modification of Special Condition No. 25-71-NW-3 for occupancy not to exceed 110 passengers on the upper deck of airplanes with straight segmented stairway was transmitted to The Boeing Company by FAA letter dated August 3, 1981.
5. Special Condition No. 25-77-NW-4 (modification of the auto pilot system to approve the airplane for use of the system under Category IIb landing conditions) was transmitted to The Boeing Company by FAA letter dated July 8, 1977.
6. Special Condition No. 25-ANM-16 for use of an overhead crew rest area, occupancy not to exceed ten crewmembers was transmitted to The Boeing Company by FAA letter dated November 19, 1987. FAA approved procedures required for compliance with paragraph 13 of the Special Condition are located in Boeing Document D926U303, Appendix D.
7. Special Condition No. 25-ANM-24 applicable to flight deck displays and propulsion control system was provided to Boeing on December 22, 1988.
8. Special Condition No. 25-ANM-25 which established lightning and radio frequency (RF) energy protection requirements was provided to Boeing on December 22, 1988.
9. Special Condition No. 25-ANM-16A for installation of an overhead crew rest area with hard partitions and a curtain, occupancy not to exceed 10 crewmembers. FAA approved procedures required for compliance with paragraph 2 and 13(e) of the Special Condition are located in Boeing Document D926U303, Appendix D and E.

The following optional requirements, which are part of the Model 747-300 certification basis, apply also to the 747-400:

Ditching Provisions	Section 25.801
Ice Protection Provisions	Section 25.1419

The following equivalent safety findings, previously made for earlier models under the provisions of Section 21.21(b)(1), are also applicable to the Model 747-400:

Width of Aisle	Section 25.815
Pilot Compartment View	Section 25.773
Use of 1-g Stall Speed (nonstructural items)	Several (747-400 only)
Use of 1-g Stall Speed (structural items)	Several (747-400 only)
Position Light Distribution and Intensities	Section 25.1389(b)(3) (747-400 only)
Fire-detection System	Section 25.1203 See Note 1.
Pressure Relief	Section 25.1103(d) See Note 1.
Emergency Locator Transmitter (ELT)	Section 25.1415(d)
Emergency Exit Marking	Section 25.811(f)

Note 1: Applies to RB211-524G/H series engine installations only.

Equivalent Safety Findings exist with respect to the following Regulation: 25.773(b)(2)(i), Amendments 25-1 through 25-67 (Boeing 747-400 Series)

X. 747-400 (cont'd):

Part 25 of the FAR, effective February 1, 1965, as amended by Amendment 25-1 through 25-59 With the following exceptions: (See Note 15).

Exemptions from FAR Part 25:

Exemption from 14 CFR 25.779(b)(1), 25.1301(d), and 25.1309(a), 747-400F with Rolls Royce RB211-524G/H engines installed with Full Authority Fuel Control Software "Issue 17" software (Exemption 10069, dated May 25, 2010)

Time Limited Exemption from 14 CFR 25.901(c), 25.981(a)(3) Fuel tank ignition prevention associated with the FQIS (Exemption 10924, dated February 4, 2014) (Expiration date February 4, 2017)

Exemption from FAR 25.961(a)(5), Amendment 59, to allow an 80 degrees F maximum fuel temperature limitation for JP-4 and Jet-B fuels on the 747-400/-400F/RB211-524G-T/H-T (Exemption 7496, dated April 12, 2001)

Certification Maintenance Requirements (CMR's):

The CMR's are listed in either the FAA-approved Section 9 of Boeing Maintenance Planning Data Document D621U400 or the applicable engine Type Certificate Data Sheet. The more restrictive requirement from these two documents shall be in force.

Production Basis: Production Certificate No. 700 has been issued to The Boeing Company.

Equipment: The basic required equipment as prescribed in the applicable airworthiness regulations (see Certification Basis) must be installed in the aircraft.

XI - 747-400D (Approved October 10, 1991) Transport Aircraft

The 747-400D is basically the 747-400 series airplane with strengthened wings and without the 6-foot wing tip extension and 6-foot winglet. It is delivered with a wing tip equivalent in planform to the 747-300 airplane and has provisions for a "one-time" conversion from the Domestic configuration to the International configuration by adding the 747-400 wing extension and winglet.

Engines: 4 General Electric CF6-80C2B1F

Engine Thrust Limits: See data pertinent to all Model 747-400's

Fuel: See NOTE 3.

Airspeed Limits: VMO/MMO 365/0.92 (KCAS) For other airspeed limits see the appropriate FAA Approved Airplane Flight Manual.

C.G. Range: See the appropriate FAA Approved Airplane Flight Manual.

Maximum Weights: See the appropriate FAA Approved Airplane Flight Manual.

Maximum Baggage/Cargo: See the appropriate Weight and Balance Control and Loading Manual.

Fuel and Oil Capacity: See the appropriate Weight and Balance Control and Loading Manual.

FAA Approved Weight and Balance Control and Loading Manual: D043U540

FAA Approved Airplane Flight Manual: D6U10002

<u>Model</u>	<u>Eligible Serial Numbers</u>
747-446D	25213, 25214, 26345, 26347-26349, 26351, 26352
747-481D	25292, 25639, 25640, 25642-25644, 25646, 25647, 27163, 27436, 27442

For engine operating limits see the FAA Approved Airplane Flight Manual referenced under Section XI of this data sheet or the appropriate engine type certificate data sheet:

General Electric: E13NE

Thrust Setting: The appropriate EPR or N1 thrust setting curves in Section 4 of the Airplane Flight Manual (AFM) must be used for control of engine thrust.

Maximum Operating Altitude: 45,100 feet

XI. 747-400D (cont'd):

Minimum Crew: For all flights, 2 persons (pilot, copilot). When passengers are being carried, one attendant is required at each No. 3 over-wing exit. At least one flight attendant is required on the upper deck during taxi, takeoff, and landing when passengers occupy the upper deck.

Maximum Passengers: For 747-400D airplanes the total passenger capacity is Limited to: 660 passengers with 5 pair of Type "A" exits on main deck plus one pair of Type "A" exits on the upper deck. (Main deck limited to 550 and upper deck limited to 110 if in compliance with the requirements of modified Special Condition Number 25-71-NW-3, transmitted to Boeing by FAA letter dated August 3, 1981).

Required Equipment: The basic required equipment as prescribed in the applicable airworthiness regulations (See Certification Basis) must be installed in the aircraft for certification. The required equipment is noted in the Type Design Data.

Datum: Balance Arm Datum corresponds to Body Station 0 and is 90 inches forward of nose. All production stations coincide numerically with arms. Horizontal distance of datum to nose gear jack points is 384.7 inches.

MAC: MAC length is 327.8 inches. Leading edge of MAC is 1258 inches aft of datum.

Level Means: A plumb-bob attachment and leveling provision scale are provided in the R.H. body wheel well at BS 1444.0.

Control Surface Movements: To insure proper operation of the airplane, the movement of the various control surfaces must be carefully controlled by proper rigging of the flight control systems. The airplane must, therefore, be rigged according to the following FAA-approved data:

Boeing Drawing Numbers:

251U1001	Rigging Procedures	Aileron and Spoiler
251U2001	Rigging Procedures	Elevator
251U3002	Rigging Procedures	Rudder
251U4001	Rigging Procedures	Stabilizer Trim
253U5001	Rigging Procedures	Control Stand (includes flap control assembly)
256U2001	Rigging Procedures	Leading Edge Flaps
256U3001	Rigging Procedures	Trailing Edge Flaps
251U1003	Rigging Procedures	Speed Brakes

Service Information: Boeing Report D634U102, "Structural Repair Manual," is FAA-approved. Service Bulletins and other Service information, when FAA-approved, will carry a statement to that effect.

Certification Basis: Part 25 of the FAR, effective February 1, 1965, as amended by Amendments 25-1 through 25-70 with the following exceptions:

<u>SECTION NO.</u>	<u>TITLE</u>	<u>THRU</u> <u>AMDT.25-</u>
25.107	Takeoff speeds	41
25.109	Accelerate-stop distance	41
25.149	Minimum control speed	41
25.251	Vibration and buffeting	22
25.305	Strength and deformation	22
25.331	General	45
25.351	Yawing conditions	45
25.365	Pressurized cabin loads	53
25.561	General	63
25.562	Emergency landing dynamic conditions	63**
25.571	Damage-tolerance and fatigue evaluation of structure	9
25.607	Fasteners	22
25.631	Bird strike damage	(NA)**
25.657	Hinges	22
25.675	Stops	37
25.683	Operation tests	22
25.772	Pilot compartment doors	46
25.783	Doors	53
25.785	Seats, berths, safety belts, harnesses	50
25.809	Emergency exit arrangement	45
25.812	Emergency lighting	31

XI. 747-400D (cont'd):

25.855	Cargo or baggage compartments	59
25.858	Cargo Compartment Fire Detection Systems	(NA)**
25.1103	Induction system ducts and air duct systems	45
25.1401	Anticollision light system	26
25.1438	Pressurization and pneumatic systems	(NA)**
25.1529	Instructions for continued airworthiness(NA)**	

** Not applicable - The requirements of this section do not apply to this type design because the original certification basis, which did not include this section, has been determined to be adequate.

Based on 14 CFR § 21.101(g) for changes to TC's, applicable provisions of 14 CFR part 26 are included in the certification basis. For any future 14 CFR part 26 amendments, the holder of this TC must demonstrate compliance with the applicable sections.

Compliance has been found for the following regulations at Amendment 26-0: §26.11

Compliance has been found for the following regulations at Amendment 26-1: §26.49

Compliance has been found for the following regulations at Amendment 26-4: §26.43, §26.45

Compliance has been found for the following regulations at Amendment 26-6: §26.21

Part 36 of the FAR as amended by Amendments 36-1 through 36-18.

Special Federal Aviation Regulation (SFAR) 27, as amended by Amendments 27-1 through 27-6, and any later amendments in existence, at the time of certification

The following special conditions, exemptions, and equivalent safety findings, which are part of the Model 747-300 certification basis, are also part of the certification basis for the Model 747-400D:

The special conditions include those enclosed with FAA letter to The Boeing Company dated February 20, 1970, and the following:

1. Special Condition 4A, revised to apply to airplanes with the landing gear load evener system deleted, was recorded as an enclosure to an FAA letter to The Boeing Company dated May 12, 1971.
2. Special Condition No. 25-61-NW-1 for occupancy not to exceed 32 passengers on the upper deck of airplanes with spiral staircase was transmitted to The Boeing Company by FAA letter dated February 26, 1975.
3. Special Condition No. 25-71-NW-3 for occupancy not to exceed 45 passengers on the upper deck of airplanes with straight segmented stairway was transmitted to The Boeing Company by FAA letter dated September 8, 1976.
4. Modification of Special Condition No. 25-71-NW-3 for occupancy not to exceed 110 passengers on the upper deck of airplanes with straight segmented stairway was transmitted to The Boeing Company by FAA letter dated August 3, 1981.
5. Special Condition No. 25-77-NW-4 (modification of the auto pilot system to approve the airplane for use of the system under Category IIIb landing conditions) was transmitted to The Boeing Company by FAA letter dated July 8, 1977.
6. Special Condition No. 25-ANM-16 for use of an overhead crew rest area, occupancy not to exceed ten crewmembers was transmitted to The Boeing Company by FAA letter dated November 19, 1987.
7. Special Condition No. 25-ANM-24 applicable to flight deck displays and propulsion control system was provided to Boeing on December 22, 1988. FAA approved procedures required for compliance with paragraph 13 of the Special Condition are located in Boeing Document D926U303, Appendix D.
8. Special Condition No. 25-ANM-25 which established lightning and radio frequency (RF) energy protection requirements was provided to Boeing on December 22, 1988.
9. Special Condition No. 25-ANM-16A for installation of an overhead crew rest area with hard partitions and a curtain, occupancy not to exceed 10 crewmembers. FAA approved procedures required for compliance with paragraph 2 and 13(e) of the Special Condition are located in Boeing Document D926U303, Appendix D and E.

Exemptions from FAR Part 25:

Time Limited Exemption Exemption from 14 CFR 25.901(c), 25.981(a)(3) Fuel tank ignition prevention associated with the FQIS. (Exemption 10924, dated February 4, 2014) (Expiration date February 4, 2017)

XI. 747-400D (cont'd):

The following Optional requirements, which are part of the Model 747-300 certification basis, apply also to the 747-400D:

Ditching Provisions	Section 25.801
Ice Protection Provisions	Section 25.773

The following equivalent safety findings, previously made for earlier models under the provisions of Section 21.21(b)(1), are also applicable to the Model 747-400D:

Width of Aisle	Section 25.815
Use of 1-g Stall Speed (nonstructural items)	Several
Use of 1-g Stall Speed (structural items)	Several
Position Light Distribution and Intensities	Section 25.1389(b)(3)
Emergency Locator Transmitter (ELT)	Section 25.1415(d)
Emergency Exit Markings	Section 25.811(f)

Part 25 of the FAR, effective February 1, 1965, as amended by Amendment 25-1 through 25-59 with the following exceptions: (See Note 15)

Certification Maintenance Requirements (CMR's):

The CMR's are listed in the FAA-approved Section 9 of Boeing Maintenance Planning Data Document D621U400 or the applicable engine Type Certificate Data Sheet. The more restrictive requirements from these two documents shall be in force.

Production Basis: Production Certificate No. 700.

Equipment: The basic required equipment as prescribed in the applicable airworthiness regulations (see Certification Basis) must be installed in the aircraft.

Note: The Boeing Company has offered and the FAA has agreed, to upgrade the certification basis for the Model 747-400D in relation to FAR Part 25.365 (Amendment 25-54), Pressurized Cabin Loads on the condition that initial deliveries need not comply at the time of delivery, but shall be retrofitted later.

By March 31, 1993, Model 747-400D production airplanes must include an FAA-approved production change which demonstrates compliance with the Certification Basis. Retrofit modification kits will also be available (beginning June 30, 1993) for installation in airplanes delivered without the production change (S/N's 25213, 25214, 25292, 25639, 25640, 25642 & 26347).

XII - 747-400F (Approved October 27, 1993) Transport Aircraft

The new 747-400F (Freighter) is basically the 747-400 series airplane with strengthened wings and the 747-200F fuselage.

Engines: 4 Pratt & Whitney PW4000 Series
4 General Electric CF6-80C2B1F, CF6-80C2B5F
Rolls-Royce RB211-524-G2-19, RB211-524G3-19, RB211-524H2-19, RB211-524G2-T-19,
RB211-524G3-T-19, RB211-524H2-T-19

WARNING: To prevent unsafe airplane handling characteristics, PW4000 series engines with electronic engine control (EEC) part number 791100-14-102 (Pratt & Whitney part number 54D043) must not be installed on the same airplane as PW4000 series engines that have the ring case compressor configuration. This combination of engine configurations is not approved because of a significant difference in engine acceleration rates and the effect of that difference on airplane handling characteristics. Ring case compressor equipped engines were approved with the same engine model number as previously approved PW4000 configurations, and must be identified by the presence of a "/A5" marked at the end of the "INSTL ARR" block on the engine data plate.

SEE NOTE 5 for additional information regarding intermixing engines.

XII. 747-400F (cont'd):

Engine Thrust Limits:	See data pertinent to all Model 747-400's
Fuel:	See NOTE 3.
Airspeed Limits:	VMO/MMO 365/0.92 (KCAS) For other airspeed limits see the appropriate FAA Approved Airplane Flight Manual.
C.G. Range:	See the appropriate FAA Approved Airplane Flight Manual.
Maximum Weights:	See the appropriate FAA Approved Airplane Flight Manual.
Maximum Baggage/Cargo:	See the appropriate Weight and Balance Control and Loading Manual.
Fuel and Oil Capacity:	See the appropriate Weight and Balance Control and Loading Manual.

FAA Approved Weight and Balance Control and Loading Manual: D043U542
 FAA Approved Airplane Flight Manual: D6U10001, D6U10002 and D6U10003

<u>Model</u>	<u>Eligible Serial Numbers</u>
747-406F	33694-33696, 35233
747-409F	30759-30771, 33729, 33731-33733, 33738, 33739, 34265, 34266
747-412F	26553, 26558-26561, 26563, 28026, 28027, 28030, 28032, 28263, 32897-32902
747-428F	25632, 32866, 32867, 32870, 33096, 33097
747-446F	33748, 33749
747-467F	27175, 27503, 30804, 30805, 32571, 34150, 36867-36871, 37299
747-481F	34016-34018, 34283
747-4B5F	26401, 26406, 26408, 26411, 26413, 26414, 26416, 27073, 32808, 32809, 33515-33517, 33945, 33946, 34302, 35526
747-4G4F	30201
747-4H6F	28434, 29902
747-4R7F	25866-25868, 29053, 29729-29733, 30400, 30401, 33827, 34235, 35804, 35805
747-40BF	35207, 35208
747-41BF	32803, 32804
747-44AF	35662-35669
747-45EF	30607-30609
747-46NF	30808-30812, 35420, 35421
747-47UF	29252-29261, 30558, 30559, 32837, 32838, 32840
747-48EF	25781, 25783, 27603, 28367, 29170, 29907
747-4EVF	35169-35174
747-4FTF	34235, 34239, 34240
747-4HAF	35232-35237
747-4HQF	37303, 37304
747-4KZF	36132-36135, 36784, 36785

For engine operating limits see the FAA Approved Airplane Flight Manual referenced under Section XII of this data sheet or the appropriate engine type certificate data sheet:

Pratt & Whitney	E24NE
General Electric:	E13NE
Rolls-Royce	E30NE

Thrust Setting:	The appropriate EPR or N1 thrust setting curves in Section 4 of the Airplane Flight Manual (AFM) must be used for control of engine thrust.
Maximum Operating Altitude:	45,100 feet
Minimum Crew:	For all flights, 2 persons (pilot, copilot).
Maximum Persons:	For 747-400F airplanes the total persons capacity is Limited to: Six (6) persons on the upper deck per Exemption 1870E

XII. 747-400F (cont'd):

Required Equipment:	The basic required equipment as prescribed in the applicable airworthiness regulations (See Certification Basis) must be installed in the aircraft for certification. The required equipment is noted in the Type Design Data.
Datum:	Balance Arm Datum corresponds to Body Station 0 and is 90 inches forward of nose. All production stations coincide numerically with arms. Horizontal distance of datum to nose gear jack points is 384.7 inches.
MAC:	MAC length is 327.8 inches. Leading edge of MAC is 1258 inches aft of datum.
Level Means:	A plumb-bob attachment and leveling provision scale are provided in the R.H. body wheel well at BS 1444.0.
Control Surface Movements:	To insure proper operation of the airplane, the movement of the various control surfaces must be carefully controlled by proper rigging of the flight control systems. The airplane must, therefore, be rigged according to the following FAA-approved data: Boeing Drawing Numbers: 251U1001 Rigging Procedures Aileron and Spoiler 251U2001 Rigging Procedures Elevator 251U3002 Rigging Procedures Rudder 251U4001 Rigging Procedures Stabilizer Trim 253U5001 Rigging Procedures - Control Stand (includes flap control assembly) 256U2001 Rigging Procedures Leading Edge Flaps 256U3001 Rigging Procedures Trailing Edge Flaps 251U1003 Rigging Procedures Speed Brakes
Service Information:	Boeing Report D634U102, "Structural Repair Manual," is FAA-approved. Service Bulletins and other Service Information, when FAA-approved, will carry a statement to that effect.
Certification Basis:	Part 25 of the FAR, effective February 1, 1965, as amended by Amendments 25-1 through 25-67 with the following exceptions: (See Note 14 for cargo compartment liner requirements)

<u>SECTION NO.</u>	<u>TITLE</u>	<u>THRU AMDT.25-</u>
25.107	Takeoff speeds	41
25.109	Accelerate-stop distance	41
25.149	Minimum control speed	41
25.251	Vibration and buffeting	22
25.305	Strength and deformation	22
25.331	General	45
25.351	Yawing conditions	45
25.365	Pressurized Compartment Loads	53
25.562	Emergency landing dynamic conditions	63**
25.571	Damage-tolerance and fatigue evaluation of structure	9
25.607	Fasteners	22
25.631	Bird strike damage	22
25.657	Hinges	22
25.675	Stops	37
25.683	Operation tests	22
25.772	Pilot compartment doors	46
25.773(b)(2)(ii)	Pilot Compartment View	72
25.783	Doors	53
25.809(f)(1)(v)	Emergency exit arrangement	45
25.812	Emergency lighting	31
25.858	Cargo Compartment Fire Detection Systems	(NA)**
25.1103	Induction system ducts and air duct systems	45
25.1401	Anticollision light system	26
25.1438	Pressurization and pneumatic systems	(NA)**

XII. 747-400F (cont'd):

25.1529 Instructions for continued airworthiness (NA)**

**Not Applicable - The requirements of this section do not apply to this type design because the original certification basis, which did not include this section, has been determined to be adequate.

Based on 14 CFR § 21.101(g) for changes to TC's, applicable provisions of 14 CFR part 26 are included in the certification basis. For any future 14 CFR part 26 amendments, the holder of this TC must demonstrate compliance with the applicable sections.

Compliance has been found for the following regulations at Amendment 26-0: §26.11

Compliance has been found for the following regulations at Amendment 26-1: §26.49

Compliance has been found for the following regulations at Amendment 26-4: §26.43, §26.45

Compliance has been found for the following regulations at Amendment 26-6: §26.21

Part 36 of the FAR as amended by Amendments 36-1 through 36-20.

Special Federal Aviation Regulation (SFAR) 27, as amended by Amendments 27-1 through 27-7. (Same as FAR Part 34, October 14, 1993)

The following special conditions, exemptions, and equivalent safety findings, which are part of the Model 747-200F and 747-400 certification basis, are also part of the certification basis for the Model 747-400F:

The special conditions include those enclosed with FAA letter to The Boeing Company dated February 20, 1970, and the following:

1. Special Condition 4A, revised to apply to airplanes with the landing gear load evener system deleted, was recorded as an enclosure to an FAA letter to The Boeing Company dated May 12, 1971.
- 2, 3, and 4 were removed in this Revision 27, dated August 1, 1996
5. Special Condition No. 25-77-NW-4 (modification of the auto pilot system to approve the airplane for use of the system under Category IIb landing conditions) was transmitted to The Boeing Company by FAA letter dated July 8, 1977.
6. was removed in this Revision 27, dated August 1, 1996
7. Special Condition No. 25-ANM-24 applicable to flight deck displays and propulsion control system was provided to Boeing on December 22, 1988.
8. Special Condition No. 25-ANM-25 which established lightning and radio frequency (RF) energy protection requirements was provided to Boeing on December 22, 1988.

Exemptions from FAR Part 25:

1. Exemption from 14 CFR 25.807(c)(1), 25.807(c)(5), 25.809(f)(1), 25.813(b), Allowance of non crew members on the upper deck of 747-200F, 747-200C, certain 747-100 airplanes when in the main deck cargo configuration, and 747-400F. (Exemption No. 1870E dated September 8, 1993)
2. Partial Exemption from 14 CFR 25.855(c), Latches used on decompression vent doors only (Exemption No. 5649, dated April 27, 1993)
3. Exemption from 14 CFR 25.779(b)(1), 25.1301(d), and 25.1309(a) , 747-400F with Rolls Royce RB211-524G/H engines installed with Full Authority Fuel Control Software "Issue 17" software (Exemption 10069, dated May 25, 2010)
4. Time Limited Exemption from 14 CFR 25.901(c), 25.981(a)(3) Fuel tank ignition prevention associated with the FQIS (Exemption 10924, dated February 4, 2014) (Expiration date February 4, 2017)
5. Exemption from FAR 25.961(a)(5), Amendment 59, to allow an 80 degrees F maximum fuel temperature limitation for JP-4 and Jet-B fuels on the 747-400/-400F/RB211-524G-T/H-T (Exemption 7496, dated April 12, 2001)

The following optional requirements, which are part of the Model 747-400 certification basis, apply also to the 747-400F:

Ditching Provisions	Section 25.801
Ice Protection Provisions	Section 25.773

The following equivalent safety findings (ESF), previously made for earlier models under the provisions of Section 21.21(b)(1), are also applicable to the Model 747-400F:

XII. 747-400F (cont'd):

	Width of Aisle	Section 25.815
	Use of 1-g Stall Speed (nonstructural items)	Several
	Use of 1-g Stall Speed (structural items)	Several
	Position Light Distribution and Intensities	Section 25.1389(b)(3)
	Emergency Locator Transmitter (ELT)	Section 25.1415(d)
	Emergency Exit Marking	Section 25.811(f)
New ESF for 747-400F:	Doors	Section 25.783(e)
	Part 25 of the FAR, effective February 1, 1965, as amended by Amendment 25-1 through 25-59 with the following exceptions: (See Note 15).	

Certification Maintenance Requirements (CMR's):

The CMR's are listed in the FAA-approved Section 9 of Boeing Maintenance Planning Data Document D621U400 or the applicable engine Type Certificate Data Sheet. The more restrictive requirement from these two documents shall be in force.

Production Basis: Production Certificate No. 700 has been issued to The Boeing Company

Equipment: The basic required equipment as prescribed in the applicable airworthiness regulations (see Certification Basis) must be installed in the aircraft for certification.

XIII. 747-400SF Major Design Change

A 747-400 SF (Special Freighter), or optionally known as a 747-400 BCF (Boeing Converted Freighter), is a 747-400 Series passenger airplane that has been modified in accordance with FAA-approved Boeing Service Bulletin 747-00-2004 to operate in a freighter configuration. These aircraft remain as 747-400 Series aircraft for documentation purposes on this TCDS and with regard to the applicability of airworthiness directives. Because of the magnitude of this design change, the certification basis for the changed aspects was required to be established and documented in accordance with section 21.101 (Changed Product Rule).

All general information in TCDS A20WE for the 747-400 Series remains applicable to an airplane operating in the 747-400SF configuration, with the following exceptions:

Maximum Passengers: There are no provisions for the carriage of passengers. A maximum of 20 supernumeraries can occupy the aft cabin of the upper deck as given in Exemption 8590.

Minimum Crew: There is no requirement for a flight attendant, as given in Exemption 8590.

FAA Approved Weight and Balance Control and Loading Manual: D043U544

FAA Approved Airplane Flight Manual: D6U10001, D6U10002, and D6U10003

Service Information: Boeing Report D634U104, "Structural Repair Manual," is FAA-approved. Service Bulletins and other Service Information, when FAA-approved, will carry a statement to that effect.

Certification Maintenance Requirements (CMR's):

The CMR's are listed in the FAA-approved Section 9 of Boeing Maintenance Planning Data Document D621U400 or the applicable engine Type Certificate Data Sheet. The more restrictive requirement from these two documents shall be in force.

The 747-400 SF certification basis was established according to the requirements given in § 21.101 and AC 21.101-1, and was determined in accordance with FAA Order 8110.48. The conversion to the 747-400 SF configuration entails the following product level changes:

1. Passenger to Freighter change (significant product level change, per AC 21.101-1) and,
2. Upper Deck Interior Rearrangement (not a significant change, per AC 21.101-1)

XIII. 747-400SF Major Design Change (cont'd)

1. Significant Product Level Change - Passenger to Freighter Conversion:

Certification basis: Part 36: unchanged from 747-400 Series

SFAR 27: unchanged from 747-400 Series

Part 25 of the FAR, effective February 1, 1965, as amended by Amendments 25-1 through 25-112 with the following exceptions per section 21.101(b):

<u>SECTION NO.</u>	<u>TITLE</u>	<u>THRU AMDT.25-</u>
25.305 (a)(b)	Strength and Deformation	25-22
25.365	Pressurized Compartment	25-53, except as follows: Areas that comply with 25-54: Lower Lobe – Nose area, STA 140 to 460, all below WL 200. Wing – Wheel Well Floor Beam area Areas that comply with Amendment 25-72: Ceiling compartment above Main Deck Cargo Compartment. Main Deck Cargo Compartment. Lower Lobe – Forward, Aft, and Aft Bulk Cargo Compartments.
25.561	Emergency Landing Conditions	25-91 except the requirements of 25.561(c)(1)(ii) are not included in the certification basis.
25.571	Damage Tolerance and Fatigue Evaluation of Structure	25-22
25.831(a)	Ventilation	25-41
25.841(a)	Pressurized Cabins	25-38

Changed Areas:

The following is a listing of the changes incorporated as part of the passenger to freighter conversion:

- Increased maximum zero fuel weight
- Strengthened wing-to-body joint, main deck floor, fuselage frames and fuselage stub beams
- Replaced aft upper deck floor beams with tension ties
- Added a main deck side cargo door, door surround structure, and related control wiring
- Installed provisions (structural, electrical & drainage) to support installation of cargo handling systems
- Modified upper deck floor beams to allow installation of a folding ladder
- Installed new main deck sidewall & ceiling cargo liners
- Deactivated horizontal stabilizer tail fuel tanks (if previously installed)
- Reconfigured air conditioning, air distribution, equipment cooling, cabin pressurization, and lavatory/galley ventilation systems to freighter configurations
- Changed decompression venting
- Added main deck smoke detection and class E depressurization capability
- Replaced smoke detectors with area detectors in the lower cargo compartments
- Replaced cabin pressure controller for compatibility with cargo fire mode
- Added additional Halon bottle and air conditioning for the lower cargo compartments
- Added a main deck rigid cargo barrier forward of STA 140 and a 9-G cargo net aft of the aft bulkhead of the upper deck

All other changes resulting from the Passenger to Freighter Product Level Change are either Secondary or Not Affected in accordance with § 21.101 and AC 21.101-1. Amendment levels for sections of 14CFR Part 25 that apply to Secondary Changes or Not Affected Areas remain at the 747-400 Series amendment levels.

XIII. 747-400SF Major Design Change (cont'd)**2. Product Level Change - Upper Deck Interior Reconfiguration:**

Certification basis: The certification basis for the changed aspects associated with the upper deck interior configuration rearrangement is unchanged from the 747-400 Series in accordance with section 21.101(b)(1).

Based on 14 CFR § 21.101(g) for changes to TC's, applicable provisions of 14 CFR part 26 are included in the certification basis. For any future 14 CFR part 26 amendments, the holder of this TC must demonstrate compliance with the applicable sections.

Compliance has been found for the following regulations at Amendment 26-0: §26.11

Compliance has been found for the following regulations at Amendment 26-1: §26.49

Compliance has been found for the following regulations at Amendment 26-4: §26.43, §26.45

Compliance has been found for the following regulations at Amendment 26-6: §26.21

Special Conditions: Special conditions that are part of the certification basis for the 747-400 Series apply to the airplane operating in the 747-400 SF configuration, unless otherwise noted below:

Special Condition 25-ANM-16 (use of an overhead crew rest area, occupancy not to exceed ten crewmembers) does not apply to aircraft operated in the 747-400SF configuration.

Special Conditions 25-61-NW-1 (occupancy not to exceed 32 passengers on the upper deck – spiral staircase) and 25-71-NW-3 (occupancy not to exceed 45 (or later, 110) passengers on the upper deck of airplanes with a straight segmented stairway):

The 747-400 SF conversion removes the stairway between the main and upper deck, which eliminates some aspects of Special Conditions 25-61-NW-1 and 25-71-NW-3 as described below. For Special Condition 25-61-NW-1, all aspects related to occupant egress and escape provisions noted in this special condition are also addressed in Special Condition 25-71-NW-3. Special Condition 25-71-NW-3 remains part of the certification basis for the 747-400 Series operating in the 747-400 SF configuration, with the following noted exceptions:

1. The requirements of Special Condition numbered 25-71-NW-3, 3(a)(1) through 3(a)(7) do not apply to airplanes in the 747-400 SF configuration.
2. The requirements of Special Condition numbered 25-71-NW-3, 4(a) and 4(b) do not apply to airplanes in the 747-400 SF configuration.

Exemptions From 14 CFR Part 25:

All exemptions from 14 CFR Part 25 listed in TCDS A20WE for the 747-400 Series apply to the 747-400 SF configuration.

Partial Exemption from 14 CFR 25.785(j), 25.807(c), 25.857(e), 25.1447(c) – Allowance for up to 20 persons to occupy the upper deck cabin and in-flight access to Class E Cargo compartments with limitations listed in the exemption of the 747-400 SF without a flight attendant. (Exemption No. 8590, dated July, 25 2005, No. 8590A, dated May 1, 2008, and No. 8590B, dated December 1, 2008)

Equivalent Safety Findings: All existing Equivalent Safety Findings listed in TCDS A20WE for the 747-400 Series apply to the 747-400 operated in the 747-400 SF configuration.
ELOS AT8167SE-T-ES-1, section 25.857(c)(1), was granted on 12/06/2005, Inadvertent Smoke Detection in the Forward and Aft Lower Lobe Class C Cargo Compartments from a Smoke Source in a Main Deck Class E Compartment.

TCDS Notes: All Notes in TCDS A20WE that apply to the 747-400 Series also apply to an airplane operated in the 747-400 SF configuration.

Note 14, as applicable to the 747-400F Series, is also applicable to the 747-400 Series operated in the 747-400 SF configuration.

Optional Requirements: All optional requirements in TCDS A20WE that apply to the 747-400 Series also apply to an airplane operated in the 747-400 SF configuration.

XIV. 747-400 Large Cargo Freighter (LCF) Major Design Change

A 747-400 LCF is a 747-400 Series passenger airplane that has been modified in accordance with FAA-approved Boeing Service Bulletin 747-00-2084 to operate in a freighter configuration. These aircraft remain 747-400 Series aircraft for documentation purposes on this TCDS and with regard to the applicability of airworthiness directives. Because of the magnitude of this design change, the certification basis for the changed aspects was required to be established and documented in accordance with section 21.101 (Changed Product Rule). All general information in TCDS A20WE for the 747-400 Series remains applicable to an airplane operating in the 747-400 LCF configuration, with the following exceptions:

Maximum Passengers: Maximum of four (4) persons including the flight crew, per exemption 8769C and limitations outlined in the FAA approved Airplane Flight Manual.

Minimum Crew: Two (2) persons: pilot and copilot

FAA Approved Weight and Balance Control and Loading Manual: D043U545-BHC1

FAA Approved Airplane Flight Manual: D6U10001.4J61

Maximum Operating Altitude: 43,100 feet

Service Information: Boeing Report D634U105, "Structural Repair Manual," is FAA-approved. Service Bulletins and other Service Information, when FAA-approved, will carry a statement to that effect.

Certification Maintenance Requirements (CMR's):

The CMR's are listed in the FAA-approved Section 9 of Boeing Maintenance Planning Data Document D621U400-9 or the applicable engine Type Certificate Data Sheet. The more restrictive requirement from these two documents shall be in force.

Allowable Cargo: These airplanes are not approved for commercial freight hauling operations of material other than that approved per Exemptions 8769, 8769A and 8769B. Only cargo that supports Boeing corporate lines of business is allowed for carriage. All items intended for carriage must conform to the standards found in Document D926U013-44, "747-400 LCF Flammability Acceptance Criteria for Cargo Carriage," or be accepted by the FAA once a safe method of transport has been established. A summary of all items allowed for carriage is identified in Document D451U742-01, "Allowable Cargo – 747-400 Large Cargo Freighter." Document D451U742-01 is considered part of the Weight and Balance Manual/Airplane Flight Manual. In addition, a listing of the FAA-approved shipping mechanical equipment (SME) fixtures that are approved for installation on the 747-400 LCF aircraft are contained in the Weight and Balance Control and Loading Manual (Document D043U545-BHC1).

<u>Model</u>	<u>Eligible Serial Numbers</u>
747-409	24309 (RT631) 24310 (RT632)
747-4H6	27042 (RT743)
747-4J6	25879 (RT876)

The conversion to the 747-400 LCF configuration entails the following product level changes:

1. Passenger to Freighter change (significant product level change, per AC 21.101-1) and,
2. Reconfiguration of the interior commodities within the pressurized portion of the aircraft (not a significant change, per AC 21.101-1)

1. Significant Product Level Change - Passenger to Freighter Conversion:

Certification basis: Part 36: unchanged from 747-400 Series

SFAR 27: unchanged from 747-400 Series

XIV. 747-400 LCF Major Design Change (cont'd)

Part 25 of the FAR, effective February 1, 1965, as amended by Amendments 25-1 through 25-112 and 25.783 as amended by 25-114 (for the swing tail only) with the following exceptions per section 21.101(b):

<u>Section No.</u>	<u>Title</u>	<u>At Amdt 25-</u>
25.103	Performance- Stalling Speed	0
25.107(b)-(f)	Takeoff Speeds	38
25.121	Climb (One Engine Inoperative)	84
25.125	Landing	84
25.143(f)	Controllability and Maneuverability: General	42 (i.e. not part of certification basis)
25.201(d)	Stall Demonstration	42
25.251(e)	Vibraton and Buffeting	22 (i.e. not part of certification basis)
25.305	Strength & Deformation	22
25.335	Design Airspeeds	23
25.365	Pressurized Compartment Loads	53
25.427	Unsymmetrical Loads	23
25.473	Ground Load Conditions and Assumptions	23
25.479	Level Landing Conditions	23
25.481	Tail-down Landing Conditions	0
25.483	One-wheel Landing Conditions	0
25.485	Side Load Conditions	0
25.491	Takeoff Run	0
25.493	Braked Roll Conditions	23
25.499	Nose-wheel Yaw	46
25.519	Jacking and Tie-Down Provisions	0 (i.e. not part of certification basis)
25.571	Damage-tolerance and Fatigue Evaluation Of Structure	0 (except as modified by Note 15)
25.629	Aeroelastic Stability Requirements	46
25.831	Ventilation	41
25.841	Pressurized Cabin	38
25.1587	Performance Information	105

Voluntary compliance with later requirements has been demonstrated as follows:

<u>Section No.</u>	<u>Title</u>	<u>At Amdt 25-</u>
25.733(e)	Tires	78
25.773(b),(c)	Pilot Compartment View (ECS System)	72
25.820	Lavatory Doors	114
25.1438	Pressurization and pneumatic systems (new ducting)	41

Changed Areas:

The following is a high level description of changes incorporated as part of the passenger to LCF conversion:

- Installed new crown structure to increase the fuselage cross section,
- Installed a new pressure bulkhead immediately aft of the flight deck,
- Installed a swing tail cargo door in conjunction with a 10 foot fuselage extension,
- Installed a 5 foot vertical stabilizer extension,
- Installed strengthened floor beams,
- Installed an electronic flight bag (EFB) based system to interface with a cargo camera monitoring system,
- Revised cargo ventilation system,
- Winglets removed.

The certification basis for areas not affected by the change and for secondary changes is the original certification basis for the Model 747-400 shown on TCDS A20WE

2. Product Level Change - Reconfiguration of the interior commodities within the pressurized portion of the aircraft:

Certification basis:

The certification basis for the changed aspects associated with the reconfiguration of the interior commodities within the pressurized portion of the aircraft is unchanged from the 747-400 Series.

XIV. 747-400 LCF Major Design Change (cont'd)

14 CFR part 26:

Based on 14 CFR § 21.101(g) for changes to TC's, applicable provisions of 14 CFR part 26 are included in the certification basis. For any future 14 CFR part 26 amendments, the holder of this TC must demonstrate compliance with the applicable sections.

Compliance has been found for the following regulations at Amendment 26-0: §26.11

Compliance has been found for the following regulations at Amendment 26-1: §26.49

Compliance has been found for the following regulations at Amendment 26-4: §26.43, §26.45

Compliance has been found for the following regulations at Amendment 26-6: §26.21

Special Conditions: Special conditions that are part of the certification basis for the 747-400 Series apply to the airplane operating in the 747-400 LCF configuration, unless otherwise noted below:

Special Condition 25-ANM-16 (use of an overhead crew rest area, occupancy not to exceed ten crewmembers) does not apply to aircraft operated in the 747-400 LCF configuration.

Special Conditions 25-61-NW-1 (occupancy not to exceed 32 passengers on the upper deck – spiral staircase) and 25-71-NW-3 (occupancy not to exceed 45 (or later, 110) passengers on the upper deck of airplanes with a straight segmented stairway) do not apply to aircraft operated in the 747-400 LCF configuration

Exemptions from 14 CFR Part 25:

All exemptions from 747-400 series aircraft apply to the 747-400 LCF configuration

Exemption from 14 CFR 25.855(b), 25.855(h)(2), 25.857(e)(2), 25.857(e)(3) - provide relief from the requirements to provide a complete cargo compartment liner, conduct flight tests to show compliance to smoke penetration requirements, provide a smoke detection system within the main deck and lower-lobe cargo compartment and provide a means to shut off the ventilating airflow to, or within, the main deck and lower-lobe cargo compartment; (Exemption No. 8769, dated 8/18/2006, No. 8769A, dated 1/29/2007, and No. 8769B, dated 9/12/2012)

Exemption from 14 CFR 25.791(a)(b), 25.807(b), (c)(1), (c)(5), (c)(6), 25.809(f)(1), 25.813(f), 25.857(e), 25.1447(c)(1)- provide relief to allow carriage of two non-crewmembers (commonly referred to as supernumeraries) other than flight crew to occupy the observer seats located within the flight deck of the 747-400 LCF. (Exemption No. 8769C, dated 5/29/2013)

Equivalent Safety Findings: All existing Equivalent Safety Findings listed in TCDS A20WE for the 747-400 Series apply to the 747-400 operated in the 747-400 LCF configuration, except those listed below:

- Section 25.815, Width of Aisle, does not apply
- Section 25.1203, Fire-Detection System, does not apply
- Section 25.1103(d), Pressure Relief, does not apply

The following Equivalent Safety Findings are specific to the 747-400 LCF and documented in the following memorandums:

- Section 25.1435(b)(1), Hydraulic system test pressure, granted 10/11/2006 (Documented in Transport Airplane Directorate ELOS memo AT8613SE-T-S-1)
- Section 25.783(f), Visual Indication of Swing Tail Door Closed, Latched and Locked Condition, granted 05/24/2007 (Documented in Transport Airplane Directorate ELOS memo PS05-0023-C-1)
- Section 25.783(f), Visual Inspection Camera System, granted 05/24/2007 (Documented in Transport Airplane Directorate ELOS memo PS05-0023-C-2)
- Section 25.729(e), Landing Gear Configuration Warning System, granted 05/29/2007 (Documented in Transport Airplane Directorate ELOS memo PS05-0023-S-2)

TCDS Notes: All Notes in TCDS A20WE that apply to the 747-400 Series also apply to an airplane operated in the 747-400 LCF configuration.

Optional Requirements: All optional requirements in TCDS A20WE that apply to the 747-400 Series also apply to an airplane operated in the 747-400 LCF configuration.

Data pertinent for Fuel Tank Flammability Reduction System Installed on Model 747-400, -400D, and -400F SERIES

A flammability reduction system (FRS) may be installed as an option in new airplane production, or as a modification in accordance with an FAA-approved Boeing service bulletin. Airworthiness limitations for the FRS are contained in section 9 of the applicable Maintenance Planning Data document for each airplane model incorporating the FRS.

DATA PERTINENT TO ALL MODEL 747-400 SERIES:

Certification Basis: Amendment 25-102, section 25.981 transmitted to The Boeing Company dated August 24, 2005.

Special Conditions No. 25.285-SC for the certification and operation requirements of the flammability reduction means (fuel tank inerting).

Engine Models	PW4056	PW4062A	CF6-80C2B1F	RB211-524G, RB211-524G2, RB211-524G3	RB211-524H, RB211-524H2
<u>Thrust Limits:</u>					
Takeoff, Sea Level, Standard Day (5 minutes)	56,750 lbs.	62,000 lbs.	57,160 lbs.	56,870 lbs.	59,450 lbs.
Maximum Continuous	47,970 lbs.	47,970 lbs.	49,800 lbs.	47,230 lbs.	47,230 lbs.

THE FOLLOWING INFORMATION AND NOTES APPLY TO ALL MODELS PRIOR TO MODEL 747-8 SERIES UNLESS OTHERWISE NOTED:

Exemptions to 14 CFR part 25:

1. Exemption from 14 CFR 25.1301(a), 25.1303(b), and 21.601 (formerly 37.120(a)) - To permit the type certification of Boeing Model 747 aircraft with: (1) location of the flap position indicator in the lower left-hand corner of the pilot's center instrument panel and (2) servo altimeters configured with dial markings at 50-foot increments. This exemption is subject to the following conditions: (1) It is valid only for foreign air carriers only. (2) Boeing must provide a list of all operators and aircraft operated under this exemption to be maintained in the public docket for this exemption. Boeing must update the list whenever a change is made. (Exemption No. 3035, September 9, 1980, No. 3035A, September 7, 1983, No 3035B, August 6, 1986, No. 3035C, January 23, 1987, No. 3035D, June 2, 1987, No. 3035E, September 4, 1987, No. 3035F, April 19, 1988.)
2. Exemption from 14 CFR 25.471(b) - Allowance for lateral displacement of the C.G. from the airplane centerline (Exemption No. 1013A dated December 24, 1969)
3. Partial Time-Limited Exemption from 14 CFR §25.853(a), appendix F, paragraph (a)(1)(i), Testing on Large Interior Panels, granted through November 28, 2011. (Exemption No. 9791, November 28, 2008, Exemption No. 9791B, March 1, 2010, Exemption No. 9791C, February 4, 2011)

Equivalent Safety Findings: PS08-0670-C-1 § 25.853(a) for Adhesives Used in Interior Panel Joint Potting Applications.

NOTES APPLY TO ALL MODELS PRIOR TO MODEL 747-8 SERIES UNLESS OTHERWISE SPECIFIED

- NOTE 1. A current Weight and Balance Manual including a list of equipment included in the certificated empty weight and loading instructions must be in each aircraft at the time of original airworthiness certification and at all times thereafter except in the case of an operator having an approved weight control system.
- NOTE 2. Airplane operation must be in accordance with the FAA Approved Airplane Flight Manual. All placards required by either the FAA Approved Airplane Flight Manual, the applicable operating rules or the certification basis must be installed in the airplane.
- NOTE 3. The following fuels are eligible for Pratt and Whitney engines: JP-1, JP-4, and JP-5 fuels conforming to the P&WA Specification No. 522E or later revision may be used separately or mixed in any proportion without adversely affecting the engine operation or power output. No fuel control adjustment is required when switching fuel types.
- G.E. engines use fuels conforming to G.E. Spec. D50TF2. MIL-T-5624, Grades JP-4 or JP-5, and ASTM D1655, Jet A, Jet A1, and Jet 8 are consistent with G.E. Specifications. [JP-8 is also approved for use in CF6-80C2 Series engines.] CF6-80C2 series engines incorporating Dribble Flow Fuel Nozzles PN 9331M72P33, P34 and P41 are prohibited from the use of JP-4 and Jet B (wide cut) fuel.

The following fuels are eligible for Rolls Royce RB211-524 Series engines:

Grade (Type)	Specification
Kerosene,(Type)	D. Eng. R.D. 2453
(AVTUR:JP-1)	D. Eng. R.E. 2494
	A.S.T.M. D1655 Jet A
	A.S.T.M. D1655 Jet A-1
	3-GP-23
	I.A.T.A. Kerosene Type

NOTES APPLY TO ALL MODELS PRIOR TO MODEL 747-8 SERIES UNLESS OTHERWISE SPECIFIED**(cont'd):**

Wide Cut Fuels D. Eng. R.D. 2454
 (AVTAG:JP-4) D. Eng. R.D. 2486
 A.S.T.M. D1655 Jet B Type
 3-GP-22
 MIL-T-5624 JP-4 Grade
 I.A.T.A. Wide Cut
 RB211-524G/H-T series engines are prohibited from the use
 Of JP-4 and Jet B (wide cut) fuel

High Flash Point D.Eng. R.D. 2498

(AVCAT:JP-5) 3-GP-24
 MIL-T-5624 JP-5 Grade 13

Optional Additives (Applies to all engines)

The only optional additives that may be used in approved fuel are as follows:

- (1) Anti-static additive - Shell ASA3 in concentrations not exceeding 1.0 parts per million (grams per cubic meter).
- (2) Anti-icing additive - Specification D. Eng. R.D. 2451 (Issue 2) or MIL/1/27686E in concentrations not exceeding 0.15 percent by volume.
- (3) Anti-Corrosion/lubricity additive - HITEC E515 may be used (formerly Santolene C) at a concentration range up to 5 lb. per 35,000 Imperial gallons, which gives a phosphorus content in the order of 0.07 parts per million.
- (4) Anti-microbiological additive - Biobor JF may be used on an intermittent or not-continuous basis at a concentration level not exceeding 270 parts per million (20 ppm Boron). It is permitted to burn off the treated fuel provided the concentration does not exceed 270 ppm, and the fuel is not contaminated by microbial debris.
- (5) Corrosion inhibitor additive:
 - (a) TOLAD 245 - in concentrations not exceeding 12 lb. per 35,000 Imperial gallons (approximately 35 mg/L).
 - (b) APOLLO PRI 19 - in concentrations not exceeding 8 lb. per 35,000 Imperial gallons (approximately 23 mg/L).
 - (c) EMERY 9855 - in concentrations not exceeding 12 lb. per 35,000 Imperial gallons (approximately 35 mg/L).

Fuel load and usage limitations are contained in the FAA Approved Airplane Flight Manual applicable to each operator.

The following oils are eligible for the engines:

- Pratt & Whitney: Synthetic type conforming to P&WA 521 as revised.
 P&WA Turbojet Engine
 Service Bulletin No. 238 lists approved brand oils.
- General Electric: G.E. engines use synthetic type oil conforming to G.E. Spec. D50TF1, classes A and B. G.E.
 Service Bulletin 79-1 lists approved oil brands.
- Rolls Royce: RB211 engines use ESSO Turbo Oil 25 or Aero Shell Turbine Oil 555. Castrol 580 gas turbine oil II and these oils reclaimed to Rolls Royce standards.

NOTE 4. LIFE LIMITED PARTS AND INSPECTION REQUIREMENTS:**Nose Landing Gear:**

The nose landing gear is life-limited to 50,430 landings. This service life may be corrected to flight hours based on service route segments average times and must be approved by the FAA.

Refueling Spoiler:

Inflight refueling spoiler P/N 65B20238 is limited to 20,000 inflight operations.

Escape System:

Escape system cool gas generator cartridges manufactured by Olin Corporation and stored either in their original (unopened) shipping canisters or in a cool gas generator between +10°F and +90°F for up to 6 years from date of manufacture are considered serviceable. Cartridges stored for more than 6 years must not be put into service. Inservice cartridge life is limited to 3 years.

NOTES APPLY TO ALL MODELS PRIOR TO MODEL 747-8 SERIES UNLESS OTHERWISE SPECIFIED**(cont'd):**

Escape system cool gas generator cartridges manufactured by Talley Industries (Ref. Boeing Service Bulletin 747-25-2448) have a storage limit of 7 years from the date of manufacture. Cartridges stored for more than 7 years must not be put in service. Inservice cartridge life is limited to 3 years.

Escape system off-wing slide door and latch thruster (six each per airplane) must be replaced after 15 firings. In addition, the housing bore must be replaced if the bore is 0.002 inches more than the maximum drawing tolerance. Thruster cartridges must be replaced before 5 years calendar time after date of manufacture.

Number 3 and 4 Flap Track Fairings:

The following parts on numbers 3 and 4 flap track fairings are life limited when operated with an RB211 engine in the spare engine position.

152-Hour Life Limit

Outboard Vertical Rod - Rod Ends - 69B14163
 Drive Rod Attach Fittings to the Mid-Flap - 65B39035-1
 Box Links - 65B15598, 65B15599, 65B15598-1-3 and 65B15599-1-3-5
 Seal Support Channels - 65B15544 and 65B15666
 Drive Rod Tubes - 65B15929, 65B15929-3 and 65B15929-8
 Outboard Vertical Rod Tubes - 69B13761-2
 Inboard Vertical Rod Tubes - 69B13762-2

300-Hour Life Limit

Inboard Vertical Rod - Rod Ends - 69B14163-1
 Drive Truss Fittings - 65B17002-1 and 65B17003-1

600-Hour Life Limit

Lateral Rod Tubes - 69B13750-5 and 69B13750-6

1200-Hour Life Limit

Outboard Vertical Rod Brackets - 69B13755-2 and 69B13758-1
 Lateral Rod Brackets - 69B13758-2 and 69B13759-2

747-400F Nacelle Strut Spring Beam Assemblies:

The following spring beam assemblies are life limited to 50,000 landings.

<u>Engine Installation</u>	<u>Engine Position</u>	<u>Part Number</u>
GE CF6-80C2 Series	1	311U0050-46 and -48
	4	311U0050-42 and -44
RR RB211-524G/H Series	1	321U0496-11 and -12
	4	65B89727-27 and -28
PW 4000 Series	1	311U0050-46 and -48
	4	311U0050-50 and -52

Engine Pylon - Required Inspections:

All outboard engine pylons incorporating the strut beams with spherical bearings must be inspected for bearing seizure every 6,000 flight hours on all models except for the 747-400 airplane. The inspection interval shall not exceed 12,500 hours for the 747-400 airplane. Inspection procedures specified in Boeing Maintenance Planning Document D6-13747, or D621U400 for the 747-400 airplane, or equivalent are acceptable.

NOTE 5.

The Pratt and Whitney JT9D-3 and JT9D-3A engines and the JT9D-3A, JT9D-7, JT9D-7A, JT9D-7F, JT9D-7Q, JT9D-7Q3, JT9D-7R4G2, and JT9D-7J engines may be intermixed in the combinations and with the appropriate limitations noted in the FAA Approved Airplane Flight Manual.

The Pratt and Whitney JT9D-7H engines may be intermixed with all JT9D-7 engines with appropriate limitations noted in the FAA Approved Airplane Flight Manual.

The Pratt and Whitney JT9D-7AH engines may be intermixed will all JT9D-7A engines with appropriate limitations noted in the FAA Approved Airplane Flight Manual.

NOTES APPLY TO ALL MODELS PRIOR TO MODEL 747-8 SERIES UNLESS OTHERWISE SPECIFIED (cont'd):

The General Electric CF6-50C engines may be intermixed with CF6-50E engines with appropriate limitations noted in the FAA Approved Airplane Flight Manual.

The Rolls Royce RB211-524B2-19, RB211-524C2-19, and RB211-524D4-19, and RB211-524D4-39 engines may be intermixed with the appropriate limitations noted in the FAA Approved Airplane Flight Manual.

The Rolls Royce RB211-524D4X-19 and RB211-524D4X-B-19 engines may be intermixed with RB211-524D4-19 and RB211-524D4-39 engines with the appropriate limitations noted in the FAA Approved Airplane Flight Manual.

The Rolls Royce RB211-524D4-B-19 and RB211-524D4-B-39 engines may be intermixed with RB211-524D4-19 and RB211-524D4-B-39 engines with the appropriate limitations noted in the FAA Approved Airplane Flight Manual.

The Rolls-Royce RB211-524B2-B-19 engines may be intermixed with RB211-524B2-19 engines, and RB211-524C2-B-19 engines may be intermixed with RB211-524C2-19 engines with the appropriate limitations noted in the FAA Approved Airplane Flight Manual.

The Rolls-Royce RB211-524G2-19, RB211-524G3-19, and RB211-524H2-19 engines may be intermixed in the combinations and with the appropriate limitations noted in the FAA Approved Airplane Flight Manual.

The Rolls-Royce RB211-524G2-T-19, RB211-524G3-T-19, and RB211-524H2-T-19 engines may be intermixed in the combinations and with the appropriate limitations noted in the FAA-Approved Airplane Flight Manual.

The Rolls-Royce RB211-524G2-T-19, RB211-524G3-T-19, and RB311-524H2-T-19 engines may be intermixed with RB524G2-19, RB211-534G3-19 and RB211-524H2-19 in the combinations and with the appropriate limitations noted in the FAA-Approved Airplane Flight Manual.

- NOTE 6. Blow-in door and fixed lip nacelles may be intermixed in the combinations and the appropriate limitations noted in the FAA Approved Airplane Flight Manual and in the appropriate Appendix of the Airplane Flight Manual.
- NOTE 7. The 747-100B series airplanes are basically 747SR series airplanes.
- NOTE 8. There are service bulletins which call for modifications which do not comply with the Type Certification Basis. These service bulletins are listed in Boeing Document D6-30300 titled "Service Bulletin 747". The records of airplanes imported into the USA should be reviewed to be sure that further modifications are accomplished to ensure compliance, if the non FAA-approved service bulletins modifications have been installed.
- NOTE 9. On certain 747-300 and 747-400 airplanes, the Upper deck exits are rated as a Type "I" due only to the interior arrangement. Requirements for the rerating of the exit are located in FAA Letter ANM-120S:RSY, dated August 1, 1989. The passenger capacity of these airplanes is the same as for the 747-200B (550 total passengers with up to 45 on the upper deck.)
Also on certain 747-400 airplanes, Door No. 3 is rated as a Type "I" due only to the interior arrangement. Requirements for the rerating of the exit are located in FAA Letter ANM-120S:JG dated December 21, 1988. The passenger capacity is limited to 485 total with up to 45 on the upper deck when the upper deck is also rated as Type "I". With the upper deck rated as a Type "A" the passenger capacity is 595 total (485 main deck plus 110 on the upper deck).
- NOTE 10. Airplanes line number 679, 685, 696, 700, 705, 708, 710, and on were manufactured after August 20, 1988, and Airplane line numbers 804 and subsequent were manufactured after August 20, 1990, (Reference FAR 121.312(a)(1) Amendment 121-198). Airplane line numbers 805 through 814 are exempt (Exemption No. 5176A). See Boeing Document D6-30300 titled "Service Bulletin 747" for cross reference of line number to serial number to block number.
- NOTE 11. Message Category Definitions
1. Warning: Defined as an operational or aircraft system condition which may require immediate corrective or compensatory action by the crew.
 2. Cautions: An operational or aircraft system condition which requires immediate crew awareness and prompt compensatory action.
 3. Advisories: An operational or aircraft system condition which requires crew awareness for possible future compensatory action.
 4. Memo: Crew reminders of the current state of selected normal conditions.

NOTES APPLY TO ALL MODELS PRIOR TO MODEL 747-8 SERIES UNLESS OTHERWISE SPECIFIED**(cont'd)**

5. Status: Indications of airplane's condition for dispatch.
6. FMC Alerts: Associated with advisories - FMC related operational conditions which require crew awareness for possible future compensatory action.
7. CMC Messages: Detailed (maintenance level) messages related to airplane faults.

NOTE 12. MESSAGE, OPERATION, ACTION AND RESPONSIBILITY:

Message	Responsibility	Phase of Operation	How Quickly is: Awareness Req'd	How Quickly is: Action Req'd
WARNING	PILOTS	ALL	IMMEDIATE	IMMEDIATE
CAUTIONS	PILOTS	ALL	IMMEDIATE	PROMPT
ADVISORIES	PILOTS	ALL	TIMELY	TIMELY*
STATUS	GROUND CREW AND PILOTS	DISPATCH	DISPATCH	BEFORE DISPATCH, DEPENDS ON MMEL
FMC ALERTS	PILOTS	ALL WHEN USING FMCs	TIMELY	TIMELY (if required)
FMC ADVISORIES	PILOTS	ALL WHEN USING FMCs	TIMELY	TIMELY (if required)
CMC	GROUND CREW & MAINTENANCE	DISPATCH PREPARATION & CHECKS	WHEN REQ'D BY CMR OR MAINTENANCE	CMR OR SCHEDULE A MAINTENANCE

*Depends on other failures, phase of flight or context of operation of airplane.

NOTE 13. The Boeing 747 Supplemental Structural Inspection Document D6-35022 (See AD 84-21-02, Amendment 39-4936) is applicable.

NOTE 14. The class E cargo compartment on the 747-400F is required to be fitted with a full fire resistant liner which meets the requirement of Part 25 Appendix F, Part III at Amendment 25-60. This requirement is documented in Issue Paper SE-1, Stage 4, dated October 14, 1993, titled Protection of Critical Systems and Equipment within Class E Cargo Compartments.

NOTE 15. Boeing production line numbers 1047 and on have incorporated the 747 strut modification program in the production sequence. The certification basis for the strut-to-wing attachment structure complies with the following FAR's at the upgraded amendment levels listed below:

FAR(s)	Subject	Amendment Level
25.301, 25.303, 25.307	General Structure	78
25.305	Strength and Deformation	54
25.321 through 25.563	Load Conditions	78
25.571	Damage Tolerance	45
25.581 through 25.625	Design and Construction	78
25.629	Aerodynamic Stability	78

Boeing Production Line Numbers 1 through 1046 have incorporated the 747 strut modification program by means of Airworthiness Directive (AD) compliance. The certification basis of this modification is as listed above. The AD's are as follows: 95-13-07 (CF6-45/-50 & JT9D-70; AD 95-13-06 (PW4000 & CF6-80C2); AD 95-13-05 (RB211); and AD 95-10-16 (JT9D-3, -7).

NOTE 16. The Rolls-Royce Model RB211-524B-19 is removed as an eligible engine because it is removed from the Engine Type Certificate Data Sheet E12EU.

NOTE 17: For Model 747-100, -200B, -200F, -200C, SR, SP, -100B, -300, and -100B SUD series airplanes: Mandatory replacement times, inspection intervals, related inspection procedures and all critical design configuration control limitation for the fuel tank system determined during the Special Federal Aviation Regulation No. 88 program and for compliance with 14 CFR 25.981 are listed in the FAA-approved Airworthiness Limitations document, Boeing 747-100/200/300/SP Airworthiness Limitations and Certification Maintenance Requirements, Document D6-13747-CMR, Revision March 2006 or later FAA-approved revision. The FAA has issued an airworthiness directive 2008-10-06 mandating compliance with Revision March 2006, or a later FAA-approved revision, applicable to all Model 747-100, -200B, -200F, -200C, SR, SP, -100B, -300, and -100B SUD series airplanes.

NOTES APPLY TO ALL MODELS PRIOR TO MODEL 747-8 SERIES UNLESS OTHERWISE SPECIFIED (cont'd)

NOTE 18: For Model 747-400, -400D, and -400F series airplanes: Mandatory replacement times, inspection intervals, related inspection procedures and all critical design configuration control limitation for the fuel tank system determined during the Special Federal Aviation Regulation No. 88 program and for compliance with 14 CFR 25.981 and Special Conditions No. 25.285-SC are listed in the FAA-approved Airworthiness Limitations and Certification Maintenance Requirement, Section 9, of Boeing 747-400 Maintenance Planning Data Document D621U400-9, Revision August 2005 or later FAA-approved revision. All Model 747-400, -400D, and -400F series airplanes, production line number 1377 and on, must comply with Revision March 2006, or a later FAA-approved revision. The FAA is planning to issue an airworthiness directive mandating compliance with Revision March 2006, or a later FAA-approved revision, applicable to all Model 747-400, -400D, and -400F series airplanes with production numbers lower than 1377

XV. Model 747-8F (Approved August 19, 2011) Transport Category

The 747-8F series is based on the model 747-400F series aircraft with design changes to the empennage, fuselage, landing gear, wings, engines, fuel systems, and other aircraft systems as defined in the certification basis within this section. The certification basis for areas unaffected by this change from the 747-400F series aircraft will remain certified at the 14 CFR Part 25 Amendment level of their original certification date.

Engines: 4 General Electric Turbofan Engines Model: GENx-2B67, GENx-2B67B, GENx-2B67/P (Engine Type Certificate No. E00078NE)

WARNING: To prevent unsafe airplane handling characteristics, electronic engine control (EEC) software C060 (or newer) cannot be intermixed on the same aircraft with older EEC software: C032, C040, or C045. The idle selection logic is different in GE C060 software compared to older versions of EEC software. This difference can potentially provide large unsafe thrust asymmetries during acceleration from lower power if C060 EEC software is mixed with older EEC software (i.e. one or more engine at a high idle, while the rest are at minimum idle. The engines at high idle will respond much quicker if there is a rapid throttle advance). See Boeing Service Bulletin 747-73A2083

SEE Note 4 (after Section XVI) Applicable to Model 747-8F and 747-8 regarding intermixing of Engines

Fuel: General Electric Turbofan Engines

Fuels conforming to:

ASTM D-1655 grades Jet-A and Jet A-1

MIL-T-5624 grade JP-5

MIL-T-83133 grade JP-8

are acceptable

Fuels produced to other specifications and having properties meeting the requirements of the above specifications are acceptable.

The fuel and any fuel additives must conform to the relevant Engine Operating Instructions.

Engine Limits: General Electric Turbofan Engines

See the FAA approved Airplane Flight Manual for engine ratings.

Airspeed Limits: VMO/MMO = 365/0.9 (KCAS) See the appropriate FAA Approved Airplane Flight Manual for other airspeed limits

C.G. Range: See the appropriate FAA Approved Airplane Flight Manual

Empty Weight C.G.: See the appropriate FAA Approved Airplane Flight Manual

Datum: See Weights and Balance Manual

Leveling Means: See FAA Approved Airplane Flight Manual

Maximum Weights: See the appropriate FAA approved Airplane Flight Manual

Minimum Crew: Two (2) persons: pilot and copilot

Number of Seats: Maximum of eight (8) persons including the flight crew per exemption 9793C and limitations outlined in the FAA approved Airplane Flight Manual

Maximum Compartment Weights: See the appropriate Weight and Balance Control Manual

Fuel Capacity: See the appropriate Weight and Balance Control Manual

XV. Model 747-8F (cont'd)

\Oil Capacity: See the appropriate Weight and Balance Control Manual

Maximum Operating: 42,100

Altitude

Control Surface: To insure proper operation of the airplane, the movement of the various control surfaces must be carefully
Movements controlled by proper rigging of the flight control systems. The airplane must, therefore, be rigged according to the following FAA-approved data:

Boeing Drawing Numbers:

251U1001	Rigging Instructions	Lateral Controls
251U1003	Rigging Instructions	Speed Brakes
251U2001	Rigging Instructions	Elevator Controls
251U3002	Rigging Instructions	Rudder Controls
251U4001	Rigging Instructions	Stablizer Trim Controls
114U0001	Rigging Instructions	Leading Edge Slats Controls
253U5001	Rigging Instructions	Control Stand
256U5001	Rigging Instructions	Trailing Edge Flap Controls

Model

Eligible Serial Numbers

747-83QF	44937
747-867F	39238-39247, 43394, 43536, 43825
747-87UF	37561-37564, 37564-37572
747-8B5F	37654-37656
747-8HTF	37132, 37133
747-8HVF	37581, 37668-37670, 37580
747-8KZF	36136- 36139, 37393, 37394
747-8R7F	35806-35812, 35821, 35822, 38077, 38078

Certification Basis:

A. The certification basis of the 747-8F is 14 CFR part 25, as amended by Amendment 25-1 through Amendment 25-120 with exceptions permitted by 14 CFR 21.101. Section A documents the changed/affected areas of the aircraft. Section B documents all regulations for which there are exceptions from Amendment 25-120 for the changed/affected areas. Section C documents unchanged/unaffected areas for which compliance has been shown at an Amendment level higher than the 747-400F Amendment level.

Section A	
The following section contains a listing of all areas that are changed/affected as part of the 747-8F minor model.	
Airplane Area	Changed/Affected Areas
Airplane Level	Static Loads; Dynamic Flight Loads; Dynamic Ground Loads; Flutter
	Flotation and ditching
	Weight and balance; Onboard weight and balance system
	Aerodynamic Stability & Control; Aerodynamic Performace; Aerodynamic Configurations
Airframe – Empennage	All empennage (includes the outboard elevator balance weight towers) except: <ul style="list-style-type: none"> • Inboard elevator; Remainder of outboard elevator

XV. Model 747-8F (cont'd)

Section A (continued)	
The following section contains a listing of all areas that are changed/affected as part of the 747-8F minor model.	
Airplane Area	Changed/Affected Areas
Airframe – Fuselage	<p>All fuselage (includes all fuselage, floors, doors, and windows) except:</p> <ul style="list-style-type: none"> •nose cargo door cutout including latches and hinges •upper deck structure from S-0 to S-13, BS 220 to BS 300 •crown skin/stringer from S-0 to S-6, BS 300-520 •upper deck side of body shear trusses •flight deck floor beams from BS 220-300 •structural support for flight deck windshields •all upper deck seat tracks, floor panels, decompression trusses, and side of body shear panels from BS 520-700 •BS 2360 aft pressure dome and APU tail cone •Nose radome and nose landing gear doors •Nose cargo door, main entry door, crew door (and integrated window) •flight deck overhead exit door, and forward and center electrical equipment access doors.
Avionics	<p>Pitot static line plumbing</p> <p>Integrated Display System (IDS)</p> <p>Modularized Avionics and Warning Electronics Assembly (MAWEA)</p> <p>Flight Management Computer (FMC)</p> <p>Communication Management Unit (CMU)</p> <p>Enhanced Ground Proximity Warning System (EGPWS)</p> <p>Central Maintenance Computer System (CMCS)</p> <p>Airplane Condition and Monitoring System (Data Management Unit (DMU) and Quick Access Recorder (QAR))</p> <p>Low Range Radio Altimeter (LRRRA)</p> <p>Multi-Mode Receiver (MMR)</p> <p>Distance Measuring Equipment (DME)</p> <p>Automatic Direction Finder (ADF)</p> <p>VHF Omnidirectional Range/Marker Beacon (VOR/MB)</p> <p>Air Data Inertial Reference System (ADIRS)</p> <p>SATCOM</p> <p>Cockpit Voice Recorder (CVR)</p> <p>Flight Deck (FD) Printer</p> <p>Flight Data Recorder Systems (FDRS)</p> <p>Onboard Network System (ONS)</p> <p>Terminal Wireless Lan Unit (TWLU)</p> <p>Emergency Locator Transmitter (ELT)</p> <p>HF/VHF Radio Communication Panel</p> <p>Main Deck Alerting System (MDAS)</p> <p>Traffic Alert and Collision Avoidance System (TCAS) and Air Traffic Control (ATC) Systems</p> <p>Flight Deck Audio System (Audio Management Unit (AMU) and Audio Control Panels (ACP))</p>
Cargo	<p>Provisions including structural, electrical & drain for Cargo Handling System for Main Deck and Lower Lobe Compartments</p> <p>Cargo Furnishings, Linings and Placards</p>

XV. Model 747-8F (cont'd)

Section A (continued)	
The following section contains a listing of all areas that are changed/affected as part of the 747-8F minor model.	
Airplane Area	Changed/Affected Areas
Electrical Sub-systems	Duct Leak Detection System (DLDS)
	Integrated Wingtip Light Assembly (IWLA)
	Integrated Drive Generator (IDG)
	Main and APU battery
	Weight and Balance Computer of the On-Board Weight and Balance System
	Dimmer control unit (DCU)
	Electrical Power Generation System
	Cargo Powered Outlets
	Window Heat Control Unit (WHCU) and flight deck window sensors
	Service and maintenance lights in the wheel wells, AC pack bay, Tailcone/APU compartment and forward EE bay
Electrical Wiring and Installation	Fuselage, Wing, Strut, Wheel Well, E/E Cooling, Cargo Handling, FQIS, and Engine Wiring
	Wing Fuel Tank Stringer clip
	Integration panels
Environmental Systems	Main Deck and Lower Lobe Cargo Fire Protection System
	Forward Cargo Air Conditioning (FCAC) System flow rate and ducting
	Aft Cargo Air Conditioning (ACAC) System flow rate and ducting
	APU air supply ducting
	Air conditioning and trim ducting.
	E6/E9 equipment cooling supply line
	Forward cargo heat ducting
	Aft/bulk cargo heat ducting
	Recirculation fans
	Lower recirculation filters
	Lav/Galley Vent System (LGVS) ducting
	Cabin Pressure Control System (CPCS)
	Alternate Ventilation System (AVS)
	Engine Anti-Ice Valves
	Air Supply Control System (ASCS)
	Wing Anti-Ice (WAI) System
	Hydraulic Air Drive Unit (ADU) air ducting in outboard engine struts
	Cabin Air Conditioning Temperature Control System (CACTCS)
Forward and aft electrical equipment (EE) cooling systems	

XV. Model 747-8F (cont'd)

Section A (continued)	
The following section contains a listing of all areas that are changed/affected as part of the 747-8F minor model.	
Airplane Area	Changed/Affected Areas
Flight Controls	Fly-by-Wire (FBW) spoiler and outboard aileron control system
	Inboard and outboard aileron droop
	Flight control mechanical component installations and flight control cables
	Upper and lower rudder actuator
	Autoflight software
	Integrated Standby Flight Display (ISFD)
	Rudder ratio changer
	Elevator feel computer
	Yaw damper control laws
	Yaw damper stabilizer trim modules (YSM)
	Pitch Augmentation Control System (PACS)
	Yaw Damper Modal Suppression System (MSS)
	Outboard Aileron Modal Suppression (OAMS)
	Roller brake assembly
	Lateral Augmented Pitch Function (LAPS)
	Landing Attitude Modifier (LAM)
Elevator Feel Shift (EFS)	
Rudder Input Linkages	
Flight Controls Stabilizer Trim Indication	
High Lift Systems	
Flight Crew Oxygen System	Fourth 115 cu. ft. crew oxygen cylinder provisions
Flight Deck	Forward instrument panel (FIP) structure
	Flight deck display interface
	Glareshield
	Pilot Compartment Viewing
	Ram Air Turbine (RAT) manual deploy switch
Flight Deck Crew Accommodations	Emergency equipment stowage, equipment and placarding
	Flight manual stowage retention straps
	Flight deck stowage door latches
	Portable oxygen bottle stowage provisions
	PC power outlets for Captain and First Officer
	Hand microphones at all 4 crew positions
	Provisions to support EFB installation
	Crew oxygen mask stowage boxes
	Crew oxygen masks
	Pencil holders
	Overhead light
	Carpet periphery
Boom microphone jack panels at all 4 crew positions	
Interiors	Thermal acoustic blankets.
	Fuselage mounted emergency light for inertia reel use at crew door.
	Customer specific exterior markings including door bands at the crew door.

XV. Model 747-8F (cont'd)

Section A (continued)	
The following section contains a listing of all areas that are changed/affected as part of the 747-8F minor model.	
Airplane Area	Changed/Affected Areas
Landing Gear Structures	Nose Landing Gear
	Body Landing Gear
	Wing Landing Gear
Mechanical and Hydraulic Systems	Landing gear alternate extend cables and brake cables
	Wheels, brakes, and tires.
	Brake system control unit
	Body and wing gear retract actuators
	Body and wing gear door actuators
	Ram Air Turbine (RAT) and associated equipt and engine driven pumps (EDPs), EDP hoses and EDP check valves
	Hydraulic system (except RAT and associated equipment and EDPs, EDP hoses, and EDP check valves)
	Tire Pressure Indication System and Brake Monitor System
	Ground Fault Interrupt
	Landing Gear Selection System

Propulsion	GENx-2B67, GENx-2B67B, GENx-2B67/P engines
	Engine Driven Hydraulic Pumps (EDP)
	Hydraulic tubing, hoses, and component installations on the engine
	Hydraulic tubing, hoses, and component installations in the aft engine strut
	APU, APU Controls and APU Installation
	Engine Controls
	Thrust Reverser Systems
Propulsion – Electrical Sub-systems	APU power feeder
Propulsion -Fuels	Jettison System
	Auxiliary Power Unit (APU) Feed System line, pumps and plumbing
	Reserve Tank Transfer System
	Fuel System Scavenge
	Fuel tank structure
	Fuel Feed System
	Fuel Vent System
	Fuel Management System
	Refuel/Defuel System
	Fuel Quantity Indicating System (FQIS) and fuel level sensing
	Fuel sump system drain valves
	Nitrogen Generation System (NGS)
Propulsion – Structures	Strut, nacelle, thrust reverser, inlet, exhaust, and systems

XV. Model 747-8F (cont'd)

Section A (continued)	
The following section contains a listing of all areas that are changed/affected as part of the 747-8F minor model.	
Airplane Area	Changed/Affected Areas
Supernumerary Area	Emergency Evacuation Harnesses
	Ceilings
	Closet
	Seats
	PSUs and general lighting
	Sidewall linings
	Partition between closet and RH sidewall
	Placarding
	Floor coverings
	Crew bunk mattresses
	Crew bunk area smoke penetration seals
	Ladder Enclosure to Upper Deck Supernumerary Area Smoke Penetration Seals
	Lavatory
	Galley
	Portable oxygen cylinders and full face masks for main deck cargo access
	Placarding in supernumerary area for main deck cargo access
Emergency equipment stowage, equipment and placarding	
Lighted Signs and Overhead emergency exit signs	
Supernumerary Oxygen System	Oxygen boxes
	Portable oxygen bottles
	Composite Cylinders
Waste/Water	Potable water pressurization system
	Potable water tank attachment flanges
	Potable water distribution lines
	Vacuum lavatory system
	Gray waste water drain system and service panel
Wing	Wing pylon structure
	All wing structure

XV. Model 747-8F (cont'd)

Section B			
The following section contains a listing of all regulations for which changed/affected areas of the aircraft comply with 14 CFR §25 at an Amendment level other than 25-120.			
14 CFR §	Title	Amdt Level For Changed/Affected Areas	Comments
25.305	Strength and deformation.	25-0 for 25.305(b) for Airframe - Empennage (Outboard Elevator Balance Weight Tower)	
25.365	Pressurized compartment loads.	25-0 for 25.365(e), (f), and (g) for Systems Stress related to: Flight Deck (Linings, stowages, and latches, oxygen mask stowage box) and Interiors - Supernumerary Area (Galley and Lavatory) 25-54 for 25.365(e)(2) for Airframe – Fuselage and Floors; Section 41 Lower Lobe, Flight Deck, and Empennage (Forward Fin Box of the Vertical Stabilizer).	
25.395	Control system.	25-23 for 25.395(a), (b), and (c) for Systems Stress related to: Flight Controls Rudder Control (Cables, mech components installations, upper/lower actuator installation, rudder input linkage), Flight Controls Elevator Control (Cables, mech components installations, Elevator Feel computer. Horizontal stabilizer trim actuator - trim arm switch and control wire) and Flight Controls High Lift (Flap Detents vs Dspeed, LE/TE components, flap drive stroke, flap skew detection).	
25.397	Control system loads.	25-38 for 25.397 for Systems Stress related to: Flight Controls Rudder Control (Cables, mech components installations, upper/lower actuator installation, rudder input linkage), Flight Controls Elevator Control (Cables, mech components installations, Elevator Feel computer. Horizontal stabilizer trim actuator - trim arm switch and control wire) and Flight Controls High Lift (Flap Detents vs Dspeed, LE/TE components, flap drive stroke, flap skew detection).	
25.415	Ground gust conditions.	25-0 for 25.415 for Systems Stress related to: Flight Controls Rudder Control (Cables, mech components installations, upper/lower actuator installation, rudder input linkage), Flight Controls Elevator Control (Cables, mech components installations, Elevator Feel computer. Horizontal stabilizer trim actuator - trim arm switch and control wire) and Flight Controls High Lift (Flap Detents vs Dspeed, LE/TE components, flap drive stroke, flap skew detection).	
25.561	General.	N/A for 25.561(c)(1)(ii) for Airframe – Fuselage/Floor Structures (Section 46 floor beams and frames)	
25.562	Emergency landing dynamic conditions.	N/A for 25.562 for Flight Deck - Flight Deck Seats and Interiors – Supernumerary Area	

XV. Model 747-8F (cont'd)

Section B (continued)			
The following section contains a listing of all regulations for which changed/affected areas of the aircraft comply with 14 CFR §25 at an Amendment level other than 25-120.			
14 CFR §	Title	Amdt Level For Changed/Affected Areas	Comments
25.571	Damage-tolerance and fatigue evaluation of structure	<p>25-0 for 25.571(a) and (c) for Systems Stress related to: Flight Controls Rudder Control (Cables, mech components installations, upper/lower actuator installation, rudder input linkage), Flight Controls Elevator Control (Cables, mech components installations, Elevator Feel computer. Horizontal stabilizer trim actuator - trim arm switch and control wire) and Flight Controls High Lift (Flap Detents vs Dspeed, LE/TE components, flap drive stroke, flap skew detection).</p> <p>25-86 for 25.571(a) and (b) for Systems Stress related to Flight Controls – Lower Rudder Tab Push Rod. (Note: “External loads used in this analysis were evaluated in accordance with 25.571(b) at Amendment 25-120”)</p> <p>25-86 for 25.571(a) and (b) for All Fuselage (includes Floors, Doors, and Windows), All Wing, All Empennage. (Note: “External loads used in this analysis were evaluated in accordance with 25.571(b) at Amendment 25-120”)</p> <p>N/A for 25.571 for Landing Gear (Main Gear)</p>	Compliance to be shown to CFR25.573(a) and (c) Amdt 25-0 in lieu of CFR25.571 Amdt 120 for Landing Gear (Main Gear).
25.573	Fatigue evaluation of landing gear.	25-0 for 25.573(a) and (c) for Landing Gear (Main Gear)	

XV. Model 747-8F (cont'd)**Section B (continued)**

The following section contains a listing of all regulations for which changed/affected areas of the aircraft comply with 14 CFR §25 at an Amendment level other than 25-120.

14 CFR §	Title	Amdt Level For Changed/Affected Areas	Comments
25.607	Fasteners.	<p>25-0 for 25.607 for Airframe – Empennage (Outboard Elevator Balance Weight Tower)</p> <p>25-0 for 25.607 for Flight Controls Elevator and Lateral Control (Control Wheels, Left and Right Forward Cable Quadrants, Forward Load Limiter Device, Right and Left Cable Systems, Aileron Feel and Centering Unit, Aileron Trim System, Lateral Central Control Actuator, Third Autopilot Servo, Aileron Programmer, Wing Cable System to Inboard Aileron PCU, No-back Brake assembly, Elevator Feel Computer and Autospeedbrake system to drive speedbrake lever) and High Lift Systems</p> <p>25-0 for 25.607 for Hydraulics (except RAT and hydraulics associated with engine installations)</p> <p>25-0 for 25.607 for Systems Stress related to: Landing Gear (Landing gear alternate extend cables and brake cables, Body gear truck positioner mounting features), Hydraulics (Hydraulic reservoirs, hydraulic line, Rudder PCA tubing, LG retract actuators, aileron and spoiler PCUs, Hydraulic Systems 1 and 4 electric pump , PACS actuator and elevator feel shift module hydraulic tubing, Aft strut hydraulic installations), Flight Controls Rudder Control (Cables, mech components installations, upper/lower actuator installation, rudder input linkage), Flight Controls Elevator Control (Cables, mech components installations, Elevator Feel computer. Horizontal stabilizer trim actuator - trim arm switch and control wire) and Flight Controls High Lift (Flap Detents vs Dspeed, LE/TE components, flap drive stroke, flap skew detection).</p>	
25.613	Material strength properties and design values.	25-46 for 25.613 for Airframe – Empennage (Outboard Elevator Balance Weight Tower)	
25.615	Design properties.	25-23 for 25.615 for Airframe – Empennage (Outboard Elevator Balance Weight Tower)	

XV. Model 747-8F (cont'd)

Section B (continued)			
The following section contains a listing of all regulations for which changed/affected areas of the aircraft comply with 14 CFR §25 at an Amendment level other than 25-120.			
14 CFR §	Title	Amdt Level For Changed/Affected Areas	Comments
25.625	Fitting factors.	25.23 for 25.625(a), (b) and (c) for System Stress related to: Hydraulics (Hydraulic reservoirs, hydraulic line, Rudder PCA tubing, LG retract actuators, aileron and spoiler PCUs, Hydraulic Systems 1 and 4 electric pump , PACS actuator and elevator feel shift module hydraulic tubing, Aft strut hydraulic installations), Landing Gear (Landing gear alternate extend cables and brake cables, Body gear truck positioner mounting features), Flight Controls Rudder Control (Cables, mech components installations, upper/lower actuator installation, rudder input linkage), Flight Controls Elevator Control (Cables, mech components installations, Elevator Feel computer. Horizontal stabilizer trim actuator - trim arm switch and control wire) and Flight Controls High Lift (Flap Detents vs Dspeed, LE/TE components, flap drive stroke, flap skew detection).	
25.675	Stops.	25-0 for 25.675(a), (b), and (c) for Flight Controls - Elevator and Lateral Control (Control Wheels, Left and Right Forward Cable Quadrants, Forward Load Limiter Device, Right and Left Cable Systems, Aileron Feel and Centering Unit, Aileron Trim System, Lateral Central Control Actuator, Third Autopilot Servo, Aileron Programmer, Wing Cable System to Inboard Aileron PCU, No-back Brake assembly, Elevator Feel Computer and Autospeedbrake system to drive speedbrake lever), Rudder (Rudder cables, Rudder PCMs, Rudder PCAs, Press-to-Center function, Remote compensators, Rudder Anti-cav/relief valves; Primary control linkage aft of aft quadrant, secondary linkage (buss linkage), rudder input linkage) and Stabilizer (Trim arm and control wires) 25-0 for 25.675(a) and (b) for Flight Controls High Lift System 25-0 for 25.675(c) for System Stress related to: Flight Controls Rudder Control (Cables, mech components installations, upper/lower actuator installation), Flight Controls Elevator Control (Cables, mech components installations, Elevator Feel computer. Horizontal stabilizer trim actuator - trim arm switch and control wire) and Flight Controls High Lift (Flap Detents vs Dspeed, LE/TE components, flap drive stroke, flap skew detection).	

XV. Model 747-8F (cont'd)

Section B (continued)			
The following section contains a listing of all regulations for which changed/affected areas of the aircraft comply with 14 CFR §25 at an Amendment level other than 25-120.			
14 CFR §	Title	Amdt Level For Changed/Affected Areas	Comments
25.677	Trim systems.	<p>25-23 for 25.677(a), (b), (c), and (d) for Flight Controls Elevator and Lateral Control System (Control Wheels, Left and Right Forward Cable Quadrants, Forward Load Limiter Device, Right and Left Cable Systems, Aileron Feel and Centering Unit, Aileron Trim System, Lateral Central Control Actuator, Third Autopilot Servo, Aileron Programmer, Wing Cable System to Inboard Aileron PCU, No-back Brake assembly, Elevator Feel Computer and Autospeedbrake system to drive speedbrake lever)</p> <p>25-23 for 25.677(a), (b), and (c) for Flight Controls Rudder (Rudder cables, Rudder PCMs, Rudder PCAs, Press-to-Center function, Remote compensators, Rudder Anti-cav/relief valves) and Stabilizer (Trim arm and control wires)</p> <p>25-23 for 25.677(b) for Flight Controls Stabilizer trim indicator and greenband on flight deck</p>	
25.683	Operation tests.	25-0 for 25.683 for Systems Stress related to: Flight Controls Rudder Control (Cables, mech components installations, upper/lower actuator installation, rudder input linkage), Flight Controls Elevator Control (Cables, mech components installations, Elevator Feel computer. Horizontal stabilizer trim actuator - trim arm switch and control wire) and Flight Controls High Lift (Flap Detents vs Dspeed, LE/TE components, flap drive stroke, flap skew detection).	
25.685	Control system details.	25-0 for 25.685(a), (b), and (c) for Flight Controls Elevator and Lateral Control System (Control Wheels, Left and Right Forward Cable Quadrants, Forward Load Limiter Device, Right and Left Cable Systems, Aileron Feel and Centering Unit, Aileron Trim System, Lateral Central Control Actuator, Third Autopilot Servo, Aileron Programmer, Wing Cable System to Inboard Aileron PCU, No-back Brake assembly, Elevator Feel Computer and Autospeedbrake system to drive speedbrake lever)	
25.693	Joints.	25-0 for 25.693 for Systems Stress related to: Flight Controls Rudder Control (Cables, mech components installations, upper/lower actuator installation, rudder input linkage), Flight Controls Elevator Control (Cables, mech components installations, Elevator Feel computer. Horizontal stabilizer trim actuator - trim arm switch and control wire) and Flight Controls High Lift (Flap Detents vs Dspeed, LE/TE components, flap drive stroke, flap skew detection).	
25.701	Flap interconnection.	25-23 for 25.701(a) for Flight Controls High Lift System	
25.783	Doors.	<p>25-88 for 25.783 for Main Deck Side Cargo Door; Forward and Aft Lower Lobe Cargo Doors</p> <p>25-23 for 25.783 for Airframe – Fuselage (Bulk Cargo Door; ECS pack bay access panels)</p>	

XV. Model 747-8F (cont'd)

Section B (continued)			
The following section contains a listing of all regulations for which changed/affected areas of the aircraft comply with 14 CFR §25 at an Amendment level other than 25-120.			
14 CFR §	Title	Amdt Level For Changed/Affected Areas	Comments
25.785	Seats, berths, safety belts, and harnesses.	25-64 for 25.785(a), (b), (c), (d), (e) and (i) for Interiors – Supernumerary Area 25-64 for 25.785(a) for Flight Deck - Flight Deck Seats	25.785(a) at amendment 25-64 references 25.562 however, the 747-8F has an exception for 25.562 documenting that 25.562 is not applicable to flight deck and supernumerary seats so reference to 25.562 in 25.785(a) does not imply compliance to 25.562 for those seats
25.795	Security considerations.	25-127 for 25.795(b)(2) for Environmental Systems – Air Distribution System	
25.807	Emergency exits.	25-67 for 25.807(b) and (c) for Interiors – Supernumerary Area 25-67 for 25.807(a) for Escape Systems (escape slide at crew door)	
25.809	Emergency exit arrangement.	25-114 for 25.809(a) for Escape Systems (Flight Deck Overhead Exit Door; Crew Service Door) 25-47 for 25.809(f)(1)(ii), f(1)(iv) and (f)(2) for Escape Systems (Crew Door Escape Slide) 25-34 for 25.809(f)(1)(v) for Escape Systems (Crew Door Escape Slide)	
25.811	Emergency exit marking.	25-46 for 25.811(a), (b), (d), (e) and (g) for Interiors – Supernumerary Area and Supernumary Area Emergency Lighting	
25.812	Emergency lighting.	25-28 for 25.812 for Interiors – Supernumerary Area and Supernumary Area Emergency Lighting	
25.813	Emergency exit access.	25-46 for 25.813(a), (b), (c) and (d) for Interiors – Supernumerary Area	
25.863	Flammable fluid fire protection.	25-0 for 25.863(a) and (b) for Flight Controls Elevator and Lateral Control System (Control Wheels, Left and Right Forward Cable Quadrants, Forward Load Limiter Device, Right and Left Cable Systems, Aileron Feel and Centering Unit, Aileron Trim System, Lateral Central Control Actuator, Third Autopilot Servo, Aileron Programmer, Wing Cable System to Inboard Aileron PCU, No-back Brake assembly, Elevator Feel Computer and Autospeedbrake system to drive speedbrake lever)	
25.869	Fire protection: Systems	N/A for 25.869(a)(1) for Hydraulics Electrical (Hydraulics system fire shutoff valve and flight control shutoff valve; Hydraulic fluid quantity probe in each reservoir) 25.1359(d) at Amdt 25-32 for 25.869(a)(4) for Hydraulics Electrical (Hydraulics system fire shutoff valve and flight control shutoff valve; Hydraulic fluid quantity probe in each reservoir; Ground Fault Interrupt) and Flight Controls High Lift	<i>Compliance to be shown to CFR25.1359(d) Amdt 25-32 in lieu of CFR25.869(a)(4) Amdt 120 for Hydraulics Electrical.</i>
25.899	Electrical bonding and protection against static electricity.	25-123	
25.903	Engines.	25-57 for 25.903(a) and (c) for Propulsion - APU	

XV. Model 747-8F (cont'd)**Section B (continued)**

The following section contains a listing of all regulations for which changed/affected areas of the aircraft comply with 14 CFR §25 at an Amendment level other than 25-120.

14 CFR §	Title	Amdt Level For Changed/Affected Areas	Comments
25.981	Fuel tank ignition prevention.	25-120 for 25.981(a)(3), and (b) except: 25-11 for 25.981(a)(3) and (b) for APU fuel feed system line, pumps and plumbing, and fuel system scavenge for the following airplane serial numbers(SNs): 35808, 36136, 36137, 35806, 35807, 37132, 37133, 39238, 39239, 37562, 37580, 36138, 37563, 39240, 35809, 37564, 39241, 39242, 37561, 37568, 37569, 39243, 37581, 39244 and 37668. All other airplane SNs are at 25-120. Regardless of SN, any changes to these systems that affect 25.981 compliance, including the APU fuel feed system line, pumps and plumbing, and fuel system scavenge systems, must comply at amendment 25-120.	
		25-125 for 25.981(c) Nitrogen Generation System (NGS)	
25.1013	Oil tanks.	25-57 for 25.1013(a) and (c) for Propulsion - APU	
25.1093	Induction system deicing and anti-icing provisions.	25-57 for 25.1093(b) for Propulsion - APU	
25.1103	Induction system ducts.	25-23 for 25.1103(b)(2) for Propulsion - APU	
25.1141	Powerplant controls: General.	25-40 for 25.1141(f)(2) for Propulsion - APU	
25.1181	Designated fire zones: Regions included.	25-23 for 25.1181(b) for Propulsion - APU	
25.1183	Lines and fittings.	25-57 for 25.1183 for Propulsion - APU	
25.1305	Powerplant instruments.	25-54 for 25.1305(a)(7) for Propulsion - APU	
25.1309	Equipment systems and installations.	25-0 for 25.1309(a), (b), (c), and (d) for Flight Controls Elevator and Lateral Control System (Control Wheels, Left and Right Forward Cable Quadrants, Forward Load Limiter Device, Right and Left Cable Systems, Aileron Feel and Centering Unit, Aileron Trim System, Lateral Central Control Actuator, Third Autopilot Servo, Aileron Programmer, Wing Cable System to Inboard Aileron PCU, No-back Brake assembly, Elevator Feel Computer and Autospeedbrake system to drive speedbrake lever)	
25.1317	High-intensity radiated fields (HIRF) protection.	25-122	
25.1323	Airspeed indicating system.	25-108 for 25.1323(a), (b), and (c) for Flight Controls – Integrated Standby Flight Display 25-108 for 25.1323(b), (c), (d), (e), and (f) for Avionics – ADIRS 25-108 for 25.1323(b) and (c) for Aerodynamic Configurations	

XV. Model 747-8F (cont'd)

Seciton B (continued)			
The following section contains a listing of all regulations for which changed/affected areas of the aircraft comply with 14 CFR §25 at an Amendment level other than 25-120.			
14 CFR §	Title	Amdt Level For Changed/Affected Areas	Comments
25.1329	Flight guidance system.	25-46 for Avionics – Flight Management Computer System 25-46 for Flight Controls - Autopilot Flight Director System 25-46 for 25.1329(f) for Flight Controls Elevator and Lateral Control System (Control Wheels, Left and Right Forward Cable Quadrants, Forward Load Limiter Device, Right and Left Cable Systems, Aileron Feel and Centering Unit, Aileron Trim System, Lateral Central Control Actuator, Third Autopilot Servo, Aileron Programmer, Wing Cable System to Inboard Aileron PCU, No-back Brake assembly, Elevator Feel Computer and Autospeedbrake system to drive speedbrake lever)	
25.1335	Flight director systems.	25-41 for Flight Controls - Autopilot Flight Director System	
25.1353	Electrical equipment and installations.	25-42 for 25.1353(a) for Hydraulics (Hydraulics system fire shutoff valve and flight control shutoff valve) 25-42 for 25.1353(a) for Electircal Subsystems - APU 25-42 for 25.1353(a) and (b) for Flight Controls High Lift System	
25.1413	Safety belts.	25-51 for Interiors – Supernumary Area	
25.1431	Electronic equipment.	N/A for 25.1431(d) for Hydraulics (Hydraulic fluid quantity probe in each reservoir) N/A for 25.1431(d) for Electrical Subsystems - APU	
25.1435	Hydraulic systems.	25-0 for 25.1435(a) and (b) for Flight Controls Elevator and Lateral Control (Control Wheels, Left and Right Forward Cable Quadrants, Forward Load Limiter Device, Right and Left Cable Systems, Aileron Feel and Centering Unit, Aileron Trim System, Lateral Central Control Actuator, Third Autopilot Servo, Aileron Programmer, Wing Cable System to Inboard Aileron PCU, No-back Brake assembly, Elevator Feel Computer and Autospeedbrake system to drive speedbrake lever), Rudder (Rudder cables, Rudder PCMs, Rudder PCAs, Press-to-Center function, Remote compensators, Rudder Anti-cav/relief valves; Primary control linkage aft of aft quadrant, secondary linkage (buss linkage)) and Stabilizer (Trim arm and control wires) 25-41 for 25.1435(a)(1), (a)(5), (a)(6), (a)(7), and (b)(2) for Flight Controls High Lift System 25-41 for 25.1435(a)(1), (a)(2), (a)(4), (a)(5), (a)(6), (a)(7), (a)(8), (b)(1), (b)(2), and (c) for Hydraulics (except RAT and hydraulics associated with engine installations)	

XV. Model 747-8F (cont'd)

Section B (continued)			
The following section contains a listing of all regulations for which changed/affected areas of the aircraft comply with 14 CFR §25 at an Amendment level other than 25-120.			
14 CFR §	Title	Amdt Level For Changed/Affected Areas	Comments
25.1439	Protective breathing equipment.	25-38 for Interiors – Supernumerary Area	
25.1447	Equipment stands for oxygen dispensing units.	25-41 for 25.1447(a), (c)(1), (c)(3)(i) and (c)(3)(ii) for Interiors – Supernumerary Area	
25.1457	Cockpit voice recorders.	25-124 for 25.1457(a)(6), (d)(1), (d)(4), (d)(5)(i), (d)(5)(ii), (d)(5)(iii), (6)(e)(1) for Avionics - Cockpit Voice Recorder	
25.1459	Flight recorders.	25-124 for 25.1459(a)(3), (a)(7) and (a)(8) for Avionics – Flight Data Recorder System	
25.1522	APU Limitations.	25-46 for 25.1522 for Propulsion - APU	
25.1551	Oil quantity indicator.	25-0 for 25.1551 for Propulsion - APU	

Section C			
The following section contains a listing of all regulations for which unchanged/unaffected areas of the aircraft comply with 14 CFR §25 at an Amendment level greater than the 747-400F Amendment level.			
14 CFR §	Title	Amdt Level For Changed/Affected Areas	Comments
25.305	Strength and deformation.	25-120 for 25.305(a), (b) and (c) for Airframe - Fuselage	
25.365	Pressurized cabin loads.	25-54 for 25.365(e) for Airframe – Fuselage - Flight deck floor beams/frames (not affected from decompression standpoint)	
25.571	Damage-tolerance and fatigue evaluation of structure.	25-86 for 25.571(a) and (b) for Airframe – Empennage and Fuselage. (Note: “External loads used in this analysis were evaluated in accordance with 25.571(b) at Amendment 25-120”) 25-120 for 25.571(d) and (e) for Airframe – Empennage and Fuselage	

XV. Model 747-8F (cont'd)

Section C			
The following section contains a listing of all regulations for which unchanged/unaffected areas of the aircraft comply with 14 CFR §25 at an Amendment level greater than the 747-400F Amendment level.			
14 CFR §	Title	Amdt Level For Changed/Affected Areas	Comments
25.807	Emergency Exits.	25-120 for 25.807(g)(1) for Interiors – Escape Systems Exits	

Additional Certification Basis Information:

Based on 14 CFR §21.101(g) for changes made to TCs applicable provisions of 14 CFR part 26 are included in the certification basis. For any future 14 CFR part 26 amendments, the holder of this TC must demonstrate compliance with the applicable sections

Compliance has been found for the following regulations at Amendment 26-0: §26.11

Compliance has been found for the following regulations at Amendment 26-1: §26.49

Compliance has been found for the following regulations at Amendment 26-4: §26.43 and §26.45

14 CFR §34 of the FAR as amended by Amendments 34-1 through 34-4, and any later amendments in existence at the time of certification

14 CFR §36 of the FAR as amended by Amendments 36-1 through 36-28, and any later amendments in existence at the time of certification

Exemptions from 14 CFR §25:

Applicable Part 25 Section	Amdt Level	Subject	Exemption Number	Date Issued	Expiration Date (if applicable)
25.841(a) (2) and (a)(3)	25-87	Pressurized Cabins – Uncontained Engine Failure	9943 9943A	10/29/2009 7/12/2011	None
25.901(c)	25-40	Installation-No Single Engine Failure Criteria	8518	03/23/2005	None
25.981(a) (3)	25-102	Fuel Tank Ignition Prevention-Fuel Tank Structural Fastener Penetrations	10174	12/14/2010	None
25.783(g) 25.785(d) 25.807(a)(1) 25.807(g)(1) 25.807(i)(1) 25.810(a)(1)(i) 25.810(a)(1)(iii) 25.812(g)(1)(ii) 25.813(a) 25.813(b) 25.857(e) 25.1447(c)(1)	25-23 25-64 25-67 25-114 25-114 25-114 25-114 25-28 25-46 25-46 25-93 25-41	Partial Exemption from, Carriage of supernumeraries on an airplane with a class E cargo compartment (with access to the class E compartment) and escape systems	9793 9793A 9793B 9793C	11/26/2008 10/02/2009 10/22/2010 6/16/2011	None
25.1305(c)(6) 25.1309(c)	25-120	Fuel System Contamination	10267 10267A 10267B	05/19/2011 08/05/2011 06/07/2013	12/31/2016 06/30/2014 12/31/2016

XV. Model 747-8F (cont'd)

The following regulations have been complied with by findings of an Equivalent Level of Safety:

Applicable Part 25 Section	Amndt Level	Subject	ELOS Number
25.107(e)(1)(iv)		Minimum Unstick Speed (VMU)	TC6918SE-T-F-6
25.689(a)(1)		Control Cable Diameter	PS05-0212-SF-2
25.777(e)	25-46	Wing Flap Control Lever	PS05-0212-SF-1
25.783(e)	25-88	Visual Indication of Forward and Aft Lower Lobe Cargo Door Locked Condition	PS05-0212-C-1
25.783(e)	25-88	Visual Indication of Main Deck Side Cargo Door Closed, Latched, and Locked Condition.	PS05-0212-C-2
25.811		Door Sill Reflectance and Exterior Exit Markings	TC6918SE-T-CS-2
25.831(g)		Acceptable High Temperature Physiological Environment During Failure Conditions	PS05-0020-ES-3 Rev 1
25.857(c)(1)		Cargo Compartment Classification Inadvertent Smoke Detection in Lower Lobe Class C Cargo Compartments	AT8167-T-ES-1
25.863 25.1182(a) 25.1183(a)		Engine Nacelle Power Door Opening System (PDOS) Fire Testing	PS05-0211-P-6
25.863 25.1182(a) 25.1183(a)		Nacelle Areas Behind Firewalls for Thrust Reverser Directional Control Valve (DCV)	PS05-0212-P-18
25.933		Flight Critical Thrust Reverser	TC6918SE-T-P-2
25.934		Engine and Thrust Reverser System Testing	TC6918SE-T-P-17
25.981(a)(3)		Means of Compliance for the Installation of GFI Relays on Boeing Model 707, 727, 737CL, 737NG, 747 CL, 747-400, 757, 767, & 777 Airplanes and Equivalent Safety Finding for Ground Fault Interrupter Circuit Protection for Fuel Override and Jettison Pumps	PS05-0123-P-1 Rev 1 PS05-0212-P-24
25.981(b)	125	Fuel Tank Flammability Reduction Rule	PS05-0177-P-2
25.997(d) 25.1305(c)(6)		Warning Means for Engine Fuel Filter Contamination	PS05-0212-P-4
25.1145(a) and (b)		Ignition Switches	PS05-0212-P-5
25.1181(a)(6) 25.1182(a)		Fire Safety Requirements for the GENx-2B Engine Fan Case	PS05-0211-P-23
25.1182 25.1183		Fire Safety Requirements for the Aft Strut Fairing Compartment	PS05-0212-P-21
25.1193		Cowling and Nacelle Skin Fireproof Regions	PS05-0212-P-16
25.1301(a), and (d) 25.1309(a), and (c)		Transition Speed of Enhanced Ground Proximity Warning System (EGPWS) Mode 4 Alerts; Too Low Flaps/Too Low Terrain	PS05-0212-S-3
25.1303(c)(1)		Overspeed Aural Warning	TC6918SE-T-SA-11
25.1435(b)(1)	104	Request for an Equivalent Level of Safety Finding for the Hydraulic System Pressure Test	PS05-0212-SF-4
25.1517		Rough Air Speed (VRA)	TC6918SE-T-F-4
25.1529 Appendix H		Maintenance Planning Document Section 9 (Instructions for Continued Airworthiness)	PS05-0212-P-G-8
25.1325(e)		Standby Air Data System	PS05-0212-F-3
25.161(a), and (c)(3), 25.1301(a), 25.1309(a)		Longitudinal Trim	PS05-0212-F-4

XV. Model 747-8F (cont'd)

Special Conditions with respect to the following subjects apply to the 747-8F:

Special Condition Number	Effective Date	Subject
25-385-SC	11/09/2009	Structural Design Requirements for Four-Post Main Landing Gear System
25-387-SC	09/11/2009	Additional Airframe Structural Design Requirements Related to Sudden Engine Stoppage Due to Fan Blade Failures
25-388A-SC	06/27/2011	Interaction of Systems and Structures
25-401-SC	02/16/2010	Systems and Data Networks Security--Protection of Airplane Systems and Data Networks From Unauthorized External Access
25-402-SC	02/16/2010	Design Roll Maneuver Requirement

Additional Design Requirements and Conditions:

The following design details or information must be maintained to ensure that an unsafe design condition is not present:

14 CFR 25.1329 – Flight Guidance System

The following design features must be incorporated in the type design (reference § 25.1329, Amendment 25-46). In lieu of the following, compliance to 25.1329, Amendment 25-119, may be shown.

1. Quick autopilot disconnect switches for each pilot on the outboard arm of each control wheel and quick autothrust disconnect switches for each pilot on the underside of the thrust control levers for engines 1 and 4.
2. Positive disconnect function for the autopilot is provided by the disconnect bar located at the glare shield on the autopilot mode control panel (MCP).
3. Positive disconnect function for the autothrottle is provided by the autothrottle arm switch, also located on the MCP.
4. Automatic synchronization of the autopilot and autothrust functions is provided in order to ensure transient free engagement and mode switching.
5. Automatic stabilizer trim is used to offload the elevator in order to ensure transient free disengagement of the autopilot pitch axis.
6. The wheel position provides a visual and tactile indication of any wheel input which may be required at disengagement of the autopilot roll axis.
7. When multiple autopilot channels are engaged, disengagement of an individual autopilot does not result in a transient any greater than a minor transient.
8. The throttle levers remain in the current position when the autothrust function is disengaged.
9. Failures of the automatic stabilizer trim function, and other detected failures which degrade autopilot operation but do not pose an immediate hazard to the airplane, result in activation of the master caution light and aural, as well as the display of an AUTOPILOT caution message.
10. Detected failures which do pose an immediate hazard to the airplane, result in an autopilot disconnect with associated autopilot disconnect warning level annunciation that includes activation of the master warning light and aural as well as the display of an AUTOPILOT warning message.
11. Transition from multiple autopilot operation to single autopilot operation (with associated yaw axis autopilot servo disconnect), during engine inoperative go-around, does not require exceptional piloting skill, alertness, or strength.
12. The AFDS provides low speed protection via the following features:
 - a. The AFDS controls to an angle-of-attack which corresponds to one degree below the stick shaker angle-of-attack.
 - b. The AFDS take-off mode provides windshear recovery guidance which meets the criteria of AC 25-12 and AC 120-41.
 - c. An indication to the flight crew of a low speed condition includes the display of the stick shaker angle-of-attack via a pitch limit indicator (PLI).
 - d. The thrust management function (TMF), when engaged in SPD mode, provides low speed protection when the AFDS vertical speed (V/S) mode is engaged and commanding a climb. In addition, if the angle-of-attack rises above a fixed reference point, the AFDS issues a V/S mode failure by removing the pitch flight director bars if the flight director is turned on.

XV. Model 747-8F (cont'd)

- e. If the autopilot is engaged, a V/S mode failure will result in an amber line being drawn through the V/S mode annunciation on the primary flight display (PFD), illumination of the master caution light, activation of the master caution aural, and display of an AUTOPILOT caution message.
 - f. An indication to the flight crew of a low speed condition is an AIRSPEED LOW caution message when the airspeed drops below the top of the lower amber band of the airspeed indicator.
 - g. The AFDS provides low speed protection by controlling to a reference angle-of-attack when in Flight Level Change (FLCH) mode. An additional indication to the flight crew of a low speed condition is an AIRSPEED LOW caution message when the airspeed drops below the top of the lower amber band.
 - h. When the AFDS altitude capture (ALT CAP) mode is engaged, the TMF, if engaged in SPD mode, provides low speed protection. In addition, under certain conditions the AFDS will provide altitude capture speed floor protection by controlling to a speed no lower than 5 knots below the MCP selected speed.
 - i. If the AFDS altitude capture mode is engaged, and the angle-of-attack rises above a fixed reference point the AFDS will issue an ALT CAP mode failure by removing the pitch flight director bars if the flight director is turned on. If the autopilot is engaged, the ALT CAP mode failure will result in a mode annunciation on the Primary Flight Display (PFD), illumination of the master caution light, activation of the master caution aural, and display of an AUTOPILOT caution message. An additional indication to the flight crew of a low speed condition is an AIRSPEED LOW caution message when the airspeed drops below the top of the lower amber band.
 - j. When the AFDS Altitude Hold (ALT HLD) mode is engaged, the TMF, if engaged in SPD mode, provides low speed protection. An additional indication to the flight crew of a low speed condition is an AIRSPEED LOW caution message when the airspeed drops below the top of the lower amber band.
 - k. When the AFDS Vertical Navigation (VNAV) mode is engaged, the TMF, if engaged in SPD mode, provides low speed protection. Otherwise, when engaged in VNAV SPD, the FMF provides low speed protection. An additional indication to the flight crew of a low speed condition is an AIRSPEED LOW caution message when the airspeed drops below the top of the lower amber band.
 - l. When the AFDS glideslope (G/S) mode is engaged, the TMF, if engaged in SPD mode, provides low speed protection. An additional indication to the flight crew of a low speed condition is an AIRSPEED LOW caution message when the airspeed drops below the top of the lower amber band.
 - m. When the AFDS go-around mode is engaged, the AFDS provides low speed protection by controlling to an angle-of-attack which corresponds to one degree below the stick shaker angle-of-attack. The AFDS go-around mode provides windshear recovery guidance and meets the criteria of AC 25-12 and AC 120-41. An additional indication to the flight crew of a low speed condition includes the display of the stick shaker angle-of-attack (via a pitch limit indicator (PLI)).
 - n. Autothrottle wake-up requires that the autothrottle arm switch, located on the MCP, be in the ARM position. When the AFDS is not in takeoff, go-around, FLCH, or VNAV SPD modes, the autothrottle will automatically engage into SPD mode and provide speed protection when the airspeed drops approximately 5 to 10 knots below the top of the lower amber band.
13. The AFDS provides high speed protection via the following features:
- o. Indication to the flight crew of a high speed condition is an OVERSPEED warning message when the airspeed/Mach number exceeds VMO/MMO
 - p. When the AFDS takeoff mode is engaged, the AFDS provides high speed protection by controlling to the flap placard (flaps down) or VMO/MMO (flaps up).
 - q. When the AFDS V/S mode is engaged, the TMF, if engaged in SPD mode, provides high speed protection.
 - r. When the AFDS FLCH mode is engaged, the AFDS provides high speed protection by controlling to the flap placard (flaps down) or VMO/MMO (flaps up).
 - s. When the AFDS ALT CAP mode is engaged, the TMF, if engaged in SPD mode, provides high speed protection.
 - t. When the AFDS ALT HLD mode is engaged, the TMF, if engaged in SPD mode, provides high speed protection.
 - u. When the AFDS VNAV mode is engaged, the TMF, if engaged in SPD mode, provides high speed protection. Otherwise, when engaged in VNAV SPD, the FMF provides high speed protection.
 - v. When the AFDS G/S mode is engaged, the TMF, if engaged in SPD mode, provides high speed protection.
 - w. When the AFDS go-Around mode is engaged, the AFDS provides high speed protection by controlling to the flap placard (flaps down) or VMO/MMO (flaps up).

XV. Model 747-8F (cont'd)

14. For the flight guidance system functions, controls, indications, and alerts, means are provided to indicate the current mode of operation as well as any armed modes. Mode transitions are indicated on the Primary Flight Display (PFD) and highlighted with boxes that are displayed around the changed mode for ten seconds following the mode change. The indications are visible to each pilot under all expected lighting conditions during the flight deck lighting evaluation.
15. Autopilot disengagement is annunciated via illumination of the master warning light, activation of the master warning aural, and via the display of an AUTOPILOT warning message. A dedicated autopilot warning provides for an aural warning which is unique from all of the other aural warnings.
16. Override of the Autothrust by the flight crew using the throttles does not require excessive force, and does not create a potential hazard to the airplane.

14 CFR 25.365(e)(2) – Section 41 Lower Lobe (BS 140-460)

The following design features must be incorporated in the type design (reference § 25.365, Amendment 25-54). In lieu of incorporating the following design features, compliance to § 25.365, Amendment 25-120, may be shown.

Section 41 Lower Lobe (BS 140-460):

When evaluating this compartment for compliance to § 25.365, the compartment must be analyzed using the following two conditions:

- (1) A 3.7 square foot opening (forward EE Bay access door) with the BS 464 cargo liner intact (3.7 sf), and
- (2) A 20.0 square foot opening with the BS 464 cargo liner blown down. This essentially combines the Section 41 Lower Lobe and the forward cargo compartment into one compartment in the analysis.

14 CFR 25.561(c)(1)(ii) – Auxiliary Power Unit Fuel Line in Section 46

The following design features must be incorporated in the type design. In lieu of incorporating the following design features, compliance to § 25.561(c)(1)(ii), Amendment 25-120, may be shown.

- (1) The Section 46 floor beams must be designed to protect the auxiliary power unit (APU) fuel lines from an emergency landing load event of a minimum of 5.2 g's down and 1.5 g's up.
- (2) The APU fuel line must be routed through the main deck floor beams just outboard of BL 0 to minimize potential for all types of penetration (including rotor burst, wheels up landing impact, etc).
- (3) Occupants must be located no less than 72 feet forward of the forward-most potential penetration location in the APU fuel hose.

Damage Tolerance and Fatigue Evaluation of Structure

14 CFR 25.571(a) and (b) – Wing, Empennage, Fuselage, Floors and Doors

The following design features must be incorporated in the type design (reference § 25.571(a) and (b), Amendment 25-86). In lieu of incorporating the following design features, compliance to § 25.571(a) and (b), Amendment 25-120, may be shown.

- (1) For the 747-8F structure, an evaluation of the existing damage tolerance analysis (DTA) inspection program identified in the Supplemental Structural Inspection Document (SSID) must be performed for any required changes due to loads, geometry changes, material changes, etc. The resulting inspection requirements for the 747-8F must be included in Section 9 (Airworthiness Limitations) of the Boeing Maintenance Planning Document (MPD) D621U400 in accordance with § 25.571(a)(3) at Amendment 25-120.
- (2) The above evaluation must include loading magnitudes and loading spectra which are developed in accordance with § 25.571 at Amendment 25-120. This includes usage of the 1.15 factor for pressure acting alone in accordance with § 25.571(b)(5) at Amendment 25-120.
- (3) Maintenance instructions must be based on in-service data and fatigue testing to ensure freedom from widespread fatigue damage.

14 CFR 25.809(a) – Outside Viewing means for Flight Deck Overhead Exit

The following design features must be incorporated in the type design (reference § 25.809(a), Amendment 25-47). In lieu of incorporating the following design features, compliance to § 25.809(a), Amendment 25-120, may be shown.

- (1) Large windows installed adjacent to the overhead flight deck exit door that provide a means for outside viewing to determine if there is a hazard (such as a fire) that would pose an immediate threat to the occupants of the airplane if the emergency exit were to be opened.
- (2) 8 inertia reels (with harnesses) installed for egress out flight deck overhead exit door.

14 CFR 25.981(a)(3) and (b) – Fuel Tank Ignition Protection

The amendment level is 25-120 for § 25.981(a)(3), and (b) except:

25-11 for § 25.981 (a)(3) and (b) for APU fuel feed system line, pumps and plumbing, and fuel system scavenge systems only for the following airplane serial numbers(SNs): 35808, 36136, 36137, 35806, 35807, 37132, 37133, 39238, 39239, 37562, 37580, 36138, 37563, 39240, 35809, 37564, 39241, 39242, 37561, 37568, 37569, 39243, 37581, 39244 and 37668. All other airplane SNs are at 25-120. Regardless of SN, any changes to these systems that affect 25.981 compliance, including the APU fuel feed system line, pumps and plumbing, and fuel system scavenge systems, must comply at amendment 25-120.

XV. Model 747-8F (cont'd)

The following design details must be maintained to ensure that an unsafe design feature is not present:

Following fire/smoke detection, the crew will follow the AFM procedure to depressurize the cabin and ascend or descend the airplane to an altitude of 25,000 feet until final descent to a suitable airport is possible.

Class E cargo compartment liners will be tested to meet requirements of 14 CFR part 25, appendix F part III (Amdt. 25.83). Except at the following locations:

1. The linings above the cargo compartment ceiling in the stairwell to the upper deck;
2. Equipment/features mounted in the sidewall liners (and any sidewall liner joints to the equipment) such as the nose door control panel;
3. Liner joints at door edge frames (door 1, side cargo door, nose door);
4. Soft liner and joints above side cargo door where the hinges penetrate;
5. The aluminum and fiberglass dado panels (and associated joints) installed along the cargo compartment sidewalls from the cargo floor to approximately 10" to 15" above the floor.

Air grills in the ceiling panels between station 520 and 620 that are painted with intumescent paint which expand and close off the grill when exposed to a fire.

Protection of wires required for continued safe flight and landing inside the Class E compartment will be accomplished by any one, or combination of the following:

1. Routing behind fire resistant liners;
2. Routing of redundant wires on opposite sides of the main deck floor and/or opposite sides of the crown area, and/or with a minimum separation of 6';
3. Placement of air dams or fire stops behind cargo liners as required to prevent propagation of fire behind the liner;
4. Use of fire resistant wire or insulation where required to protect wire in locations subject to potential high temperatures on the backside of cargo liners and above ceiling panels (below the flight deck for example); and
5. Placement of special fire resistant covers behind air return grilles/decompression vents as required.

At least one critical oxygen line, which provides oxygen to the flight deck, will also be protected by fire resistant sidewall liner material and a protective fiberglass cover on the associated air return grille/decompression vent.

Additional information is listed in Section 9 of Boeing Maintenance Planning Data Document D011U721-02 or the applicable engine Type Certificate Data Sheet. The more restrictive requirement from these two documents shall be in force.

Production Basis: Production Certificate No. 700 has been issued to The Boeing Company.

Equipment: The basic required equipment as prescribed in the applicable airworthiness regulations (see Certification Basis) must be installed in the aircraft for certification.

XVI. Model 747-8 (Approved December 14, 2011) Transport Category

The 747-8 series is based on the model 747-400 series aircraft with design changes to the empennage, fuselage, landing gear, wings, engines, fuel systems, and other aircraft systems as defined in the certification basis within this section. The certification basis for areas unaffected by this change from the 747-400 series aircraft will remain certified at the 14 CFR Part 25 Amendment level of their original certification date.

Engines: 4 General Electric Turbofan Engines Model: GENx-2B67, GENx-2B67B or GENx-2B67/P (Engine Type Certificate No. E00078NE)

WARNING: To prevent unsafe airplane handling characteristics, electronic engine control (EEC) software C060 (or newer) cannot be intermixed on the same aircraft with older EEC software: C032, C040, or C045. The idle selection logic is different in GE C060 software compared to older versions of EEC software. This difference can potentially provide large unsafe thrust asymmetries during acceleration from lower power if C060 EEC software is mixed with older EEC software (i.e. one or more engine at a high idle, while the rest are at minimum idle). The engines at high idle will respond much quicker if there is a rapid throttle advance). See Boeing Service Bulletin 747-73A2083

SEE Note 4 (after Section XVI) Applicable to Model 747-8F and 747-8 regarding intermixing of Engines

Fuel: General Electric Turbofan Engines
 Fuels conforming to:
 ASTM D-1655 grades Jet-A and Jet A-1
 MIL-T-5624 grade JP-5
 MIL-T-83133 grade JP-8
 are acceptable

XVI. Model 747-8 (cont'd)

Fuels produced to other specifications and having properties meeting the requirements of the above specifications are acceptable. The fuel and any fuel additives must conform to the relevant Engine Operating Instructions.

Engine Limits:	General Electric Turbofan Engines See the appropriate FAA approved Airplane Flight Manual for engine ratings.	
Airspeed Limits:	VMO/MMO = 365/0.9 (KCAS) See the appropriate FAA Approved Airplane Flight Manual for other airspeed limits	
C.G. Range:	See the appropriate FAA Approved Airplane Flight Manual	
Empty Weight C.G.:	See the appropriate FAA Approved Airplane Flight Manual	
Datum:	See the appropriate Weight and Balance Control Manual	
Leveling Means:	See the appropriate FAA Approved Airplane Flight Manual	
Maximum Weights:	See the appropriate FAA approved Airplane Flight Manual	
Minimum Crew:	For all flights, 2 persons (pilot, copilot).	
Maximum Number of : Seats	605 passengers: Main Deck limited to 495 (when configured with 4 pairs of Type "A" exits on the main deck and one pair of Type "C" exits at Door 1) Main Deck Limited to 440 (when configured with three pairs of Type "A" exits and two pair of Type "C" exits at Doors 1 and 5) Upper Deck limited to 110 (when configured with one pair of Type A exits.) Upper Deck limited to 45 (when upper deck exits are rated as Type I due to the interior configuration.) Upper Deck limited to 55 (when upper deck exits are rated as Type C due to the interior configuration.)	
Maximum Compartment: Weights	See the appropriate Weight and Balance Control Manual	
Fuel Capacity:	See the appropriate Weight and Balance Control Manual	
Oil Capacity:	See the appropriate Weight and Balance Control Manual	
Maximum Operating: Altitude	43,100	
Control Surface: Movements	To insure proper operation of the airplane, the movement of the various control surfaces must be carefully controlled by proper rigging of the flight control systems. The airplane must, therefore, be rigged according to the following FAA-approved data: Boeing Drawing Numbers:	
	251U1001	Rigging Instructions Lateral Controls
	251U1003	Rigging Instructions Speed Brakes
	251U2001	Rigging Instructions Elevator Controls
	251U3002	Rigging Instructions Rudder Controls
	251U4001	Rigging Instructions Stabilizer Trim Controls
	114U0001	Rigging Instructions Leading Edge Slats Controls
	253U5001	Rigging Instructions Control Stand
	256U5001	Rigging Instructions Trailing Edge Flap Controls

Model

747-830
747-8JA
747-8JK
747-8LQ
747-8KB
747-8ZV
747-8H0
747-8Z5

Eligible Serial Numbers

37827-37838, 37841
40065
38636
41060
37075, 37544
42096
39749
37500-37501

XVI. Model 747-8 (cont'd)

Certification Basis:

The 747-8 series is based on the model 747-400 series aircraft with design changes to the empennage, fuselage, landing gear, wings, engines, fuel systems, and other aircraft systems as defined in the certification basis within this section. The certification basis for areas unaffected by this change from the 747-400 series aircraft will remain certified at the 14 CFR Part 25 Amendment level of their original certification date. The certification basis for areas changed or affected by the 747-8 minor model is 14 CFR part 25, as amended by Amendment 25-1 through Amendment 25-120 with exceptions permitted by 14 CFR 21.101. Section A documents the changed/affected areas of the aircraft. Section B documents all regulations for which there are exceptions from Amendment 25-120 for the changed/affected areas. Section C documents unchanged/unaffected areas for which compliance has been shown at an Amendment level higher than the 747-400 Amendment level.

A. The following section contains a listing of all areas that are changed/affected as part of the 747-8 minor model.

Airplane Area	Changed/Affected Areas
Airplane Level	Static Loads; Dynamic Flight Loads; Dynamic Ground Loads; Flutter
	Flotation and ditching
	Weight and balance
	Aerodynamic Stability & Control; Aerodynamic Performance; Aerodynamic Configurations
Airframe – Empennage	All empennage (including the outboard elevator balance weight towers) except: <ul style="list-style-type: none"> • Inboard elevator, remainder of outboard elevator.
Airframe – Fuselage	All fuselage (includes all fuselage, floors, doors, and window structure) except: <ul style="list-style-type: none"> • BS 140 pressure bulkhead; frames, S-0 to S-13, BS 160 to BS 320; • flight deck surround skins/stringers from S-0 to S-13, BS 220-300; • flight deck floor beams from BS 220-300; • structural supports and sills for flight deck windshields; • crown skin from S-0 to S-6 from BS 280 to 520; • upper deck side of body shear trusses; • 9G intercostals for upper deck galleys, • upper deck floor decompression trusses, • side of body shear panels; • BS 2360 aft pressure dome and APU tail cone; • Nose radome and nose landing gear doors; • Upper deck emergency exit doors , flight deck overhead emergency exit door, and forward and center electrical equipment access doors
Avionics	Pitot static line plumbing
	Integrated Display System (IDS)
	Modularized Avionics and Warning Electronics Assembly (MAWEA)
	Flight Management Computer (FMC)
	Communication Management Unit (CMU)
	Enhanced Ground Proximity Warning System (EGPWS)
	Central Maintenance Computer System (CMCS)
	Airplane Condition and Monitoring System (Data Management Unit (DMU) and Quick Access Recorder (QAR))
	Low Range Radio Altimeter (LRRA)
	Multi-Mode Receiver (MMR)
	Distance Measuring Equipment (DME)
	Automatic Direction Finder (ADF)
	VHF Omnidirectional Range/Marker Beacon (VOR/MB)
	Air Data Inertial Reference System (ADIRS)
	SATCOM
	Cockpit Voice Recorder (CVR)
	Flight Deck (FD) Printer
	Flight Data Recorder Systems (FDRS)
	Onboard Network System (ONS)
	Terminal Wireless LAN Unit (TWLU)
Automatic Fixed Emergency Locator Transmitter (ELT)	
HF/VHF Radio Communication Panel	

XVI. Model 747-8 (cont'd)

Airplane Area	Changed/Affected Areas
	Traffic Alert and Collision Avoidance System (TCAS) and Air Traffic Control (ATC) Systems Flight Deck Audio System (Audio Management Unit (AMU) and Audio Control Panels (ACP)
Cargo	Provisions including structural and electrical for Cargo Handling System for Lower Lobe Compartments Cargo Furnishings, Linings and Placards
Electrical Sub-systems	Duct Leak Detection System (DLDS) Integrated Wingtip Light Assembly (IWLA) Integrated Drive Generator (IDG) Main and APU battery Cabin Services System (CSS)
	Weight and Balance Computer of the On-Board Weight and Balance System Electrical Power Generation System Service and maintenance lights in the wheel wells, AC pack bay, Tailcone/APU compartment and forward EE bay Window Heat Control Unit (WHCU) and flight deck window sensors Dimmer control unit (DCU)
Electrical Wiring and Installation	Fuselage, Wing, Strut, Wheel Well, E/E Cooling, Cargo Handling, FQIS, Galley Systems, Door 2 Entry and Stairs, Door 5 Crew Rest, Lavatory, Water System, Waste System, Oxygen Systems, Cabin Services System and Engine Wiring Wing Fuel Tank Stringer clip Integration panels
Environmental Systems	Lower Lobe Cargo Fire Protection System Aft Cargo Air Conditioning (ACAC) System flow rate and ducting APU air supply ducting Air conditioning and trim ducting. E6/E9 equipment cooling supply line Forward cargo heat ducting Aft/bulk cargo heat ducting Recirculation fans Upper and lower recirculation filters Air distribution riser ducts. Lav/Galley Vent System (LGVS) ducting Air Supply Control System (ASCS)
	Wing Anti-Ice (WAI) System Cabin Air Conditioning Temperature Control System (CACTCS) Forward and aft electrical equipment (EE) cooling systems In-flight entertainment (IFE) cooling system Flight Deck Air Distribution System Alternate Ventilation System (AVS)
Escape Systems	Door 1 slide/raft with integral exterior emergency lighting Upper deck escape slide with integral exterior emergency lighting Escape Slide latch to pack board (all doors) Door 3 escape slide interface with wing flap
Flight Controls	Fly-by-Wire (FBW) spoiler and outboard aileron control system. Inboard and outboard aileron droop. Flight control mechanical component installations and flight control cables Upper and lower rudder actuator Autoflight software Integrated Standby Flight Display (ISFD) Rudder ratio changer

XVI. Model 747-8 (cont'd)

Airplane Area	Changed/Affected Areas
	Elevator feel computer Yaw damper control laws. Yaw damper stabilizer trim modules (YSM) Pitch Augmentation Control System (PACS) Lateral Modal Suppression control laws. Outboard Aileron Modal Suppression (OAMS) Flap control unit software Elevator Feel Shift (EFS) Roller brake assembly Lateral Augmented Pitch Function (LAPS) Landing Attitude Modifier (LAM) Inboard Spoiler Function (Spudders) Pedal
	Emergency Decent Spoilers (EDS) Rudder Input Linkages Stabilizer Trim Indication Maneuver Load Alleviation (MLA) augmentation function
Flight Deck	Forward instrument panel (FIP) structure Flight deck display interface Glareshield Pilot Compartment Viewing Flight deck lighting dimmer
Flight Deck Crew Accommodations	Emergency equipment stowage, equipment and placarding Flight manual stowage retention straps Flight deck stowage door latches Portable oxygen bottle stowage provisions PC power outlets for Captain and First Officer Hand microphones at all 4 crew positions Provisions to support EFB installation Crew oxygen mask stowage boxes Crew oxygen masks Overhead light Carpet periphery Boom microphone jack panels at all 4 crew positions
Flight Deck Crew Rest	Wall mounted seat
Fuels	Jettison System Auxiliary Power Unit (APU) Feed System line, pumps and plumbing Reserve Tank Transfer System Fuel System Scavenge Fuel tank structure Fuel Feed System Fuel Vent System Fuel Management System Refuel/Defuel System Fuel Quantity Indicating System (FQIS) and fuel level sensing Fuel sump system drain valves Flammability Reduction System (FRS) Horizontal Stabilizer Tank
Interior	Ceilings Stowage bins

XVI. Model 747-8 (cont'd)

Airplane Area	Changed/Affected Areas
	ceiling and bin secondary supports PSUs (including reading lights and gasper air) Sidewalls Window reveals Door and doorway linings Door 5 overhead attendant rest and entrance enclosure Closets/stowage units Partitions/class dividers Curtains Floor mounted stowages Emergency equipment stowages, equipment and related placarding Video control/Purser Work stations All main deck Lavatories
	Upper deck lavatories 6U and 8U All Galleys Door 2 stairs Cart Lift electronics, drive mechanism, frame guide mechanism, and control panel. Floor coverings Placarding throughout cabin LED interior general lighting. Interior emergency lighting Passenger & attendant seat installations Assist spaces and assist handles Paint schemes including door markings and placards Thermal acoustic blankets
Landing Gear Structures	Nose Landing Gear Body Landing Gear Wing Landing Gear
Mechanical and Hydraulic Systems	Landing gear alternate extend cables and brake cables Wheels, brakes, and tires. Brake system control unit software Body and wing gear retract actuators
	Body and wing gear door actuators Ram Air Turbine (RAT) and associated equipment and engine driven pumps (EDPs), EDP hoses and EDP check valves Hydraulic system (except RAT and associated equipment and EDPs, EDP hoses, and EDP check valves) Tire Pressure Indication System and Brake Monitor System Landing Gear Selection System System 2 & 3 Alternating Current Motor Pump (ACMP) Demand Pumps
Oxygen System	Passenger oxygen system distribution lines Door 5 crew rest oxygen system Second 115 cu. ft. crew oxygen cylinder provisions Composite oxygen cylinders.
Propulsion	GEnx-2B67, GEnx-2B67B, GEnx-2B67/P engines
	Engine Driven Hydraulic Pumps (EDP) Hydraulic tubing, hoses, and component installations on the engine. Hydraulic tubing, hoses, and component installations in the aft engine strut. APU fire extinguishing system extinguisher bottle, safety relief/filler port assembly, discharge head assembly, and discharge outlet/distribution plumbing.

XVI. Model 747-8 (cont'd)

Airplane Area	Changed/Affected Areas
	APU, APU Controls and APU Installation
	Engine Controls
	Thrust Reverser Systems
Propulsion - Structures	Strut, nacelle, thrust reverser, inlet, exhaust, and systems
Propulsion - Elec Sub-systems	APU power feeder
Water/Waste	Potable water tanks
	Waste water drain system
	Waste and Water lines
	Waste tanks
	Waste water service panel components
Wing	All wing structure
	Wing pylon structure
	Aft wall extension

B. The following section contains a listing of all regulations for which changed/affected areas of the aircraft comply with 14 CFR §25 at an Amendment level other than 25-120.

14 CFR §	Title	Amdt Level For Changed/Affected Areas	Comments
25.305	Strength and deformation.	25-0 for 25.305(b) for Airframe - Empennage (Outboard Elevator Balance Weight Tower) 25-0 for 25.305(b) for Systems Stress related to: Landing Gear (Landing gear alternate extend cables and brake cables, Body gear truck positioner mounting features), Hydraulics (Hydraulic reservoirs, hydraulic line, Rudder PCA tubing, LG retract actuators, aileron and spoiler PCUs, Hydraulic Systems 1 and 4 electric pump, PACS actuator and elevator feel shift module hydraulic tubing, Aft strut hydraulic installations), Flight Controls Rudder Control (Cables, mech components installations, upper/lower actuator installation, rudder input linkage), Flight Controls Elevator Control (Cables, mech components installations, Elevator Feel computer. Horizontal stabilizer trim actuator - trim arm switch and control wire) and Flight Controls High Lift (Flap Detents vs Dspeed, LE/TE components, flap drive stroke, flap skew detection).	
25.365	Pressurized compartment loads.	25-0 for 25.365(e), (f), and (g) for Systems Stress related to: Flight Deck (Linings, stowages, and latches, oxygen mask stowage box) 25-54 for 25.365(e)(2) for Fuselage and Floors – Section 41 Lower Lobe, Flight Deck, and Empennage (Forward fin box of vertical stab - unpressurized area)	
25.395	Control system.	25-23 for 25.395(a), (b), and (c) for Systems Stress related to: Flight Controls Rudder Control (Cables, mech components installations, upper/lower actuator installation, rudder input linkage), Flight Controls Elevator Control (Cables, mech components installations, Elevator Feel computer. Horizontal stabilizer trim actuator - trim arm switch and control wire) and Flight Controls High Lift (Flap Detents vs Dspeed, LE/TE components, flap drive stroke, flap skew detection).	

XVL. Model 747-8 (cont'd)

14 CFR §	Title	Amdt Level For Changed/Affected Areas	Comments
25.397	Control system loads.	25-38 for 25.397 for Systems Stress related to: Flight Controls Rudder Control (Cables, mech components installations, upper/lower actuator installation, rudder input linkage), Flight Controls Elevator Control (Cables, mech components installations, Elevator Feel computer. Horizontal stabilizer trim actuator - trim arm switch and control wire) and Flight Controls High Lift (Flap Detents vs Dspeed, LE/TE components, flap drive stroke, flap skew detection).	
25.415	Ground gust conditions.	25-0 for 25.415 for Systems Stress related to: Flight Controls Rudder Control (Cables, mech components installations, upper/lower actuator installation, rudder input linkage), Flight Controls Elevator Control (Cables, mech components installations, Elevator Feel computer. Horizontal stabilizer trim actuator - trim arm switch and control wire) and Flight Controls High Lift (Flap Detents vs Dspeed, LE/TE components, flap drive stroke, flap skew detection).	
25.561	General.	25-23 for Flight Deck – Flight Deck Seats 25-23 for Flight Deck - Wall Mounted Flight Deck Crew Rest Seat & Flight Deck Crew Rest Life Vest Installation Module (Static) - Stress	
25.562	Emergency landing dynamic conditions.	N/A for 25.562 for Flight Deck - Flight Deck Seats and Wall Mounted Flight Deck Crew Rest Seat	
25.571	Damage-tolerance and fatigue evaluation of structure.	<p>25-0 for 25.571(a) and (c) for Systems Stress related to: Flight Controls Rudder Control (Cables, mech components installations, upper/lower actuator installation, rudder input linkage), Flight Controls Elevator Control (Cables, mech components installations, Elevator Feel computer. Horizontal stabilizer trim actuator - trim arm switch and control wire) and Flight Controls High Lift (Flap Detents vs Dspeed, LE/TE components, flap drive stroke, flap skew detection).</p> <p>25-86 for 25.571(a) and (b) for Systems Stress related to Flight Controls – Lower Rudder Tab Push Rod. (Note: “External loads used in this analysis were evaluated in accordance with 25.571(b) at Amendment 25-120”)</p> <p>25-86 for 25.571(a) and (b) for All Fuselage (includes Floors, Doors, and Windows), All Wing, All Empennage. (Note: “External loads used in this analysis were evaluated in accordance with 25.571(b) at Amendment 25-120”)</p> <p>N/A for 25.571(a) and (c) for Landing Gear (Main Gear)</p>	

XVI. Model 747-8 (cont'd)

14 CFR §	Title	Amdt Level For Changed/Affected Areas	Comments
25.573	Fatigue evaluation of landing gear.	25-0 for 25.573(a) and (c) for Landing Gear (Main Gear)	
25.607	Fasteners.	<p>25-0 for 25.607 for Airframe – Empennage (Outboard Elevator Balance Weight Tower)</p> <p>25-0 for 25.607 for Flight Controls Elevator and Lateral Control (Control Wheels, Left and Right Forward Cable Quadrants, Forward Load Limiter Device, Right and Left Cable Systems, Aileron Feel and Centering Unit, Aileron Trim System, Lateral Central Control Actuator, Third Autopilot Servo, Aileron Programmer, Wing Cable System to Inboard Aileron PCU, No-back Brake assembly, Elevator Feel Computer and Autospeedbrake system to drive speedbrake lever) and High Lift Systems</p> <p>25-0 for 25.607 for Hydraulics (except RAT and hydraulics associated with engine installations)</p> <p>25-0 for 25.607 for Systems Stress related to: Landing Gear (Landing gear alternate extend cables and brake cables, Body gear truck positioner mounting features), Hydraulics (Hydraulic reservoirs, hydraulic line, Rudder PCA tubing, LG retract actuators, aileron and spoiler PCUs, Hydraulic Systems 1 and 4 electric pump, PACS actuator and elevator feel shift module hydraulic tubing, Aft strut hydraulic installations), Flight Controls Rudder Control (Cables, mech components installations, upper/lower actuator installation, rudder input linkage), Flight Controls Elevator Control (Cables, mech components installations, Elevator Feel computer. Horizontal stabilizer trim actuator - trim arm switch and control wire) and Flight Controls High Lift (Flap Detents vs Dspeed, LE/TE components, flap drive stroke, flap skew detection).</p>	
25.613	Material strength properties and design values.	25-46 for 25.613 for Airframe – Empennage (Outboard Elevator Balance Weight Tower)	
25.615	Design properties.	25-23 for 25.615 for Airframe – Empennage (Outboard Elevator Balance Weight Tower)	

XVI. Model 747-8 (cont'd)

14 CFR §	Title	Amdt Level For Changed/Affected Areas	Comments
25.625	Fitting factors.	25.23 for 25.625(a), (b) and (c) for System Stress related to: Hydraulics (Hydraulic reservoirs, hydraulic line, Rudder PCA tubing, LG retract actuators, aileron and spoiler PCUs, Hydraulic Systems 1 and 4 electric pump , PACS actuator and elevator feel shift module hydraulic tubing, Aft strut hydraulic installations), Landing Gear (Landing gear alternate extend cables and brake cables, Body gear truck positioner mounting features), Flight Controls Rudder Control (Cables, mech components installations, upper/lower actuator installation, rudder input linkage), Flight Controls Elevator Control (Cables, mech components installations, Elevator Feel computer. Horizontal stabilizer trim actuator - trim arm switch and control wire) and Flight Controls High Lift (Flap Detents vs Dspeed, LE/TE components, flap drive stroke, flap skew detection).	
25.675	Stops.	<p>25-0 for 25.675(a), (b), and (c) for Flight Controls - Elevator and Lateral Control (Control Wheels, Left and Right Forward Cable Quadrants, Forward Load Limiter Device, Right and Left Cable Systems, Aileron Feel and Centering Unit, Aileron Trim System, Lateral Central Control Actuator, Third Autopilot Servo, Aileron Programmer, Wing Cable System to Inboard Aileron PCU, No-back Brake assembly, Elevator Feel Computer and Autospeedbrake system to drive speedbrake lever), Rudder (Rudder cables, Rudder PCMs, Rudder PCAs, Press-to-Center function, Remote compensators, Rudder Anti-cav/relief valves; Primary control linkage aft of aft quadrant, secondary linkage (buss linkage), rudder input linkage) and Stabilizer (Trim arm and control wires)</p> <p>25-0 for 25.675(a) and (b) for Flight Controls High Lift System</p> <p>25-0 for 25.675(c) for System Stress related to: Flight Controls Rudder Control (Cables, mech components installations, upper/lower actuator installation), Flight Controls Elevator Control (Cables, mech components installations, Elevator Feel computer. Horizontal stabilizer trim actuator - trim arm switch and control wire) and Flight Controls High Lift (Flap Detents vs Dspeed, LE/TE components, flap drive stroke, flap skew detection).</p>	

XVI. Model 747-8 (cont'd)

14 CFR §	Title	Amdt Level For Changed/Affected Areas	Comments
25.677	Trim systems.	<p>25-23 for 25.677(a), (b), (c), and (d) for Flight Controls Elevator and Lateral Control System (Control Wheels, Left and Right Forward Cable Quadrants, Forward Load Limiter Device, Right and Left Cable Systems, Aileron Feel and Centering Unit, Aileron Trim System, Lateral Central Control Actuator, Third Autopilot Servo, Aileron Programmer, Wing Cable System to Inboard Aileron PCU, No-back Brake assembly, Elevator Feel Computer and Autospeedbrake system to drive speedbrake lever)</p> <p>25-23 for 25.677(a), (b), and (c) for Flight Controls Rudder (Rudder cables, Rudder PCMs, Rudder PCAs, Press-to-Center function, Remote compensators, Rudder Anti-cav/relief valves) and Stabilizer (Trim arm and control wires)</p> <p>25-23 for 25.677(b) for Flight Controls Stabilizer trim indicator and greenband on flight deck</p>	
25.683	Operation tests.	25-0 for 25.683 for Systems Stress related to: Flight Controls Rudder Control (Cables, mech components installations, upper/lower actuator installation, rudder input linkage), Flight Controls Elevator Control (Cables, mech components installations, Elevator Feel computer. Horizontal stabilizer trim actuator - trim arm switch and control wire) and Flight Controls High Lift (Flap Detents vs Dspeed, LE/TE components, flap drive stroke, flap skew detection).	
25.685	Control system details.	25-0 for 25.685(a), (b), and (c) for Flight Controls Elevator and Lateral Control System (Control Wheels, Left and Right Forward Cable Quadrants, Forward Load Limiter Device, Right and Left Cable Systems, Aileron Feel and Centering Unit, Aileron Trim System, Lateral Central Control Actuator, Third Autopilot Servo, Aileron Programmer, Wing Cable System to Inboard Aileron PCU, No-back Brake assembly, Elevator Feel Computer and Autospeedbrake system to drive speedbrake lever)	
25.693	Joints.	25-0 for 25.693 for Systems Stress related to: Flight Controls Rudder Control (Cables, mech components installations, upper/lower actuator installation, rudder input linkage), Flight Controls Elevator Control (Cables, mech components installations, Elevator Feel computer. Horizontal stabilizer trim actuator - trim arm switch and control wire) and Flight Controls High Lift (Flap Detents vs Dspeed, LE/TE components, flap drive stroke, flap skew detection).	
25.701	Flap interconnection.	25-23 for 25.701(a) for Flight Controls High Lift System	
25.783	Doors.	25-88 for 25.783 for Forward and Aft Lower Lobe Cargo Doors 25-23 for 25.783 for Airframe - Bulk Cargo Door, Passenger Entry Doors 1-5 and ECS pack bay access panels.	
25.785	Seats, berths, safety belts, and harnesses.	<p>25-32 for 25.785(h)(2) for Interiors - Zone A (Cabin Attendant Direct View)</p> <p>25-32 for 25.785(a) 25.785(b) for Flight Deck Seats</p> <p>25.32 for 25.785 (a), (i) for Flight Deck – Wall mounted Flight Deck Crew Rest Life Vest Installation Module (Static) Stress</p> <p>25-32 for 25.785 for Flight Deck - Wall Mounted Flight Deck Crew Rest Seat (including static stress)</p>	

XVI. Model 747-8 (cont'd)

14 CFR §	Title	Amdt Level For Changed/Affected Areas	Comments
25.795	Security considerations.	25-127 for 25.795(b)(2) for Environmental Systems – Air Distribution System 25-127 for 25.795(a) for Flight Deck –vertical portions of the flight deck boundaries that are common to the passenger compartment	25-106 for flight deck door
25.809	Emergency exit arrangement.	25-114 for 25.809(a) for Escape Systems – Flight deck over head exit and passenger door 3.	
25.812	Emergency lighting.	25-128 for 25.812 for Exterior Lights for Flight Deck Exits	
25.863	Flammable fluid fire protection.	25-0 for 25.863(a) and (b) for Flight Controls Elevator and Lateral Control System (Control Wheels, Left and Right Forward Cable Quadrants, Forward Load Limiter Device, Right and Left Cable Systems, Aileron Feel and Centering Unit, Aileron Trim System, Lateral Central Control Actuator, Third Autopilot Servo, Aileron Programmer, Wing Cable System to Inboard Aileron PCU, No-back Brake assembly, Elevator Feel Computer and Autospeedbrake system to drive speedbrake lever)	
25.869	Fire protection: Systems	N/A for 25.869(a)(1) for Hydraulics Electrical (Hydraulics system fire shutoff valve and flight control shutoff valve; Hydraulic fluid quantity probe in each reservoir) 25.1359(d) at Amdt 25-32 for 25.869(a)(4) for Hydraulics Electrical (Hydraulics system fire shutoff valve and flight control shutoff valve; Hydraulic fluid quantity probe in each reservoir; Ground Fault Interrupt) and Flight Controls High Lift	<i>Compliance to be shown to CFR25.1359(d) Amdt 25-32 in lieu of CFR25.869(a)(4) Amdt 120 for Hydraulics Electrical.</i>
25.899	Electrical bonding and protection against static electricity.	25-123	
25.903	Engines.	25-57 for 25.903(a) and (c) for Propulsion - APU	
25.981	Fuel tank ignition prevention.	25-125 for 25.981(a), (b), and (c) for Propulsion - Nitrogen Generation System (NGS)	
25.1013	Oil tanks.	25-57 for 25.1013(a) and (c) for Propulsion - APU	
25.1093	Induction system deicing and anti-icing provisions.	25-57 for 25.1093(b) for Propulsion - APU	
25.1103	Induction system ducts.	25-23 for 25.1103(b)(2) for Propulsion - APU	
25.1141	Powerplant controls: General.	25-40 for 25.1141(f)(2) for Propulsion - APU	
25.1181	Designated fire zones: Regions included.	25-23 for 25.1181(b) for Propulsion - APU	
25.1183	Lines and fittings.	25-57 for 25.1183 for Propulsion - APU	
25.1305	Powerplant instruments.	25-54 for 25.1305(a)(7) for Propulsion - APU	

XVI. Model 747-8 (cont'd)

14 CFR §	Title	Amdt Level For Changed/Affected Areas	Comments
25.1309	Equipment systems and installations.	25-0 for 25.1309(a), (b), (c), and (d) for Flight Controls Elevator and Lateral Control System (Control Wheels, Left and Right Forward Cable Quadrants, Forward Load Limiter Device, Right and Left Cable Systems, Aileron Feel and Centering Unit, Aileron Trim System, Lateral Central Control Actuator, Third Autopilot Servo, Aileron Programmer, Wing Cable System to Inboard Aileron PCU, No-back Brake assembly, Elevator Feel Computer and Autospeedbrake system to drive speedbrake lever)	
25.1317	High-intensity radiated fields (HIRF) protection.	25-122	
25.1323	Airspeed indicating system.	25-108 for 25.1323(a), (b), and (c) for Flight Controls – Integrated Standby Flight Display 25-108 for 25.1323(b), (c), (d), (e), and (f) for Avionics – ADIRS 25-108 for 25.1323(b) and (c) for Aerodynamic Configurations	
25.1329	Flight guidance system.	25-46 for Avionics – Flight Management Computer System 25-46 for Flight Controls - Autopilot Flight Director System 25-46 for 25.1329(f) for Flight Controls Elevator and Lateral Control System (Control Wheels, Left and Right Forward Cable Quadrants, Forward Load Limiter Device, Right and Left Cable Systems, Aileron Feel and Centering Unit, Aileron Trim System, Lateral Central Control Actuator, Third Autopilot Servo, Aileron Programmer, Wing Cable System to Inboard Aileron PCU, No-back Brake assembly, Elevator Feel Computer and Autospeedbrake system to drive speedbrake lever)	
25.1335	Flight director systems.	25-41 for Flight Controls - Autopilot Flight Director System	
25.1353	Electrical equipment and installations.	25-42 for 25.1353(a) for Hydraulics (Hydraulics system fire shutoff valve and flight control shutoff valve) 25-42 for 25.1353(a) for Electrical Subsystems - APU 25-42 for 25.1353(a) and (b) for Flight Controls High Lift System	

XVI. Model 747-8 (cont'd)

14 CFR §	Title	Amdt Level For Changed/Affected Areas	Comments
25.1431	Electronic equipment.	N/A for 25.1431(d) for Hydraulics)Hydraulic fluid quantity probe in each reservoir) N/A for 25.1431(d) for Electrical Subsystems - APU	
25.1435	Hydraulic systems.	25-0 for 25.1435(a) and (b) for Flight Controls Elevator and Lateral Control (Control Wheels, Left and Right Forward Cable Quadrants, Forward Load Limiter Device, Right and Left Cable Systems, Aileron Feel and Centering Unit, Aileron Trim System, Lateral Central Control Actuator, Third Autopilot Servo, Aileron Programmer, Wing Cable System to Inboard Aileron PCU, No-back Brake assembly, Elevator Feel Computer and Autospeedbrake system to drive speedbrake lever), Rudder (Rudder cables, Rudder PCMs, Rudder PCAs, Press-to-Center function, Remote compensators, Rudder Anti-cav/relief valves; Primary control linkage aft of aft quadrant, secondary linkage (buss linkage) and Stabilizer (Trim arm and control wires) 25-41 for 25.1435(a)(1), (a)(5), (a)(6), (a)(7), and (b)(2) for Flight Controls High Lift System 25-41 for 25.1435(a)(1), (a)(2), (a)(4), (a)(5), (a)(6), (a)(7), (a)(8), (b)(1), (b)(2), and (c) for Hydraulics (except RAT and hydraulics associated with engine installations)	
25.1457	Cockpit voice recorders.	25-124 for 25.1457(a)(6), (d)(1), (d)(4), (d)(5)(i), (d)(5)(ii), (d)(5)(iii), (6)(e)(1) for Avionics - Cockpit Voice Recorder	
25.1459	Flight recorders.	25-124 for 25.1459(a)(3), (a)(7) and (a)(8) for Avionics – Flight Data Recorder System	
25.1522	APU Limitations.	25-46 for 25.1522 for Propulsion - APU	
25.1551	Oil quantity indicator.	25-0 for 25.1551 for Propulsion - APU	

C. The following section contains a listing of all regulations for which unchanged/unaffected areas of the aircraft comply with 14 CFR §25 at an Amendment level greater than the 747-400 Amendment level.

14 CFR §	Title	Amdt Level For Unchanged/Unaffected Areas
25.305	Strength and deformation.	25-120 for 25.305(a), (b) and (c) for Airframe - Fuselage
25.365	Pressurized cabin loads.	25-54 for 25.365(e) for Airframe – Fuselage - Flight deck floor beams/frames (not affected from decompression standpoint)

XVI. Model 747-8 (cont'd)

14 CFR §	Title	Amdt Level For Unchanged/Unaffected Areas
25.571	Damage-tolerance and fatigue evaluation of structure.	25-86 for 25.571(a) and (b) for Airframe – Empennage and Fuselage. (Note: “External loads used in this analysis were evaluated in accordance with 25.571(b) at Amendment 25-120”) 25-120 for 25.571(d) and (e) for Airframe – Empennage and Fuselage
25.795(a)	Security considerations.	25-127 for 25.795(a) for Vertical portions of the flight deck boundary common to passenger compartment

Additional Certification Basis Information:

Based on 14 CFR §21.101(g) for changes made to TCs applicable provisions of 14 CFR part 26 are included in the certification basis. For any future 14 CFR part 26 amendments, the holder of this TC must demonstrate compliance with the applicable sections

Compliance has been found for the following regulations at Amendment 26-0: §26.11

Compliance has been found for the following regulations at Amendment 26-1: §26.49

Compliance has been found for the following regulations at Amendment 26-4: §26.43 and §26.45

14 CFR §34 of the FAR as amended by Amendments 34-1 through 34-4, and any later amendments in existence at the time of certification

14 CFR §36 of the FAR as amended by Amendments 36-1 through 36-28, and any later amendments in existence at the time of certification

Exemptions from 14 CFR §25:

Applicable Part 25 Section	Amdt Level	Subject	Exemption Number	Date Issued	Expiration Date (if applicable)
25.809(a)	25-116	Exterior Outside Viewing Means	10376 10376A	10/20/2011 12/27/2012	8/1/2014 Through LN1498
25.841(a) (2) and (a)(3)	25-87	Pressurized Cabins – Uncontained Engine Failure	9943 9943A	10/29/2009 7/12/2011	None
25.901(c)	25-46	Installation - No Single Failure Criteria Partial Exemption	8518	03/23/2005	None
25.981(a)(3)	25-102	Fuel Tank Ignition Prevention - Fuel Tank Structural Fastener Penetrations	10174	12/14/2010	None
25.1305(c)(6) 25.1309(c)	25-120	Fuel System Contamination	10267 10267A 10267B	05/19/2011 08/05/2011 06/07/2013	12/31/2016 06/30/2014 12/31/2016
25.813(e)		Installation of doors on mini-suites in the passenger compartment	10781	05/30/2013	(NoExpire)

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The following regulations have been complied with by findings of an Equivalent Level of Safety:

Applicable Part 25 Section	Amndt Level	Subject	ELOS Number
25.107(e)(1)(iv)		Minimum Unstick Speed (VMU)	TC6918SE-T-F-6 Rev 1
25.161(a) and (c)(3) 25.1301(a) 25.1309(a)		Longitudinal Trim	PS05-0212-F-4
25.689(a)(1)		Control Cable Diameter	PS05-0212-SF-2
25.777(e)	25-46	Wing Flap Control Lever	PS05-0212-SF-1
25.783(e)	25-88	Visual Indication of Forward and Aft Lower Lobe Cargo Door Locked Condition	PS05-0212-C-1
25.807 25.813(a) and (b)		Upper Deck 22" Passageway	PS05-0211-C-16
25.809(a)		Outside Viewing Means for Upper Deck Emergency Exits	PS05-0211-C-15
25.810(a)(1)(ii)		10 Second Inflation (in Lieu of 6 Seconds) for Type A U/D Exits.	PS05-0211-C-5
25.811		Door Sill Reflectance	TC6918SE-T-CS-2 Rev 1
25.811		Exterior Exit Markings	TC6918SE-T-CS-2 Rev 1
25.815		Width of Aisle	ANM-100S-0120-CI-1 Rev 1
25.831(g)		Acceptable High Temperature Physiological Environment During Failure Conditions	PS05-0020-ES-3 Rev 1
25.863 25.1182(a) 25.1183(a)		Engine Nacelle Power Door Opening System (PDOS) Fire Testing	PS05-0211-P-6
25.863 25.1182(a) 25.1183(a)		Nacelle Areas Behind Firewalls for Thrust Reverser Directional Control Valve (DCV)	PS05-0212-P-18
25.899(a)(2) 25.901(c) 25.954 25.981(a)(3) and (b) 25.1309(a) and (b)		Equivalent Safety Finding for Zero Fuel Horizontal Stabilizer Fuel Tank (HST)	PS05-0211-P-25
25.933		Flight Critical Thrust Reverser	TC6918SE-T-P-2 Rev 1
25.934		Engine and Thrust Reverser System Testing	TC6918SE-T-P-17 Rev 1
25.981(a)(3)		Means of Compliance for the Installation of GFI Relays on Boeing Model 707, 727, 737CL, 737NG, 747 CL, 747-400, 757, 767, & 777 Airplanes	PS05-0123-P-1 Rev 1
25.981(b)	25-125	Fuel Tank Flammability Reduction Rule	PS05-0177-P-2
25.981(a)(3)		Equivalent Safety Finding for Ground Fault Interrupter Circuit Protection for Fuel Override and Jettison Pumps	PS05-0212-P-24
25.997(d) 25.1305(c)(6)		Warning Means for Engine Fuel Filter Contamination	PS05-0212-P-4
25.1145(a) and (b)		Ignition Switches	PS05-0212-P-5
25.1181(a)(6) 25.1182(a)		Fire Safety Requirements for the GENx-2B Engine Fan Case	PS05-0211-P-23
25.1182 25.1183		Fire Safety Requirements for the Aft Strut Fairing Compartment	PS05-0212-P-21
25.1193		Cowling and Nacelle Skin Fireproof Regions	PS05-0212-P-16
25.1301(a), and (d) 25.1309(a), and (c)		Transition Speed of Enhanced Ground Proximity Warning System (EGPWS) Mode 4 Alerts; Too Low Flaps/Too Low Terrain	PS05-0212-S-3
25.1303(c)(1)		Overspeed Aural Warning	TC6918SE-T-SA-11 Rev 1

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Applicable Part 25 Section	Amndt Level	Subject	ELOS Number
25.1325(e)		Standby Air Data System	PS05-0212-F-3
25.1415(c)		Remote Stowage of Door 1 Slide/Raft Survival Kits	PS05-0211-C-9
25.1435(b)(1)	25-104	Request for an Equivalent Level of Safety Finding for the Hydraulic System Pressure Test	PS05-0212-SF-4
25.1517		Rough Air Speed (VRA)	TC6918SE-T-F-4 Rev 1
25.1529 Appendix H		Maintenance Planning Document Section 9 (Instructions for Continued Airworthiness)	PS05-0212-P-G-8
25-430-SC item 14		No smoking placards in stairway	PS08-0750-C-18

Note: The 777F issue paper ES-3, stage 4, "Acceptable High Temperature Physiological Environment During Failure Conditions," signed January 18, 2008 references the July 31, 2003 version of the Mechanical Systems Harmonization Working Group (MSHWG) final report on § 25.831(g). The Actual version of the MSHWG final report approved unanimously by the Transport Airplane Engine Issues Group (TAEIG) was dated July 24, 2003. The draft rule, transient heat analysis, and body core limits are the same in the July 24, 2003 and July 31, 2003 versions of the MSHWG final report. Compliance findings should reference the July 24, 2003 version of the MSHWG final report on § 25.831(g).

Special Conditions with respect to the following subjects apply to the 747-8:

Special Condition Number	Effective Date	Subject
25-368-SC	03/17/2008	Seats with Non-Traditional, Large, Non-Metallic Panels
25-385-SC	11/09/2009	Structural Design Requirements for Four-Post Main Landing Gear System
25-387-SC	09/11/2009	Additional Airframe Structural Design Requirements Related to Sudden Engine Stoppage Due to Fan Blade Failures
25-388A-SC	06/27/2011	Interaction of Systems and Structures
25-401-SC	02/16/2010	Systems and Data Networks Security--Protection of Airplane Systems and Data Networks From Unauthorized External Access
25-402-SC	02/16/2010	Design Roll Maneuver Requirement
25-421-SC	04/18/2011	Security Protection of Aircraft Control Domain and Airline Information Domain from the Passenger Entertainment Domain
25-430-SC	07/01/2011	Stairwell Between the Main and Upper Decks
25-438-SC	08/01/2011	Door 1 Extendable Length Escape Slide
25-442-SC	08/24/2011	Overhead Flight Attendant Rest Compartment
25-446-SC	09/28/2011	Upper Deck Occupancy

Additional Design Requirements and Conditions:

The following design details or information must be maintained to ensure that an unsafe design condition is not present:

14 CFR 25.1329 – Flight Guidance System

The following design features must be incorporated in the type design (reference § 25.1329, Amendment 25-46). In lieu of the following, compliance to 25.1329, Amendment 25-119, may be shown.

1. Quick autopilot disconnect switches for each pilot on the outboard arm of each control wheel and quick autothrust disconnect switches for each pilot on the underside of the thrust control levers for engines 1 and 4.
2. Positive disconnect function for the autopilot is provided by the disconnect bar located at the glare shield on the autopilot mode control panel (MCP).
3. Positive disconnect function for the autothrottle is provided by the autothrottle arm switch, also located on the MCP.
4. Automatic synchronization of the autopilot and autothrust functions is provided in order to ensure transient free engagement and mode switching.
5. Automatic stabilizer trim is used to offload the elevator in order to ensure transient free disengagement of the autopilot pitch axis.
6. The wheel position provides a visual and tactile indication of any wheel input which may be required at disengagement of the autopilot roll axis.
7. When multiple autopilot channels are engaged, disengagement of an individual autopilot does not result in a transient any greater than a minor transient.
8. The throttle levers remain in the current position when the autothrust function is disengaged.

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9. Failures of the automatic stabilizer trim function, and other detected failures which degrade autopilot operation but do not pose an immediate hazard to the airplane, result in activation of the master caution light and aural, as well as the display of an AUTOPILOT caution message.
10. Detected failures which do pose an immediate hazard to the airplane, result in an autopilot disconnect with associated autopilot disconnect warning level annunciation that includes activation of the master warning light and aural as well as the display of an AUTOPILOT warning message.
11. Transition from multiple autopilot operation to single autopilot operation (with associated yaw axis autopilot servo disconnect), during engine inoperative go-around, does not require exceptional piloting skill, alertness, or strength.
12. The AFDS provides low speed protection via the following features:
 - a. The AFDS controls to an angle-of-attack which corresponds to one degree below the stick shaker angle-of-attack.
 - b. The AFDS take-off mode provides windshear recovery guidance which meets the criteria of AC 25-12 and AC 120-41.
 - c. An indication to the flight crew of a low speed condition includes the display of the stick shaker angle-of-attack via a pitch limit indicator (PLI).
 - d. The thrust management function (TMF), when engaged in SPD mode, provides low speed protection when the AFDS vertical speed (V/S) mode is engaged and commanding a climb. In addition, if the angle-of-attack rises above a fixed reference point, the AFDS issues a V/S mode failure by removing the pitch flight director bars if the flight director is turned on.
 - e. If the autopilot is engaged, a V/S mode failure will result in an amber line being drawn through the V/S mode annunciation on the primary flight display (PFD), illumination of the master caution light, activation of the master caution aural, and display of an AUTOPILOT caution message.
 - f. An indication to the flight crew of a low speed condition is an AIRSPEED LOW caution message when the airspeed drops below the top of the lower amber band of the airspeed indicator.
 - g. The AFDS provides low speed protection by controlling to a reference angle-of-attack when in Flight Level Change (FLCH) mode. An additional indication to the flight crew of a low speed condition is an AIRSPEED LOW caution message when the airspeed drops below the top of the lower amber band.
 - h. When the AFDS altitude capture (ALT CAP) mode is engaged, the TMF, if engaged in SPD mode, provides low speed protection. In addition, under certain conditions the AFDS will provide altitude capture speed floor protection by controlling to a speed no lower than 5 knots below the MCP selected speed.
 - i. If the AFDS altitude capture mode is engaged, and the angle-of-attack rises above a fixed reference point the AFDS will issue an ALT CAP mode failure by removing the pitch flight director bars if the flight director is turned on. If the autopilot is engaged, the ALT CAP mode failure will result in a mode annunciation on the Primary Flight Display (PFD), illumination of the master caution light, activation of the master caution aural, and display of an AUTOPILOT caution message. An additional indication to the flight crew of a low speed condition is an AIRSPEED LOW caution message when the airspeed drops below the top of the lower amber band.
 - j. When the AFDS Altitude Hold (ALT HLD) mode is engaged, the TMF, if engaged in SPD mode, provides low speed protection. An additional indication to the flight crew of a low speed condition is an AIRSPEED LOW caution message when the airspeed drops below the top of the lower amber band.
 - k. When the AFDS Vertical Navigation (VNAV) mode is engaged, the TMF, if engaged in SPD mode, provides low speed protection. Otherwise, when engaged in VNAV SPD, the FMF provides low speed protection. An additional indication to the flight crew of a low speed condition is an AIRSPEED LOW caution message when the airspeed drops below the top of the lower amber band.
 - l. When the AFDS glideslope (G/S) mode is engaged, the TMF, if engaged in SPD mode, provides low speed protection. An additional indication to the flight crew of a low speed condition is an AIRSPEED LOW caution message when the airspeed drops below the top of the lower amber band.
 - m. When the AFDS go-around mode is engaged, the AFDS provides low speed protection by controlling to an angle-of-attack which corresponds to one degree below the stick shaker angle-of-attack. The AFDS go-around mode provides windshear recovery guidance and meets the criteria of AC 25-12 and AC 120-41. An additional indication to the flight crew of a low speed condition includes the display of the stick shaker angle-of-attack (via a pitch limit indicator (PLI)).
 - n. Autothrottle wake-up requires that the autothrottle arm switch, located on the MCP, be in the ARM position. When the AFDS is not in takeoff, go-around, FLCH, or VNAV SPD modes, the autothrottle will automatically engage into SPD mode and provide speed protection when the airspeed drops approximately 5 to 10 knots below the top of the lower amber band.

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13. The AFDS provides high speed protection via the following features:
- a. Indication to the flight crew of a high speed condition is an OVERSPEED warning message when the airspeed/Mach number exceeds VMO/MMO
 - b. When the AFDS takeoff mode is engaged, the AFDS provides high speed protection by controlling to the flap placard (flaps down) or VMO/MMO (flaps up).
 - c. When the AFDS V/S mode is engaged, the TMF, if engaged in SPD mode, provides high speed protection.
 - d. When the AFDS FLCH mode is engaged, the AFDS provides high speed protection by controlling to the flap placard (flaps down) or VMO/MMO (flaps up).
 - e. When the AFDS ALT CAP mode is engaged, the TMF, if engaged in SPD mode, provides high speed protection.
 - f. When the AFDS ALT HLD mode is engaged, the TMF, if engaged in SPD mode, provides high speed protection.
 - g. When the AFDS VNAV mode is engaged, the TMF, if engaged in SPD mode, provides high speed protection. Otherwise, when engaged in VNAV SPD, the FMF provides high speed protection.
 - h. When the AFDS G/S mode is engaged, the TMF, if engaged in SPD mode, provides high speed protection.
 - i. When the AFDS go-Around mode is engaged, the AFDS provides high speed protection by controlling to the flap placard (flaps down) or VMO/MMO (flaps up).
14. For the flight guidance system functions, controls, indications, and alerts, means are provided to indicate the current mode of operation as well as any armed modes. Mode transitions are indicated on the Primary Flight Display (PFD) and highlighted with boxes that are displayed around the changed mode for ten seconds following the mode change. The indications are visible to each pilot under all expected lighting conditions during the flight deck lighting evaluation.
15. Autopilot disengagement is annunciated via illumination of the master warning light, activation of the master warning aural, and via the display of an AUTOPILOT warning message. A dedicated autopilot warning provides for an aural warning which is unique from all of the other aural warnings.
16. Override of the Autothrust by the flight crew using the throttles does not require excessive force, and does not create a potential hazard to the airplane.

Unrelated to the necessary design features itemized above, the FAA wishes to make the following clarifying statement. The FAA has determined the equivalent safety finding associated with Longitudinal Trim (IP F-4) does not affect the exception granted for § 25.1329.

14 CFR 25.365(e)(2) – Section 41 Lower Lobe (BS 140-460)

The following design features must be incorporated in the type design (reference § 25.365, Amendment 25-54). In lieu of incorporating the following design features, compliance to § 25.365, Amendment 25-120, may be shown.

Section 41 Lower Lobe (BS 140-460):

When evaluating this compartment for compliance to § 25.365, the compartment must be analyzed using the following two conditions:

- (1) A 3.7 square foot opening (forward EE Bay access door) with the BS 464 cargo liner intact (3.7 sf), and
- (2) A 20.0 square foot opening with the BS 464 cargo liner blown down. This essentially combines the Section 41 Lower Lobe and the forward cargo compartment into one compartment in the analysis.

Damage Tolerance and Fatigue Evaluation of Structure**14 CFR 25.571(a) and (b) – Wing, Empennage, Fuselage, Floors and Doors**

The following design features must be incorporated in the type design (reference § 25.571(a) and (b), Amendment 25-86). In lieu of incorporating the following design features, compliance to § 25.571(a) and (b), Amendment 25-120, may be shown.

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- (1) For the 747-8 structure, an evaluation of the existing damage tolerance analysis (DTA) inspection program identified in the Supplemental Structural Inspection Document (SSID) must be performed for any required changes due to loads, geometry changes, material changes, etc. The resulting inspection requirements for the 747-8 must be included in Section 9 (Airworthiness Limitations) of the Boeing Maintenance Planning Document (MPD) D621U400 in accordance with § 25.571(a)(3) at Amendment 25-120.
- (2) The above evaluation must include loading magnitudes and loading spectra which are developed in accordance with § 25.571 at Amendment 25-120. This includes usage of the 1.15 factor for pressure acting alone in accordance with § 25.571(b)(5) at Amendment 25-120.
- (3) Maintenance instructions must be based on in-service data and fatigue testing to ensure freedom from widespread fatigue damage.

Production Basis: Production Certificate No. 700 has been issued to The Boeing Company.

Equipment: The basic required equipment as prescribed in the applicable airworthiness regulations (see Certification Basis) must be installed in the aircraft for certification.

NOTES APPLICABLE TO SECTION XV MODEL 747-8F and SECTION XVI MODEL 747-8 ONLY:

- NOTE 1. A current Weight and Balance Manual including a list of equipment included in the certificated empty weight and loading instructions must be in each aircraft at the time of original airworthiness certification and at all times thereafter except in the case of an operator having an approved weight control system.
- NOTE 2. Airplane operation must be in accordance with the FAA Approved Airplane Flight Manual. All placards required by either the FAA Approved Airplane Flight Manual, the applicable operating rules or the certification basis must be installed in the airplane.
- NOTE 3. The FAA approved Airworthiness Limitations Section of the Instructions for Continued Airworthiness are referenced in Maintenance Planning Data Document (MPD) Section 9 - Airworthiness Limitations and Certification Maintenance Requirements; Boeing Document D011U721-02. The Airworthiness Limitations section is FAA-approved and specifies maintenance required under 14 CFR 43.16 and 91.403 of the Federal Aviation Regulations, unless an alternative program has been FAA approved. The following documents are the FAA approved requirements to comply with 14 CFR 25.1529, 43.16 and 91.403:
- D011U721-02-01, 747-8/8F Airworthiness Limitations (AWLs)
D011U721-02-02, 747-8/8F Airworthiness Limitations (AWLs) - Line No. Specific
D011U721-02-03, 747-8/8F Certification Maintenance Requirements (CMRs)
D011U721-02-04, 747-8/8F Special Compliance Items (SCIs)/Airworthiness Limitations
- NOTE 4. Engine Intermix of GENx-2B67, GENx-2B67B and GENx-2B67/P engines is allowed in accordance with a method approved by the FAA.

...-END-....