APPENDIX A: AIRFIELD DESIGN REQUIREMENTS

INTRODUCTION

This Appendix discusses runway and taxiway design standards and runway length requirements.

DESIGN STANDARDS

Guidance on airport design standards is found in FAA Advisory Circular 150/5300-13A, *Airport Design*. Airport design standards provide basic guidelines for a safe, efficient, and economic airport system. Careful selection of basic aircraft characteristics for which the airport will be designed is important. Airport designs based only on existing aircraft can severely limit the ability to expand the airport to meet future requirements for larger, more demanding aircraft. Airport designs that are based on large aircraft unlikely to operate at the airport are not economical.

Design Aircraft

Planning a new airport or improvements to an existing airport requires the selection of one or more "design aircraft." FAA design standards for an airport are determined by a coding system that relates the physical and operational characteristics of an aircraft to the design and safety separation distances of the airfield facility. The design aircraft is the most demanding aircraft operating or forecast to operate at the airport on a regular basis, which is typically considered 500 annual operations. The design aircraft may be a single aircraft, or a grouping of aircraft.

The first consideration should be the safe operation of aircraft that regularly use the airport. According to FAA AC 150/5300-13A, any operation of an aircraft that exceeds design criteria of the airport may result in either an unsafe operation or a lesser safety margin unless air traffic control (ATC) Standard Operating Procedures (SOPs) are in place for those operations. However, the AC also states that it is not the usual practice to base the airport design on an aircraft that uses the airport infrequently, and it is appropriate and necessary to develop ATC SOPs to accommodate faster and/or larger aircraft that use the airport occasionally.[1] The FAA typically only provides funding for the airport to be designed to existing and forecasted critical aircraft that are expected to exceed 500 annual operations.

Airport and Runway Classifications

The FAA has established aircraft classification systems that group aircraft types based on their performance and geometric characteristics. These classification systems, described below and illustrated in **Table 1** and **Exhibit 1**, are used to determine the appropriate airport design standards for specific runway, taxiway, apron, or other facilities, as described in FAA AC 150/5300-13A *Airport Design*.

[1] FAA Advisory Circular 150/5300-13A, *Airport Design*

- **Aircraft Approach Category (AAC)**: a grouping of aircraft based on approach speed.

- **Airplane Design Group (ADG)**: a classification of aircraft based on wingspan and tail height. When the aircraft wingspan and tail height fall in different groups, the higher group is used.

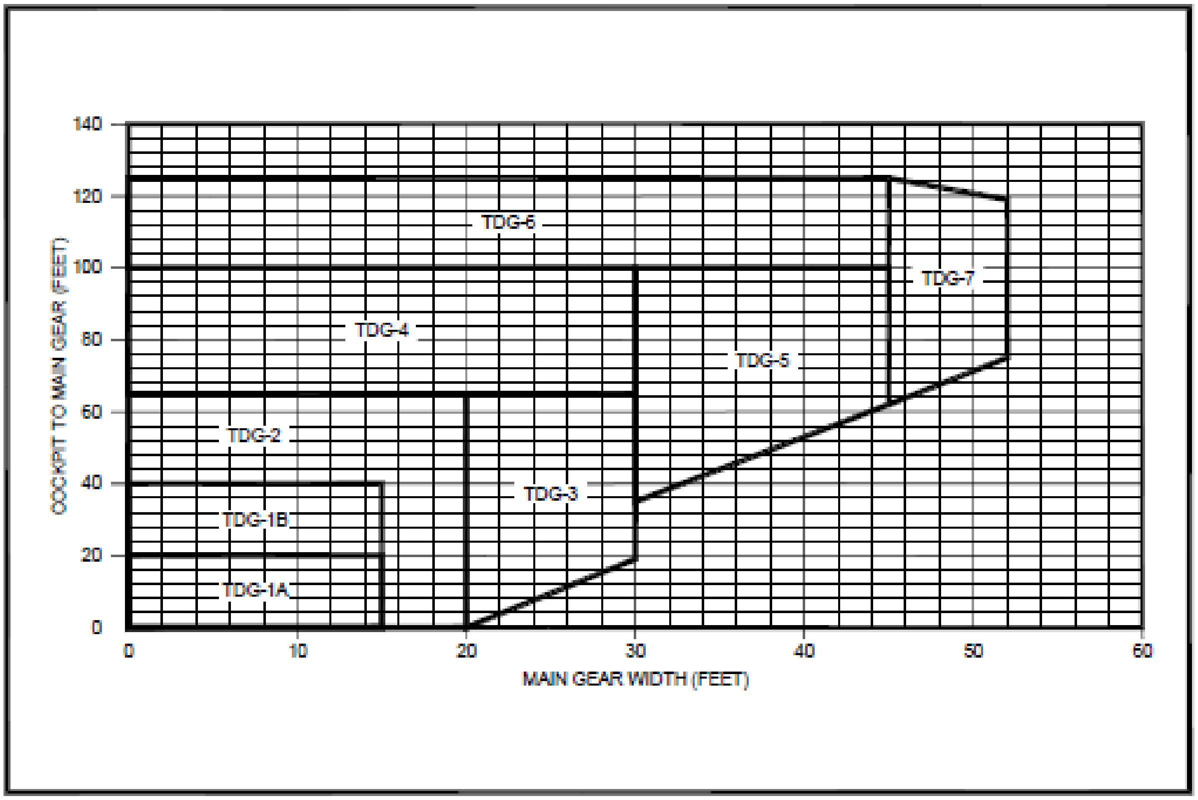
- **Approach Visibility Minimums**: relates to the visibility minimums expressed by Runway Visual Range (RVR) values in feet of 1200, 1600, 2400, 4000, and 5000 (corresponding to lower than 1/4 mile, lower than 1/2 mile but not lower than 1/4 mile, lower than 3/4 mile but not lower than 1/2 mile, lower than 1 mile but not lower than 3/4 mile, and not lower than 1 mile, respectively).

- **Taxiway Design Group (TDG)**: A classification of airplanes based on outer to outer Main Gear Width (MGW) and Cockpit to Main Gear (CMG) distance.

Table 1 – Classification Systems

Classification Systems		
Aircraft Approach Category (AAC)		
AAC	**Approach Speed**	
A	Approach Speed less than 91 knots	
B	Approach speed 91 knots or more but less than 121 knots	
C	Approach speed 121 knots or more but less than 141 knots	
D	Approach speed 141 knots or more but less than 166 knots	
E	Approach speed 166 knots or more	
Airplane Design Group (ADG)		
Group	**Tail height (ft)**	**Wingspan (ft)**
I	< 20’	< 49’
II	20’ - < 30’	49’ - < 79’
III	30’ - < 45’	79’ - < 118’
IV	45’ - < 60’	118’ - < 171’
V	60’ - < 66’	171’ - < 214’
IV	66’ - < 80’	214’ - < 262’
Approach Visibility Minimums		
RVR (ft)[1]	**Instrument Flight Visibility Category (statue mile)**	
5000	Not lower than 1 mile	
4000	Lower than 1 mile but not lower than ¾ mile (APV ¾ but< 1 mile	
2400	Lower than ¾ mile but not lower than ½ mile (CAT-I PA)	
1600	Lower than ½ mile but not lower than ¼ mile (CAT-II PA)	
1200	Lower than ¼ mile (CAT-III PA)	

Exhibit 1



Design Codes

Using the codes from **Table 1**, there are several ways in which the codes are used. This includes codes that recognize existing conditions, codes that identify planned capabilities, codes that are for specific runways and codes for the airport as a whole. In summary these codes are:

- Airport Reference Code (ARC) – an airport designation that signifies the airport's highest Runway Design Code (RDC), minus the third (visibility) component of the RDC.
- Runway Design Code (RDC) – a code signifying the design standards to which the runway is to be built.
- Approach Reference Code (APRC) – a code signifying the current operational capabilities of a runway and associated parallel taxiway with regard to landing operations.
- Departure Reference Code (DPRC) – a code signifying the current operational capabilities of a runway with regard to takeoff operations.

Airport Reference Code (ARC)

The Airport Reference Code (ARC) is an airport designation that represents the AAC and ADG of the aircraft that the airfield is intended to accommodate on a regular basis. The ARC is used for planning and design only and does not limit the aircraft that may be able to operate safely on the airport.

Runway Design Code (RDC)

Runway designs are based on specific FAA runway design standards. These standards, found in FAA AC 150/5300-13A, provide basic guidelines for a safe and efficient airport system, and are based on the most demanding or “design” aircraft expected to use the runway. Runway lengths are related to the design aircraft but are determined in accordance with procedures detailed in the current version of FAAAC 150/5325-4. All other critical dimensions related to the design aircraft are found in FAA AC 150/5300-13A, including dimensions for runway widths, safety areas and separations from other infrastructure.

APRC and DPRC (formerly Runway Reference Codes)

The APRC and DPRC were previously known jointly as the Runway Reference Code (RRC) and was defined as **the current operational capabilities of a runway and its associated parallel taxiway**. The RRC described the operational capabilities of the runway where no special procedures are necessary. In an effort to develop a code more indicative of a runway’s operational capabilities, Change 1 to FAA AC 150/5300-13A replaced RRC with two new codes: Approach Reference Code (APRC) and Departure Reference Code (DPRC). **Table 2** and **3** summarize the data for APRC and DPRC but refer to FAA AC 150/5300-13A for more specific information on the use of these codes.

Like the RDC, the APRC is composed of three components: the AAC, the ADG, and the visibility minimums. In contrast, the RDC is composed of the same three components, but is based on planned development and has no operational application. APRC signifies the current operational capabilities of a runway and associated parallel taxiway with regard to landing operations. The visibility minimums are linked to critical standards that determine which aircraft can operate on taxiways adjacent to a runway under particular meteorological conditions with no special operational procedures necessary.

DPRC signifies the runway’s operational capabilities with regard to takeoff operations. The DPRC code is similar to the APRC code, but is comprised of two components, AAC and ADG. It represents those aircraft that can take-off from a runway while any aircraft are present on adjacent taxiways, under particular meteorological condition with no special procedures necessary.

Table 2 Approach Reference Code (APRC)

Visibility Minimums	Runway to Taxiway Separation (ft)									
	≥150	≥200	≥225	≥240	≥250	≥300	≥350	≥400	≥500	≥550
Visual	B/I(S)/VIS	B/I(S)/VIS	B/I/VIS	B/II/VIS	B/II/VIS	B/III/VIS D/II/VIS	B/III/VIS	D/IV/VIS D/V/VIS	D/VI/VIS	D/VI/VIS
Not lower than 1 mile	B/I(S)/5000	B/I(S)/5000	B/I/5000	B/II/5000	B/II/5000	B/III/5000 D/II/5000	B/III/5000	D/IV/5000 D/V/5000	D/VI/5000	D/VI/5000
Not lower than 3/4 mile	B/I(S)/4000	B/I(S)/4000	B/I/4000	B/II/4000	B/II/4000	B/III/4000 D/II/4000	B/III/4000	D/IV/4000 D/V/4000	D/VI/4000	D/VI/4000
Lower than 3/4 mile but not lower than 1/2 mile		B/I(S)/2400	B/I/4000 B/I(S)/2400	B/II/4000	B/I/2400	B/III/4000 [1] D/II/4000 B/II/2400	B/III/2400	D/IV/2400 D/V/2400	D/VI/2400	D/VI/2400
Lower than 1/2 mile								D/V/2400 D/IV/1600	D/VI/2400 D/V/1600	D/VI/1600

Table 3 Departure Reference Code (DPRC)

Runway to Taxiway Separation (ft)					
≥ 150	≥ 225	≥ 240	≥ 300	≥ 400	≥ 500
B/I(S)	B/I	B/II	B/III D/II	D/IV D/V [1]	D/VI [2]

Generally, runway standards are related to aircraft approach speed, aircraft wingspan, and designated or planned approach visibility minimums. Runway to taxiway and taxiway/taxilane to taxiway/taxilane separation standards are related to ADG, TDG, and approach visibility minimums. **Table 4** summarizes aircraft classifications and their related design components. This information will be covered in greater detail later in this appendix.

Table 4 Classification and Design Components

Classification & Design Components	
Aircraft Classification	**Related Design Components**
Aircraft Approach Category (AAC) Approach Speed	Runway Safety Area (RSA), Runway Object Free Area (ROFA), Runway Protection Zone (RPZ), runway width, runway-to- taxiway separation, runway-to-fixed object
Airplane Design Group (ADG) Aircraft Width/Height	Taxiway and apron Object Free Areas (OFAs), parking configuration, hangar locations, taxiway-to-taxiway separation, runway-to-taxiway separation

Source: FAA AC 150/5300-13A, Airport Design

Code Context

It's critical to determine the context in which the specific code is being used. Depending where the code is being used, a C-II-2400 code could have the following meanings:

- Critical or design aircraft. A C-II aircraft is what the runway was either built for, or is the aircraft that the runway is being designed for. Looking at **Table H-1** above or FAA AC 150/5300-13A, a C-II aircraft is an aircraft with an approach speed between 121 and 140 knots, and a wingspan between 49 and 78 feet or a tail height between 20 and 29 feet.
- Runway Design Code (RDC). The planned runway will be designed to meet the FAA runway design standards for a C-II aircraft with a visibility minimum for a CAT-1 Precision Instrument Approach.
- Approach Reference Code (APRC). The runway currently meets the FAA runway design standards for a C-II aircraft with a visibility minimum for a CAT-1 Precision Instrument Approach and with a C-II aircraft on the adjacent parallel taxiway.
- Departure Reference Code (DPRC). The runway currently meets the FAA runway design standards for a C-II aircraft departing the runway with a C-II aircraft on the adjacent parallel taxiway.
- Airport Reference Code (ARC). The ARC can be used to discuss the operational capability of an existing airport, i.e., if the highest RDC of existing runways at an airport is C-II, the airport would have an ARC of C-II. The ARC can also be used to discuss the planned capability of an airport, i.e., an airport will be designated as an ARC C-II airport when the highest RDC of the planned runways is C-II.

Summary of Design Codes

All codes discussed in this section consist of at least two, and sometimes three, characters: a letter, a roman numeral and sometimes a number. As discussed above, the same code can represent planned or actual characteristics of aircraft, runways or airports in a number of different situations. Like many other acronyms, these codes have become a type of "shorthand" in discussions regarding airport design. To avoid confusion, it is important to understand the context in which a code is being used and the specific standards associated with it. This section is a summary of airport design standards found in FAA AC 150/5300-13A and the AC should be referred to for more detailed information.

As an example, a runway designed to accommodate C-II aircraft with minimums lower than ¾ mile but not lower than ½ mile, or CAT-I, would have a RDC code of C-II-2400. For general discussions, an RDC designation, such as C-II, is normally sufficient to identify the critical or design aircraft, as well as the specific standards used as the basis for the runway design.

Runway Design Standards

Once a determination has been made for the critical design aircraft the code will then dictate a number of FAA design and safety standards. Those related to runways are summarized below.

- **Runway Width** – The physical width of the runway pavement.
- **Runway Safety Area (RSA)** – Graded surface centered on the runway centerline. The RSA shall be free of objects and capable, under dry conditions, of supporting snow removal equipment, aircraft rescue and firefighting equipment, and the occasional passage of aircraft without causing structural damage to the aircraft.
- **Runway Object Free Area (ROFA)** – The ROFA is also centered on the runway centerline and requires the clearing of all above ground objects protruding above the RSA edge elevation (unless objects need to be located in the OFA for air navigation or aircraft ground maneuvering purposes).
- **Runway Object Free Zone (OFZ)** – The OFZ is a defined volume of airspace centered above the runway centerline that extends 200 feet beyond each end of the runway surface that precludes taxiing or parked airplanes and object penetrations, except for frangible visual NAVAIDs that need to be located in the OFZ because of their function.
- **Runway Protection Zone (RPZ)** – The RPZ is a trapezoidal area located 200 feet beyond the runway end and centered on the extended runway centerline. The RPZ is primarily a land use control that is meant to enhance the protection of people and property near the airport through airport control. Such control includes clearing of RPZ areas of incompatible objects and activities. With special application of declared distances, separate approach and departure RPZs are required.
- **Runway Obstacle Free Zone (OFZ)** – The OFZ is a defined volume of airspace centered above the runway centerline that extends 200 feet beyond each end of the runway surface that precludes taxiing or parked airplanes and object penetrations, except for frangible visual NAVAIDs that need to be located in the OFZ because of their function.

Primary Runway 14-32

The future and ultimate RDC planned for the primary runway is D-III, based on CRJ-200, E175, MD83 and A320 aircraft. Precision instrument approaches with lower than ¾ mile visibility minimums are expected for both ends of the future and ultimate primary runway. The design standards applicable to these conditions are summarized as shown in **Figure 1**.[2]

Crosswind Runway 07-25

The crosswind runway at Dickinson Theodore Roosevelt Regional Airport is designed according to A/B-II standards. Non-precision instrument approaches with visibility minimums not lower than one mile exist for Runway 25 and are anticipated to be sufficient for both runway ends for the future. The design standards applicable to planned crosswind are shown in **Figure 2**.[2]

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[2] Figure 1 and 2 are derived from a runway design standards matrix located in Appendix 7 of FAA AC 150/5300-13A. Items in “red” are applicable to the runways and recommended approaches for Dickinson.

Table 5 provides a summary of existing, proposed and ultimate design standards for the airport's runways and associated taxiways.

Table 5 – Runway & Associated Taxiway Design Standards

Runway & Associated Taxiway Design Standards			
	Existing	Proposed	Ultimate
Primary Runway			
Approach Category and Design Group	B-II	D-III	D-III
Design Aircraft	-	CRJ-200/ E175/MD83	CRJ-200/ E175/A320
Dimensions	6,400' X 100'	7700' x 150'	8800' x 150'
Visibility Minimums	½ mile	½ mile	½ mile
TDG / Design Aircraft	TDG-2	TDG-4 / MD83	TDG-4 / MD83
Primary Taxiway Width	35'	50'	50'
Crosswind Runway			
Approach Category and Design Group	B-I	B-II	B-II
Design Aircraft	Grouping B-I	B200	B200
Dimensions	4,700' X 75'	4700' x 75'	4700' x 75'
Visibility Minimums	1 mile	1 mile	1 mile
TDG / Design Aircraft	TDG-2	TDG-2 / B200	TDG-2 / B200
Crosswind Taxiway Width	none	35'	35'

Figure 1

Table A7-9. Runway design standards matrix, C/D/E - III

Aircraft Approach Category (AAC) and Airplane Design Group (ADG):		C/D/E - III			
ITEM	DIM [1]	VISIBILITY MINIMUMS			
		Visual	Not Lower than 1 mile	Not Lower than 3/4 mile	Lower than 3/4 mile
RUNWAY DESIGN					
Runway Length	A	*Refer to paragraphs 302 and 304*			
Runway Width [12]	B	150 ft	150 ft	150 ft	150 ft
Shoulder Width [12]		25 ft	25 ft	25 ft	25 ft
Blast Pad Width [12]		200 ft	200 ft	200 ft	200 ft
Blast Pad Length		200 ft	200 ft	200 ft	200 ft
Crosswind Component		16 knots	16 knots	16 knots	16 knots
RUNWAY PROTECTION					
Runway Safety Area (RSA)					
Length beyond departure end [9, 10]	R	1,000 ft	1,000 ft	1,000 ft	1,000 ft
Length prior to threshold [11]	P	600 ft	600 ft	600 ft	600 ft
Width	C	500 ft	500 ft	500 ft	500 ft
Runway Object Free Area (ROFA)					
Length beyond runway end	R	1,000 ft	1,000 ft	1,000 ft	1,000 ft
Length prior to threshold [11]	P	600 ft	600 ft	600 ft	600 ft
Width	Q	800 ft	800 ft	800 ft	800 ft
Runway Obstacle Free Zone (ROFZ)					
Length		*Refer to paragraph 308*			**200 ft**
Width		*Refer to paragraph 308*			**400 ft**
Precision Obstacle Free Zone (POFZ)					
Length		N/A	N/A	N/A	200 ft
Width		N/A	N/A	N/A	800 ft
Approach Runway Protection Zone (RPZ)					
Length	L	1,700 ft	1,700 ft	1,700 ft	2,500 ft
Inner Width	U	500 ft	500 ft	1,000 ft	1,000 ft
Outer Width	V	1,010 ft	1,010 ft	1,510 ft	1,750 ft
Acres		29.465	29.465	48.978	78.914
Departure Runway Protection Zone (RPZ)					
Length	L	1,700 ft	1,700 ft	1,700 ft	1,700 ft
Inner Width	U	500 ft	500 ft	500 ft	500 ft
Outer Width	V	1,010 ft	1,010 ft	1,010 ft	1,010 ft
Acres		29.465	29.465	29.465	29.465
RUNWAY SEPARATION					
Runway centerline to:					
Parallel runway centerline	H	*Refer to paragraph 316*			
Holding Position [8]		250 ft	250 ft	250 ft	250 ft
Parallel taxiway/taxilane centerline [2]	D	400 ft	400 ft	400 ft	400 ft
Aircraft parking area	G	500 ft	500 ft	500 ft	500 ft
Helicopter touchdown pad		*Refer to AC 150/5390-2*			

Note:

- Values in the table are rounded to the nearest foot. 1 foot = 0.305 meters.

Figure 2

AC 150/5300-13A
Appendix 7

9/28/2012

Table A7-4. Runway design standards matrix, A/B – II

Aircraft Approach Category (AAC) and Airplane Design Group (ADG):		A/B - II			
ITEM	**DIM** [1]	VISIBILITY MINIMUMS			
		Visual	Not Lower than 1 mile	Not Lower than 3/4 mile	Lower than 3/4 mile
RUNWAY DESIGN					
Runway Length	A	*Refer to paragraphs 302 and 304*			
Runway Width	B	75 ft	75 ft	75 ft	100 ft
Shoulder Width		10 ft	10 ft	10 ft	10 ft
Blast Pad Width		95 ft	95 ft	95 ft	120 ft
Blast Pad Length		150 ft	150 ft	150 ft	150 ft
Crosswind Component		13 knots	13 knots	13 knots	13 knots
RUNWAY PROTECTION					
Runway Safety Area (RSA)					
Length beyond departure end [9, 10]	R	300 ft	300 ft	300 ft	600 ft
Length prior to threshold	P	300 ft	300 ft	300 ft	600 ft
Width	C	150 ft	150 ft	150 ft	300 ft
Runway Object Free Area (ROFA)					
Length beyond runway end	R	300 ft	300 ft	300 ft	600 ft
Length prior to threshold	P	300 ft	300 ft	300 ft	600 ft
Width	Q	500 ft	500 ft	500 ft	800 ft
Runway Obstacle Free Zone (ROFZ)					
Length			200 ft *Refer to paragraph 308*		
Width			250 ft *Refer to paragraph 308*		
Precision Obstacle Free Zone (POFZ)					
Length		N/A	N/A	N/A	200 ft
Width		N/A	N/A	N/A	800 ft
Approach Runway Protection Zone (RPZ)					
Length	L	1,000 ft	1,000 ft	1,700 ft	2,500 ft
Inner Width	U	500 ft	500 ft	1,000 ft	1,000 ft
Outer Width	V	700 ft	700 ft	1,510 ft	1,750 ft
Acres		13.770	13.770	48.978	78.914
Departure Runway Protection Zone (RPZ)					
Length	L	1,000 ft	1,000 ft	1,000 ft	1,000 ft
Inner Width	U	500 ft	500 ft	500 ft	500 ft
Outer Width	V	700 ft	700 ft	700 ft	700 ft
Acres		13.770	13.770	13.770	13.770
RUNWAY SEPARATION					
Runway centerline to:					
Parallel runway centerline	H	*Refer to paragraph 316*			
Holding Position		200 ft	200 ft	200 ft	250 ft
Parallel taxiway/taxilane centerline [2, 4]	D	240 ft	240 ft	240 ft	300 ft
Aircraft parking area	G	250 ft	250 ft	250 ft	400 ft
Helicopter touchdown pad		*Refer to AC 150/5390-2*			

Note:

- Values in the table are rounded to the nearest foot. 1 foot = 0.305 meters.

Taxiway Design Standards

Similar to runways, taxiways are subject to FAA design requirements such as pavement width, edge safety margins, shoulder width, and safety and object free area dimensions. The FAA standards in relation to taxiways (as defined in AC 150/5300-13A *Airport Design*) are described below.

- **Taxiway Width** – The physical width of the taxiway pavement.
- **Taxiway Edge Safety Margin** – The minimum acceptable distance between the outside of the airplane wheels and the pavement edge.
- **Taxiway Shoulder Width** – Taxiway shoulders provide stabilized or paved surfaces to reduce the possibility of blast erosion and engine ingestion problems associated with jet engines which overhang the edge of the taxiway pavement.
- **Taxiway/Taxilane Safety Area (TSA)** – The TSA is located on the taxiway centerline and shall be cleared and graded, properly drained, and capable, under dry conditions, of supporting snow removal equipment, ARFF equipment, and the occasional passage of aircraft without causing structural damage to the aircraft.
- **Taxiway/Taxilane Object Free Area (TOFA)** – The TOFA is centered on the taxiway centerline and prohibits service vehicle roads, parked airplanes, and above ground objects, except for objects that need to be located in the TOFA for air navigation or aircraft ground maneuvering purposes.
- **Taxiway Separation Standards** – Separation standards between the taxiways and other airport facilities are established to ensure operational safety of the airport and are as follows:
  - Taxiway centerline to parallel taxiway/taxilane centerline
  - Taxiway centerline to fixed or moveable object

The dimensions for each of these standards vary according to the group of aircraft the taxiways are intended to accommodate. **Figure 3** shows AC 150/5300-13A taxiway design standards based on Airplane Design Group (ADG) and Taxiway Design Group (TDG).

Figure 3

Table 4-1. Design standards based on Airplane Design Group (ADG)

ITEM	DIM (See Figure 3-26)	ADG					
		I	II	III	IV	V	VI
TAXIWAY PROTECTION							
TSA	E	49 ft (15 m)	79 ft (24 m)	118 ft (36 m)	171 ft (52 m)	214 ft (65 m)	262 ft (80 m)
Taxiway OFA		89 ft (27 m)	131 ft (40 m)	186 ft (57 m)	259 ft (79 m)	320 ft (98 m)	386 ft (118 m)
Taxilane OFA		79 ft (24 m)	115 ft (35 m)	162 ft (49 m)	225 ft (69 m)	276 ft (84 m)	334 ft (102 m)
TAXIWAY SEPARATION							
Taxiway Centerline to Parallel Taxiway/Taxilane Centerline [1]	J	70 ft (21 m)	105 ft (32 m)	152 ft (46.5 m)	215 ft (65.5 m)	267 ft (81 m)	324 ft (99 m)
Taxiway Centerline to Fixed or Movable Object	K	44.5 ft (13.5 m)	65.5 ft (20 m)	93 ft (28.5 m)	129.5 ft (39.5 m)	160 ft (48.5 m)	193 ft (59 m)
Taxilane Centerline to Parallel Taxilane Centerline [1]		64 ft (19.5 m)	97 ft (29.5 m)	140 ft (42.5 m)	198 ft (60 m)	245 ft (74.5 m)	298 ft (91 m)
Taxilane Centerline to Fixed or Movable Object		39.5 ft (12 m)	57.5 ft (17.5 m)	81 ft (24.5 m)	112.5 ft (34 m)	138 ft (42 m)	167 ft (51 m)
WINGTIP CLEARANCE							
Taxiway Wingtip Clearance		20 ft (6 m)	26 ft (8 m)	34 ft (10.5 m)	44 ft (13.5 m)	53 ft (16 m)	62 ft (19 m)
Taxilane Wingtip Clearance		15 ft (4.5 m)	18 ft (5.5 m)	27 ft (6.5 m)	27 ft (8 m)	31 ft (9.5 m)	36 ft (11 m)

Note: 1. These values are based on wingtip clearances. If direction reversal between parallel taxiways is needed, use this dimension or the dimension specified in Table 4-14 or Table 4-15, whichever is largest.

Table 4-2. Design standards based on Taxiway Design Group (TDG)

ITEM	DIM (See Figure 4-6)	TDG							
		1A	1B	2	3	4	5	6	7
Taxiway Width	W	25 ft (7.5 m)	25 ft (7.5 m)	35 ft (10.5 m)	50 ft (15 m)	50 ft (15 m)	75 ft (23 m)	75 ft (23 m)	82 ft (25 m)
Taxiway Edge Safety Margin	TESM	5 ft (1.5 m)	5 ft (1.5 m)	7.5 ft (2 m)	10 ft (3 m)	10 ft (3 m)	15 ft (4.6m)	15 ft (4.6m)	15 ft (4.6m)
Taxiway Shoulder Width		10 ft (3 m)	10 ft (3 m)	15 ft (3 m)	20 ft (6 m)	20 ft (6 m)	30 ft (9 m)	30 ft (9 m)	40 ft (12 m)
Taxiway/Taxilane Centerline to Parallel Taxiway/Taxilane Centerline w/ 180 Degree Turn	J	See Table 4-14							
TAXIWAY FILLET DIMENSIONS		Table 4-3	Table 4-4	Table 4-5	Table 4-6	Table 4-7	Table 4-8	Table 4-9	Table 4-10

RUNWAY LENGTH

Current Conditions

Runway 14-32 is the primary runway at Dickinson Theodore Roosevelt Regional Airport. It is 6,400 feet long by 100 feet wide. Runway 7-25, the crosswind runway, is 4,700 feet long by 75 feet wide.

Runway Length Requirements

FAA Advisory Circular (AC 150/5325-4B) provides guidance on runway length requirements. The AC uses a five-step process to determine recommended runway lengths for a selected list of critical design airplanes. The five steps are as follows:

Step #1. Identify the list of critical design airplanes that will make regular use of the proposed runway for an established planning period of at least five years. Critical design airplanes are the listing of airplanes (or a single airplane) that results in the longest recommended runway length. Federally funded projects require that critical design airplanes have at least 500 or more annual itinerant operations at the airport (landings and takeoffs are considered as separate operations).

Step #2. Identify the airplanes that will require the longest runway lengths at maximum certificated takeoff weight (MTOW). This will be used to determine the method for establishing the recommended runway length. Except for regional jets, when the MTOW of listed airplanes is 60,000 pounds or less, the recommended runway length is determined according to a *family grouping of airplanes* having similar performance characteristics and operating weights. Although a number of regional jets have a MTOW less than 60,000 pounds, the exception acknowledges the long range capability of the regional jets and the necessity to offer regional jet operators the flexibility to interchange regional jet models according to passenger demand without suffering operating weight restrictions. When the MTOW of listed airplanes is over 60,000 pounds, the recommended runway length is determined according to *individual airplanes*. The recommended runway length in the latter case is a function of the most critical individual airplane's takeoff and landing operating weights, which depend on wing flap settings, airport elevation and temperature, runway surface conditions (dry or wet), and effective runway gradient. The procedure assumes that there are no obstructions that would preclude the use of the full length of the runway.

Step #3. Determine the method that will be used for establishing the recommended runway length. *Potential design airplanes* are categorized according to their MTOWs. MTOW is used because of the significant role played by airplane operating weights in determining runway lengths. Small airplanes, defined as airplanes with MTOW of 12,500 pounds or less, are further subdivided according to approach speeds and passenger seating. Regional jets are assigned to the same category as airplanes with a MTOW over 60,000 pounds. Airplane manufacturers' airport planning manuals (APM) provide the takeoff and landing runway lengths that an airport designer will in turn apply to the associated guidelines set forth by AC 150/5325-4B to obtain runway lengths.

Step #4. Select the recommended runway length from among the various runway lengths generated by step #3 per the process identified in AC 150/5325-4B chapters as follows:

Chapter 2 - Runway Lengths for Small Airplanes with Maximum Certificated Takeoff Weight of 12,500 pounds or less ***Used in Dickinson Runway Length Calculations for the Crosswind Runway***

Chapter 3 - Runway Lengths for Airplanes within a Maximum Certificated Takeoff Weight of More than 12,500 pounds up to and including 60,000 pounds ***Used in Dickinson Runway Length Calculations for General Aviation Business Aircraft Activity for the Primary Runway***

Chapter 4 - Runway Lengths for Regional Jets and those Airplanes with a Maximum Certificated Takeoff Weight of More than 60,000 pounds ***Used in Dickinson Runway Length Calculations for Airline Aircraft Activity for the Primary Runway***

Step #5. Apply any necessary adjustment to the obtained runway length, when instructed by the applicable chapter of AC 150/5325-4B, to the runway length generated by step #4 to obtain a final recommended runway length. For instance, an adjustment to the length may be necessary for runways with non-zero effective gradients. Chapter 5 of AC 150/5325-4B provides the rationale for these length adjustments. The effective runway gradient adjustment is applicable to Dickinson's primary runway.

The following pages provide runway length recommendations based on the airport conditions listed below and application of the five steps listed above.

Conditions used in runway length calculations

- Mean daily maximum temperature of 84° F (represented by Standard Day Temperature +15°C performance charts)
- Elevation of 2,590 feet MSL
- Runway gradient (difference in runway centerline elevations) of 5 feet

Primary Runway

The recommended runway length for the primary runway has been determined by two methods. These are for the general aviation business aircraft and the airline aircraft.

General Aviation Aircraft

For the general aviation business aircraft the analysis focused on aircraft more than 12,500 pounds up to and including 60,000 pounds. AC 150/5325-4B divides these aircraft into two groups and analysis charts. The first group is 75% of this fleet and the second group is the remaining 25% of the fleet therefore including 100% of the fleet. In analyzing actual activity at Dickinson there were 288 and 269 operations in 2012 and 2013 respectively by aircraft in the top 25% of this fleet type. Another variable that must be determined is the useful load on the plane. Based on the longer stage lengths typically seen to and from Dickinson the useful load of 90% was used in calculating the runway length.

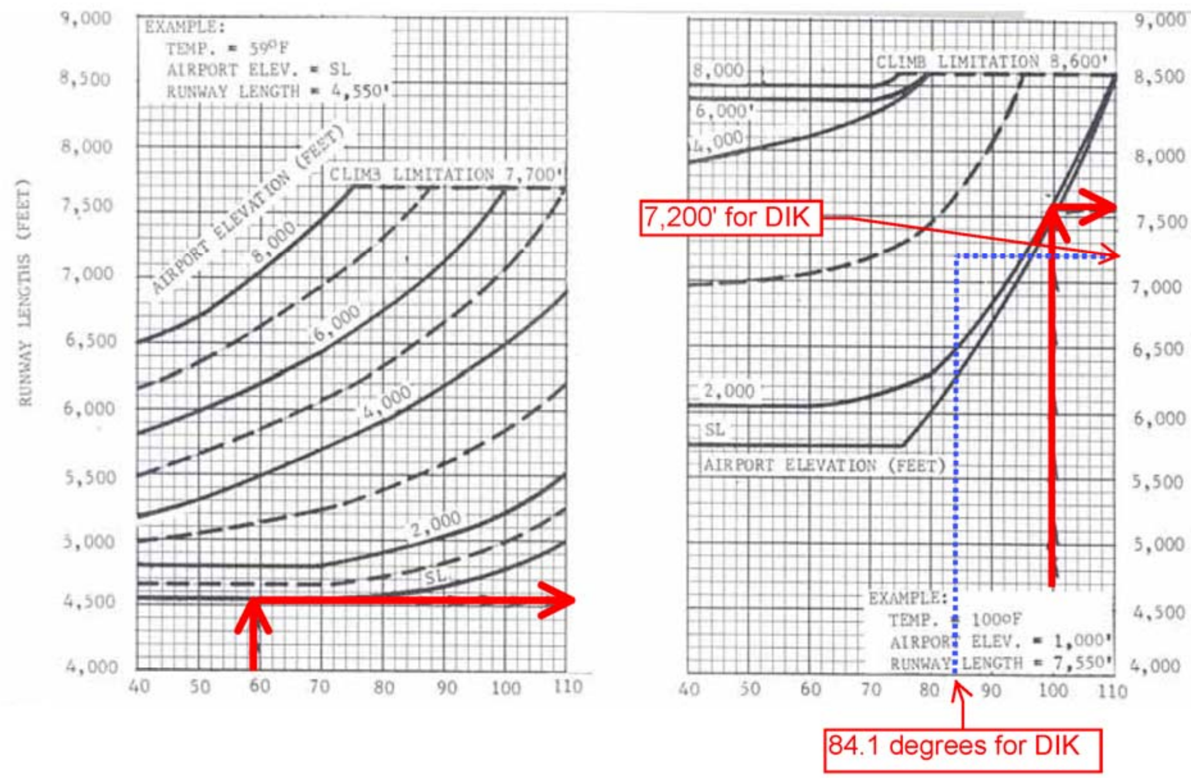
For the 75% of fleet group the runway length for Dickinson is calculated to be 7,200 feet. This information is displayed in **Figure 4**. For the 100% of fleet group the runway length for Dickinson is calculated to be 8,800 feet. This information is displayed in **Figure 5**. The effective runway gradient adjustment of 100 feet must be added to this resulting in 7,300 and 8,900 feet respectively.

The existing primary runway at Dickinson is 6,400 feet and therefore an extension or replacement runway is recommended with a length of 8,900 feet to meet the requirements of general aviation business aircraft serving Dickinson.

Figure 4

AC 150/5325-4B 7/1/2005

Figure 3-1. 75 Percent of Fleet at 60 or 90 Percent Useful Load



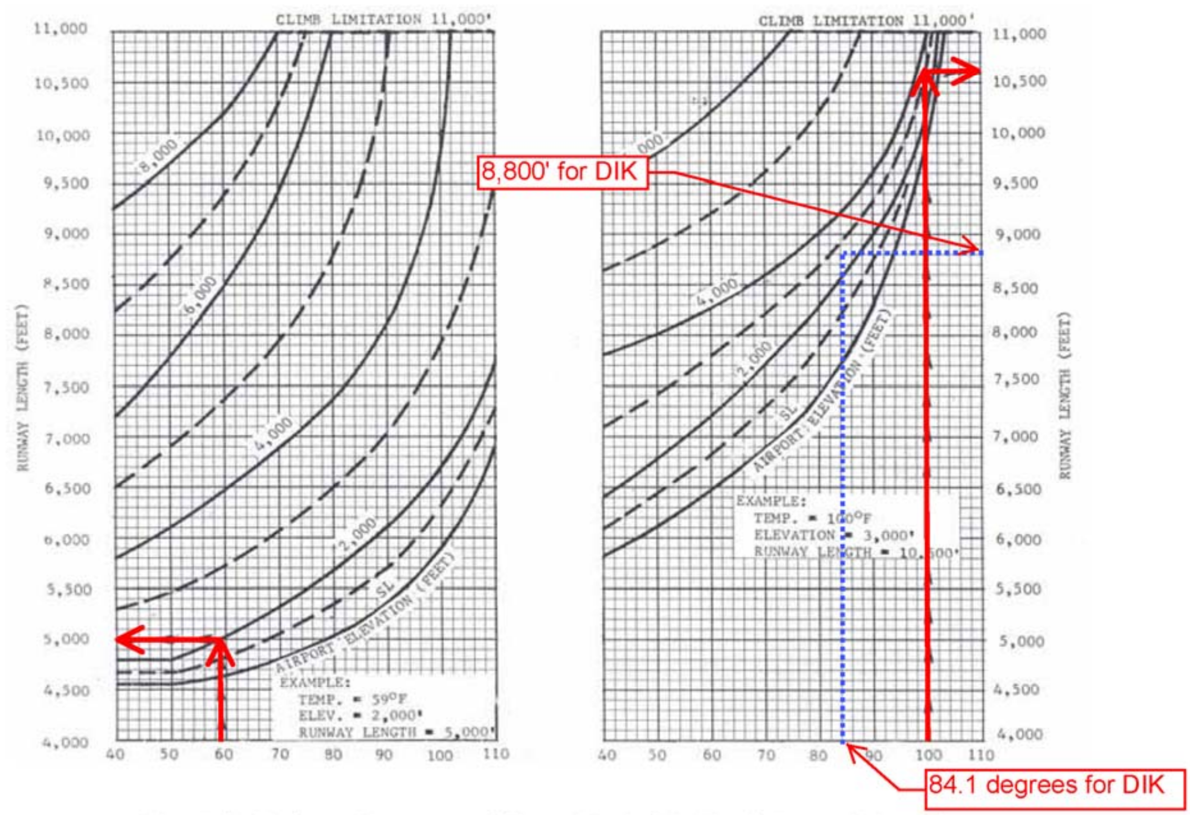
Mean Daily Maximum Temperature of Hottest Month of the Year in Degrees Fahrenheit

75 percent of feet at 60 percent useful load **75 percent of feet at 90 percent useful load**

Figure 5

7/1/2005 AC 150/5325-4B

Figure 3-2. 100 Percent of Fleet at 60 or 90 Percent Useful Load



Mean Daily Maximum Temperature of Hottest Month of the Year in Degrees Fahrenheit

100 percent of feet at 60 percent useful load **100 percent of feet at 90 percent useful load**

Airline Aircraft

For the airline aircraft the analysis was completed based on individual airplanes. The recommended runway length is a function of the critical design airplane's takeoff distance, which depends on takeoff weight, wing flap settings, airport elevation, temperature, runway surface conditions and effective runway gradient. A summary of aircraft analyzed and runway length needed according to likely flight stage lengths are shown in **Table 6**. To accommodate for the runway gradient of 5 feet, it is necessary to add 100 feet to the runway length. This change of adding the 100 feet is recognized in **Table 7**.

The aircraft selected as the critical design aircraft were based on a review of aircraft currently operating at the Airport and aircraft types frequently used by the airlines expected to serve Dickinson Theodore Roosevelt Regional Airport in the future. **Table 8** provides a list of aircraft utilized by airlines operating in the region. Although not all aircraft currently operating or expected to operate at the Airport are listed, the aircraft listed in **Table 8** are representative of the anticipated fleet for purposes of determining critical aircraft and runway length needs. The most demanding airline aircraft is the Bombardier CRJ200 operated by United Airlines and the Boeing MD83 operated by Allegiant Airlines. United Airlines serves Denver at this time but could very likely serve Dickinson from Chicago O'Hare (ORD) and the Allegiant

Airlines service to Las Vegas would be the first likely route. Each of these aircraft with these respective destinations would require a runway length of 7,600 feet to serve Dickinson. The aircraft performance charts can be found beginning on page 29, and were used to determine the necessary runway length based upon zero runway gradient. A 100-foot penalty is added and reflected in **Table 7** resulting in the length of 7,700 feet.

It is recognized that airline service through regional jet aircraft is in a state of change. At the present time, due in part to high fuel prices, the 50 passenger regional jet is not as profitable as larger models coming into service. This transition is expected to occur in the next few years but there is no guarantee; for instance if fuel prices were to drop the 50 passenger aircraft could be profitable again. It is even likely that high revenue like Dickinson could keep 50 passenger aircraft profitable and may be the last markets that these types of aircraft serve.

When the transition occurs from 50 passenger regional jets it is also unknown whether the change will be to larger regional jets which are 70 to 100 passengers or to narrow body aircraft which are 100 to 140 passengers. To assist in understanding the current status of the regional airline market the following tables provide the current fleet mix used by regional airlines (**Table 9**) and aircraft orders for regional aircraft (**Table 10**). As noted earlier from AC 150/5325-4B the FAA guidance is intended to establish runway lengths which *"offer regional jet operators the flexibility to interchange regional jet models according to passenger demand without suffering operating weight restrictions."*

It is also important to recognize that the relationships between major airlines and regional airlines are subject to change. Within the last five years Continental merged with United, Northwest merged with Delta and US Airways merged with American. As a result, some regional airlines ceased to operate and others merged and changed as well. While this information, gathered in 2014, is as accurate as presently available, there is no guarantee that it will stay the same. Please note in **Table 10**, in the case of American and Delta, that the major airline is making the order and will then make the choice as to which regional airline to contract with for service. Beginning on page 86 there are press releases and aircraft order information gathered to verify **Table 10**.

Since narrow body aircraft are also a possibility at small airports, the small airports with some level of narrow body airline service were examined with their 2012 calendar year enplanements. The following **Table 11** lists the smallest airports in the United States with scheduled airline service from airlines' narrow body aircraft. This includes service by American, Delta, United, Frontier, Alaska and Allegiant Airlines. In the table 'N' indicates that the particular airline provides service to the airport with narrow body aircraft and may also serve the airport with regional aircraft. The 'r' in the table indicates that the airline only provides service to the airport with regional aircraft. A blank space in the table means that the particular airline does not provide service to the airport.

An ultimate runway length of 8,900 feet has been planned for Dickinson Theodore Roosevelt Regional Airport. It is based on the length requirement for an Allegiant Airlines MD83 departing Dickinson for Orlando Sanford International Airport (SFB). The Allegiant flight to SFB is less likely to occur than the Allegiant flight to Las Vegas or the United flight to Chicago; however, it is foreseeable since other airports in the region (GFK, FAR and FSD) are currently served by Allegiant flights to Orlando.

The existing primary runway at Dickinson is 6,400 feet and therefore an extension or replacement runway is recommended with a length of 7,700 feet and ultimate length of 8,900 feet to meet the demands of airline aircraft serving Dickinson.

Table 6 – Zero Runway Gradient

DESIGN AIRCRAFT ANALYSIS

Zero Runway Gradient Adjustment												
AIRLINES	HUBS		Aircraft / ARC / Engines / Maximum Gross Takeoff Weight (LBS)									
			CRJ200	E145	CRJ700	CRJ900	E175	B717	MD83	MD90	A320	B737-800
	Current Service in ND*	Engine	CF34-3B1	AE 3007-A1E	CF34-8CG	CF34-8C5	CF34-8E5	BR715-A1-30	JT8D-219	V2500-D5	CFM56	CFM56-7B
		Maximum Takeoff Weight (lbs)	53,000	53,131	75,000	80,500	82,673	121,000	160,000	156,000	171,961	174,200
		Runway Design Code (RDC)	D-II	C-II	C-II	C-III	C-III	C-III	D-III	C-III	C-III	C-III
		Taxiway Design Group (TDG)	3	3	3	3	3	3	4	4	3	3
		Distance (NM)	Runway Length (FT) @ ISA +15C									
Delta	MSP	420	7,200		5,000	6,000	4,800	6,500		5,900		
United	DEN	425	7,200	5,900	5,000	6,000	4,800					
Delta	SLC	540	7,400		5,100	6,100	4,900	6,600				
United	ORD	700	7,600	6,200	5,400	6,300	5,000					
American	ORD	700		6,200								
Alaska	SEA	800			5,500							
Allegiant	LAS	850							7,600		6,000	
American	DFW	875	7,700	6,500			5,200					
Allegiant	IWA	905							7,900		6,000	
United	IAH	1,070		6,800	6,300	7,200					5,600	6,300
Delta	ATL	1,150	8,200		6,400	7,500		7,500		6,900	5,600	6,400
United	IAD	1,200	8,300		6,400	8,400	6,700				5,800	6,500
Delta	JFK	1,310			6,500	8,500	6,800	8,000		7,200	6,000	6,600
Allegiant	SFB	1,500							8,800		6,700	
Alaska	ANC	1,825										7,100

* Non Stop Service to Cities in North Dakota include MSP, DEN, SLC, ORD, LAS, DFW, IWA, IAH, ATL, SFB, LAX, and PIE

FAA A/C 150/5325 - 4B Runway Length: 75% of Fleet (up to 60,000lb MTOW) at 90% Useful Load, Length =	7,200
FAA A/C 150/5325 - 4B Runway Length: 100% of Fleet (up to 60,000lb MTOW) at 90% Useful Load, Length =	8,800

- Mean daily high temperature of 84 degrees F
- Runway difference in center line elevations N/A
- Elevation 2,590 MSL

Table 7 – Runway Gradient of 5 Feet

DESIGN AIRCRAFT ANALYSIS

Adjusted for Runway Gradient: Maximum Difference between Runway Centerline Elevations 5' = 50' Takeoff Length Extension												
AIRLINES	HUBS		Aircraft / ARC / Engines / Maximum Gross Takeoff Weight (LBS)									
			CRJ200	E145	CRJ700	CRJ900	E175	B717	MD83	MD90	A320	B737-800
	Current	Engine	CF34-3B1	AE 3007-A1E	CF34-8CG	CF34-8C5	CF34-8E5	BR715-A1-30	JT8D-219	V2500-D5	CFM56	CFM56-7B
	Service	Maximum Takeoff Weight (lbs)	53,000	53,131	75,000	80,500	82,673	121,000	160,000	156,000	171,961	174,200
	in	Runway Design Code (RDC)	D-II	C-II	C-II	C-III	C-III	C-III	D-III	C-III	C-III	C-III
	ND*	Taxiway Design Group (TDG)	3	3	3	3	3	3	4	4	3	3
		Distance (NM)	Runway Length (FT) @ ISA +15C									
Delta	MSP	420	7,300		5,100	6,100	4,900	6,600		6,000		
United	DEN	425	7,300	6,000	5,100	6,100	4,900					
Delta	SLC	540	7,500		5,200	6,200	5,000	6,700				
United	ORD	700	7,700	6,300	5,500	6,400	5,100					
American	ORD	700		6,300								
Alaska	SEA	800			5,600							
Allegiant	LAS	850							7,700		6,100	
American	DFW	875	7,800	6,600			5,300					
Allegiant	IWA	905							8,000		6,100	
United	IAH	1,070		6,900	6,400	7,300					5,700	6,400
Delta	ATL	1,150	8,300		6,500	7,600		7,600		7,000	5,700	6,500
United	IAD	1,200	8,400		6,500	8,500	6,800				5,900	6,600
Delta	JFK	1,310			6,600	8,600	6,900	8,100		7,300	6,100	6,700
Allegiant	SFB	1,500							8,900		6,800	
Alaska	ANC	1,825										7,200

* Non Stop Service to Cities in North Dakota include MSP, DEN, SLC, ORD, LAS, DFW, IWA, IAH, ATL, SFB, LAX, and PIE

FAA A/C 150/5325 - 4B Runway Length: 75% of Fleet (up to 60,000lb MTOW) at 90% Useful Load, Length =	**7,300**
FAA A/C 150/5325 - 4B Runway Length: 100% of Fleet (up to 60,000lb MTOW) at 90% Useful Load, Length =	**8,900**

- **Mean daily high temperature of 84 degrees F**
- **Runway difference in center line elevations 5 feet**
- **Elevation 2,590 MSL**

Table 8 – Western ND Commercial Service Aircraft

Western ND Commercial Service Aircraft					
Airport	**Annual Enplanements**	**Airlines**	**Service To**	**Aircraft Operated**	**Design Group**
BIS	237,683	Allegiant	LAS, PHX	A319	C-III
			LAS, PHX	MD83	D-III
		Delta	MSP	CRJ200	D-II
			MSP	ERJ175	C-III
			MSP	MD83	D-III
		Frontier	DEN	A320	C-III
		United	DEN	CRJ200	D-II
			DEN	E145	C-II
DIK	35,125	Delta	MSP	CRJ200	D-II
		United	DEN	E145	C-II
ISN	94,459	Delta	MSP	CRJ200	D-II
		United	DEN	E145	C-II
MOT	222,083	Allegiant	LAS, PHX	MD83	D-III
		Delta	MSP	ERJ175	C-III
			MSP	A319	C-III
			MSP	CRJ200	D-II
		United	DEN	CRJ200	D-II
		Frontier	DEN	A319	C-III

Table 9 – Regional Airline Existing Fleet

Regional Airline Partners for Alaska, American/US Airways, Delta and United Airlines

Ranked by 2013 Group Enplanements

Airline Partners

	2013 Enplanements	**Alaska**	**American /US Airway**	**Delta**	**United**		**CRJ200**	**CRJ700**	**CRJ900**	**DHC-8-100/ 200/300**	**DHC-8Q-400**	**EMB120**	**EMB135/ 140**	**EMB145**	**EMB170/ 175**	**EMB 190**	**Total Aircraft**
						ARC	D-II	C-II	C-III	B-III	C-III	B-II	C-II	C-II	C-III	C-III	
						MTOW	53,000	72,250	80,500	43,000	64,500	11,500	46,517	53,131	82,673	114,200	
						Pax	50	70	90	37-56	68-86	30	37-44	50	70-88	94-114	
SkyWest Airlines Group	60,524,430																**745**
ExpressJet Airlines			X	X	X		88	47	28					238			401
SkyWest Airlines		X	X	X	X		159	98	36			45			6		344
Republic Airlines Group	21,520,146																**244**
Chautauqua Airlines			X	X									9	43			52
Republic Airlines			X		X						28				91	5	124
Shuttle America				X	X										68		68
Envoy Air	17,909,764		X					47					54	118			219
Endeavor Air	13,256,029			X			82		65								147
Trans States Holdings	10,321,355																**118**
Compass Airlines				X											42		42
GoJet Airlines				X	X			47									47
Trans States Airlines			X	X	X									29			29
Mesa Airlines	8,572,950		X		X			20	47						3		70
US Airways Group	8,009,920																**101**
Piedmont Airlines			X							43							43
PSA			X				35	14	9								58
Horizon Air	7,221,439	X									51						51
Air Wisconsin	6,074,154		X		X		71										71
Commutair	1,411,440				X					21							21
							435	273	185	64	79	45	63	428	210	5	

Notes:

US Airways Group- As of June, 2014 is a wholly owned subsidiary of American Airlines Group

Partnerships as of August 2014

Aircraft Owned as of June 2014

Table 10 – Regional Airline Aircraft Orders

Aircraft on Order by Regional Airline Partners (Year of Entry into Service)

	Mitsubishi	Bombardier			Embraer	
	MRJ90*	**CS300***	**Q400**	**CRJ900**	**E170/175**	**E175-E2***
ARC	C-III	C-III	C-III	C-III	C-III	C-III
MTOW	94,358	143,999	64,500	80,500	82,673	97,730
Pax	92	135-160	68-86	90	70-88	80-90
SkyWest Airlines Group	100 (2017)				40 (ongoing)	100 (2020)
Republic Airlines Group		40 (2015)			64 (ongoing thru 2017)	
American Airlines				30 (ongoing)	60 (2015)	
Trans States Holdings	50 (2017)					50 (2020)
Horizon Air			1 (2015)			
New Eastern	20 (2019)					
Delta Airlines				40 (ongoing)		
Totals:	**170**	**40**	**1**	**70**	**164**	**150**

Notes:
Publically available order information as of October, 2014.
Firm orders only listed, options or purchase rights on other aircraft not included
Background documentation provided in this Appendix
*** MRJ90, CS300 and E175-E2 are in production, but not in operation and therefore no performance data for these aircraft exist**

Table 11 – Small Airports with Narrow Body Service

Small Airports served by Narrow Body Aircraft

ID	City	ST	Airport Name	CY 13 Enplanements	American	Delta	United	Frontier	Alaska	Allegiant
FWA	Fort Wayne	IN	Fort Wayne International	294,968	r	r	r			N
JAC	Jackson	WY	Jackson Hole	294,752	N	N	N	N		
GRB	Green Bay	WI	Austin Straubel International	293,703	r	N	r			N
SHV	Shreveport	LA	Shreveport Regional	279,897	r		r			N
RAP	Rapid City	SD	Rapid City Regional	256,052	r	N	r			N
ATW	Appleton	WI	Outagamie County Regional	246,211		N	r			N
BIS	Bismarck	ND	Bismarck Municipal	238,929	r	N	r	N		N
MOT	Minot	ND	Minot International	220,789		N	r	N		N
LAN	Clinton (Township of)	MI	Capital Region International	216,925		r	r			N
AVP	Avoca	PA	Wilkes-Barre/Scranton International	216,536	r	N	r			N
BMI	Bloomington-Normal	IL	Central IL Regional	211,957	r	r		N		
GJT	Grand Junction	CO	Grand Junction Regional	211,091	r	r	r			N
ASE	Aspen	CO	Aspen-Pitkin County/Sardy Field	206,686	r	r	r			
MRY	Monterey	CA	Monterey Regional	205,069	r		r			N
TRI	Bristol/Johnson/Kingsport	TN	Tri-Cities Regional TN/VA	204,402	r	N				N
GPI	Kalispell	MT	Glacier Park International	199,701		r	r		r	N
DRO	Durango	CO	Durango-La Plata County	192,797	r		r	N		
GTF	Great Falls	MT	Great Falls International	182,390		r	r	N	r	N
EGE	Eagle	CO	Eagle County Regional	167,166	N	N	N			
SWF	Newburgh	NY	Stewart International	163,815	r	r				N
DLH	Duluth	MN	Duluth International	155,496		N	r			N
GFK	Grand Forks	ND	Grand Forks International	148,665		r				N
IDA	Idaho Falls	ID	Idaho Falls Regional	147,073		r	r	N		N
ELM	Elmira	NY	Elmira/Corning Regional	129,749	r	r	r			N
RST	Rochester	MN	Rochester International	109,870	r	r				N
LRD	Laredo	TX	Laredo International	109,773	r		r			N
KTN	Ketchikan	AK	Ketchikan International	109,433					N	
RFD	Rockford	IL	Chicago/Rockford International	109,384				N		N
IAG	Niagara Falls	NY	Niagara Falls International	98,958						N
HTS	Huntington	WV	Tri-State/Milton J. Ferguson Field	98,752	r					N
CPR	Casper	WY	Casper/Natrona County International	98,622		r	r			N
HDN	Hayden	CO	Yampa Valley	91,823	N	N	N			
TOL	Toledo	OH	Toledo Express	86,221	r					N
MTJ	Montrose	CO	Montrose Regional	84,579	N	N	N			N
SCK	Stockton	CA	Stockton Metropolitan	71,757						N
SPI	Springfield	IL	Abraham Lincoln Capital	70,651	r		r			N
SIT	Sitka	AK	Sitka Rocky Gutierrez	67,989					N	
OTZ	Kotzebue	AK	Ralph Wien Memorial	61,274					N	
OME	Nome	AK	Nome	58,020					N	
GRI	Grand Island	NE	Central Nebraska Regional	57,165	r					N
BRW	Barrow	AK	Wiley Post-Will Rogers Memorial	51,568					N	
SCC	Deadhorse	AK	Deadhorse	48,588					N	
YNG	Youngstown	OH	Youngstown-Warren Regional	47,518						N
GUC	Gunnison	CO	Gunnison-Crested Butte Regional	30,780	N		r			
PVU	Provo	UT	Provo Municipal	30,090						N
OWB	Owensboro	KY	Owensboro-Daviess County	21,751						N
STC	St. Cloud	MN	St. Cloud Regional	15,842			r			N
CDV	Cordova	AK	Merle K (Mudhole) Smith	15,772					N	
OGD	Ogden	UT	Ogden-Hinckley	15523						N
WRG	Wrangell	AK	Wrangell	11,807					N	
CKB	Clarksburg	WV	North Central West Virginia	10,831						N
YAK	Yakutat	AK	Yakutat	10,135					N	
ADK	Adak	AK	Station/Mitchell Field	2,023					N	

r = regional aircraft only; N = narrow body aircraft and possible regional aircraft

Crosswind Runway

FAA guidance states that when the primary runway does not provide adequate wind coverage (at least 95% of the time for aircraft needing a crosswind on a regular basis), a crosswind runway may be justified. Since larger, heavier aircraft are less affected by wind, they require a crosswind runway less often than smaller, lighter aircraft. Different crosswind components (winds speeds) are used in the crosswind runway analysis for different aircraft. The FAA recommends that the criteria depicted in the table below be applied:

RDC	Allowable Crosswind Component
A-I and B-I *	10.5 knots
A-II and B-II	13 knots
A-III, B-III, C-I through D-III D-I through D-III	16 knots
A-IV and B-IV, C-IV through C-VI, D-IV through D-VI	20 knots
E-I through E-VI	20 knots

* Includes A-I and B-I small aircraft.

Wind data was analyzed to determine wind coverage. The variety of wind conditions in the Dickinson area make it impossible to orient the primary runway to provide the recommended 95 percent wind coverage for all aircraft. Therefore, a crosswind runway is recommended, the length of which should be 100% of the recommended runway length needed for the lower crosswind capable airplanes using the airport.

The primary runway at the existing site does not provide adequate wind coverage for A/B-I aircraft and their associated 10.5 knot crosswind component or A/B-II aircraft and their associated 13 knot crosswind component. Therefore, the type of aircraft classified as the design aircraft for runway length and design standards would be the more demanding B-II aircraft.

Runway Length Recommendation

Using guidance contained in AC 150/5325-4B, the recommended runway length for the crosswind runway would be 4,700 feet whether the category "small aircraft with approach speeds of 50 knots or more and less than 10 passenger seats" or the category "Small Airplanes Having 10 or More Passenger Seats" was chosen as the design aircraft family. For Federally funded projects, the criterion for substantial use applies to the airplane used as the design airplane needing the crosswind runway. Since there are more than 500 annual operations of both "small aircraft with approach speeds of 50 knots or more and less than 10 passenger seats" and the category "Small Airplanes Having 10 or More Passenger Seats" the substantial use threshold is satisfied. Using the appropriate AC charts, illustrated in **Figure 6**[3] and **Figure 7**, the recommended runway length is approximately 4,700 feet.

The existing crosswind runway at Dickinson is 4,700 feet and therefore no extension is required.

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[3] The 100 percent of fleet category was chosen because it represents airports primarily intended to serve "a relatively large population remote from a metropolitan area" as detailed in paragraph 205 of AC 150/5325-4B.

Figure 6

Figure 2-1. Small Airplanes with Fewer than 10 Passenger Seats
(Excludes Pilot and Co-pilot)

Example:

Temperature (mean day max hot month): 59° F (15° C)
Airport Elevation: Mean Sea Level

Note: Dashed lines shown in the table are mid values of adjacent solid lines.

Recommended Runway Length:

For 95% = 2,700 feet (823 m)
For 100% = 3,200 feet (975 m)

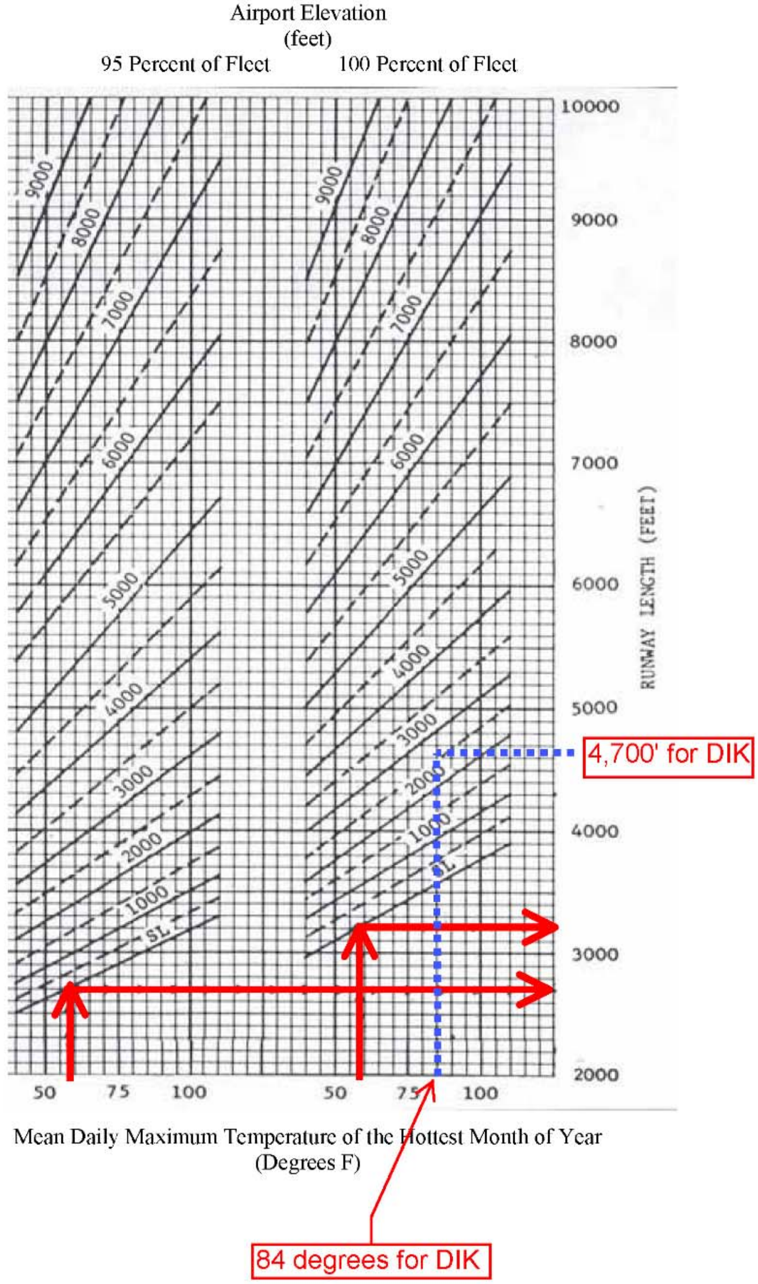
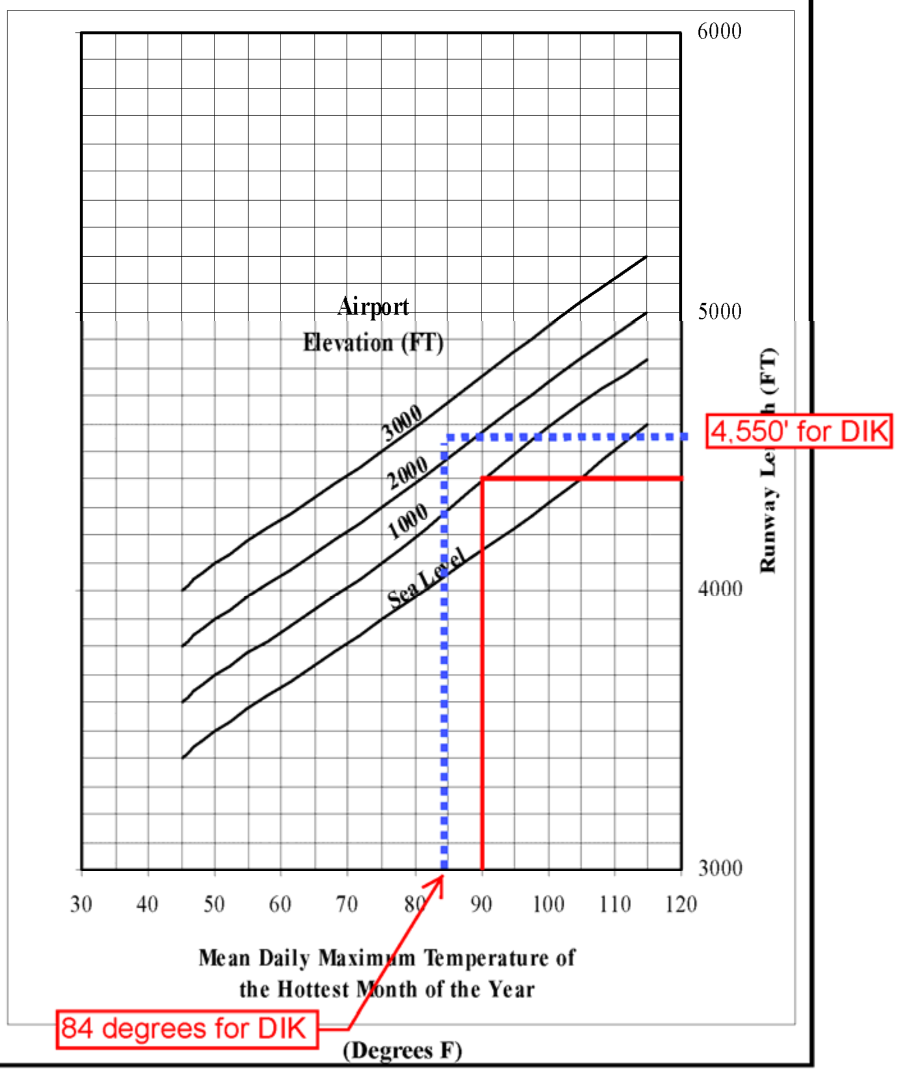


Figure 7

Figure 2-2. Small Airplanes Having 10 or More Passenger Seats
(Excludes Pilot and Co-pilot)

Representative Airplanes	Runway Length Curves
Raytheon B80 Queen Air **Raytheon** E90 King Air **Raytheon** B99 Airliner **Raytheon** A100 King Air (Raytheon formerly Beech Aircraft) **Britten-Norman** Mark III-I Trilander **Mitsubishi** MU-2L **Swearigen** Merlin III-A **Swearigen** Merlin IV-A **Swearigen** Metro II	**Example:** Temperature (mean day max hot month) 90° F (32° C) Airport Elevation (msl) 1,000 feet (328 m) Recommended Runway Length 4,400 feet (1,341 m) **Note:** For airport elevations above 3,000 feet (915 m), use the 100 percent of fleet grouping in figure 2-1.

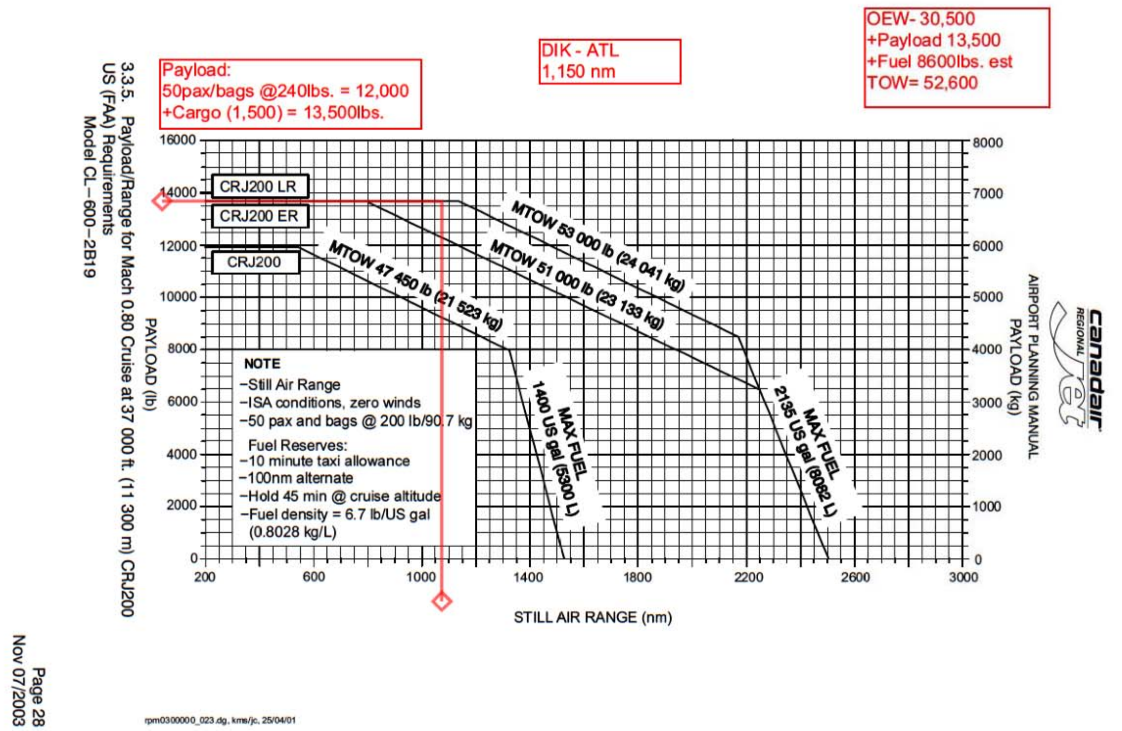


Runway Takeoff Length Calculations

The following exhibit includes the runway takeoff length requirement calculations from the manufacturers' Airport Planning Manuals for the longest takeoff length required for each aircraft analyzed that can be accommodated on a 7,700' runway, factoring in gradient. Distances shown on calculations are for "zero runway gradient". See **Table 7** for length requirements accounting for runway gradient.

Aircraft	Airline	Destination Airport
CRJ200	Delta, United, American	ATL – Atlanta Hartsfield International ORD – Chicago O'Hare International DFW – Dallas/Fort Worth International DEN – Denver International MSP – Minneapolis - St. Paul International SLC – Salt Lake City International IAD – Washington Dulles International
CRJ700	Alaska, Delta, United	ATL – Atlanta Hartsfield International ORD – Chicago O'Hare International DEN – Denver International IAH – Houston Bush Intercontinental MSP – Minneapolis - St. Paul International JKF – New York JFK International SLC – Salt Lake City International SEA – Seattle-Tacoma International IAD – Washington Dulles International
CRJ900	Delta, United	ATL – Atlanta Hartsfield International ORD – Chicago O'Hare International DEN – Denver International IAH – Houston Bush Intercontinental MSP – Minneapolis - St. Paul International JKF – New York JFK International SLC – Salt Lake City International IAD – Washington Dulles International
E145	American, United	ORD – Chicago O'Hare International DFW – Dallas/Fort Worth International DEN – Denver International IAH – Houston Bush Intercontinental

Aircraft	Airline	Destination Airport
E175	American, Delta, United	ORD – Chicago O'Hare International DFW – Dallas/Fort Worth International DEN – Denver International MSP – Minneapolis - St. Paul International JKF – New York JFK International SLC – Salt Lake City International IAD – Washington Dulles International
B717	Delta	ATL – Atlanta Hartsfield International MSP – Minneapolis - St. Paul International JKF – New York JFK International SLC – Salt Lake City International
MD83	Allegiant	LAS – Las Vegas McCarran International SFB – Orlando Stanford International IWA – Phoenix-Mesa Gateway International
MD90	Delta	ATL – Atlanta Hartsfield International MSP – Minneapolis - St. Paul International JKF – New York JFK International
A320	Allegiant, Delta, United	ATL – Atlanta Hartsfield International IAH – Houston Bush Intercontinental LAS – Las Vegas McCarran International JKF – New York JFK International SFB – Orlando Stanford International IWA – Phoenix-Mesa Gateway International IAD – Washington Dulles International
B737-800	Alaska, Delta, United	ANC – Anchorage Stevens International ATL – Atlanta Hartsfield International IAH – Houston Bush Intercontinental JKF – New York JFK International IAD – Washington Dulles International


3.3.5. Payload/Range for Mach 0.80 Cruise at 37 000 ft. (11 300 m) CRJ200
US (FAA) Requirements
Model CL–600–2B19
Payload:
50pax/bags @240lbs. = 12,000
+Cargo (1,500) = 13,500lbs.
DIK - ATL
1,150 nm
OEW- 30,500
+Payload 13,500
+Fuel 8600lbs. est
TOW= 52,600
CRJ200 LR
CRJ200 ER
CRJ200
MTOW 53 000 lb (24 041 kg)
MTOW 51 000 lb (23 133 kg)
MTOW 47 450 lb (21 523 kg)
MAX FUEL 1400 US gal (5300 L)
MAX FUEL 2135 US gal (8082 L)
NOTE
–Still Air Range
–ISA conditions, zero winds
–50 pax and bags @ 200 lb/90.7 kg
Fuel Reserves:
–10 minute taxi allowance
–100nm alternate
–Hold 45 min @ cruise altitude
–Fuel density = 6.7 lb/US gal
(0.8028 kg/L)
PAYLOAD (lb)
PAYLOAD (kg)
STILL AIR RANGE (nm)
canadair REGIONAL Jet
AIRPORT PLANNING MANUAL
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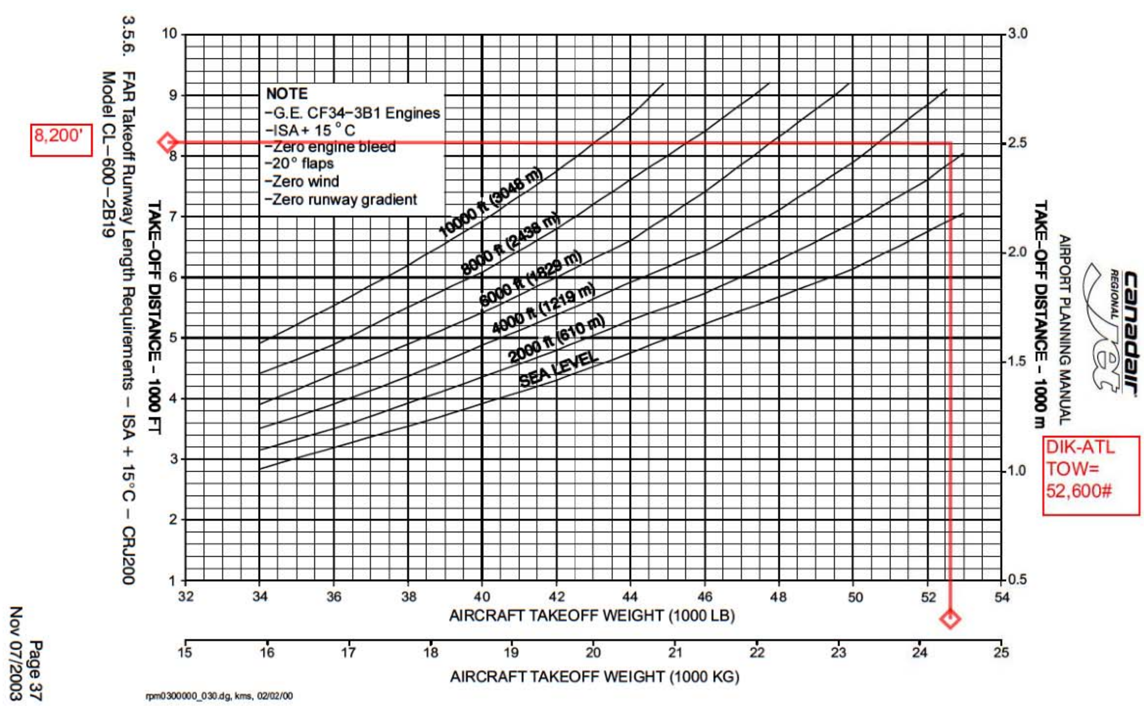
rpm0300000_023.dg, kms/jc, 25/04/01


3.5.6. FAR Takeoff Runway Length Requirements – ISA + 15°C – CRJ200
Model CL–600–2B19
8,200'
NOTE
–G.E. CF34–3B1 Engines
–ISA + 15 °C
–Zero engine bleed
–20° flaps
–Zero wind
–Zero runway gradient
10000 ft (3048 m)
8000 ft (2438 m)
6000 ft (1829 m)
4000 ft (1219 m)
2000 ft (610 m)
SEA LEVEL
TAKE–OFF DISTANCE – 1000 FT
TAKE–OFF DISTANCE – 1000 m
DIK-ATL
TOW=
52,600#
AIRCRAFT TAKEOFF WEIGHT (1000 LB)
AIRCRAFT TAKEOFF WEIGHT (1000 KG)
canadair REGIONAL Jet
AIRPORT PLANNING MANUAL
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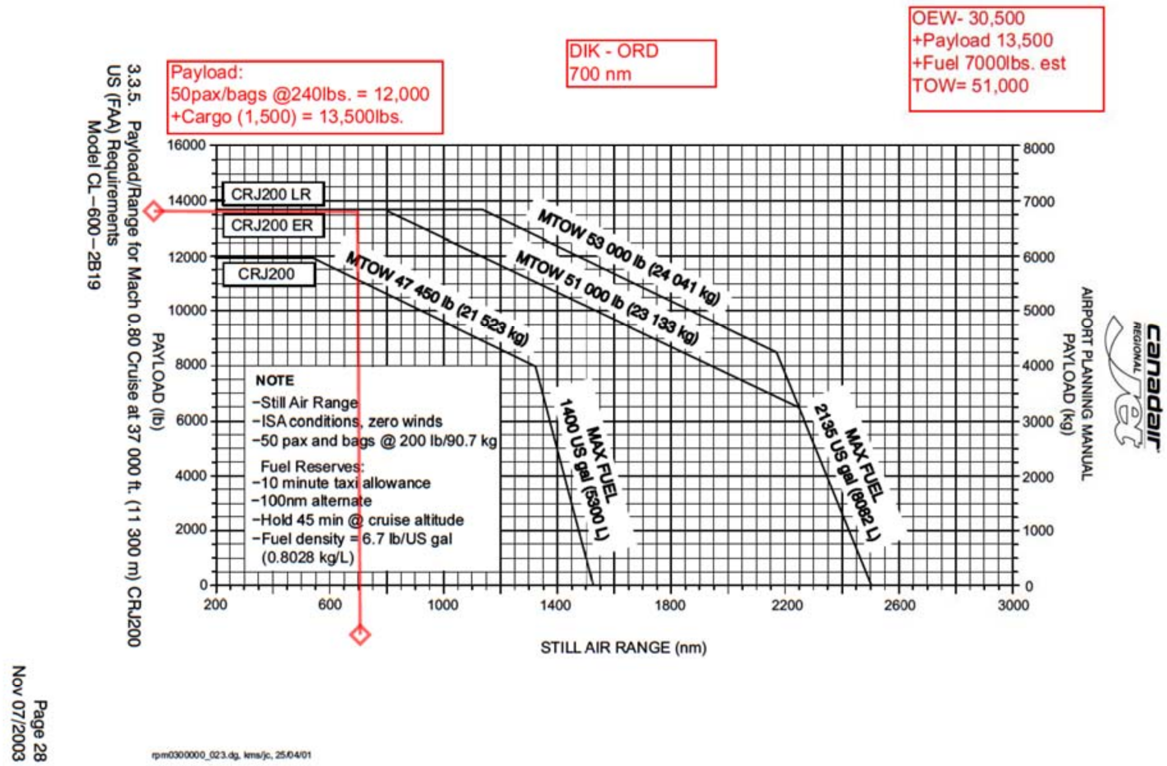
Payload:
50pax/bags @240lbs. = 12,000
+Cargo (1,500) = 13,500lbs.
DIK - ORD
700 nm
OEW- 30,500
+Payload 13,500
+Fuel 7000lbs. est
TOW= 51,000
3.5.5. Payload/Range for Mach 0.80 Cruise at 37 000 ft. (11 300 m) CRJ200
US (FAA) Requirements
Model CL-600-2B19
CRJ200 LR
CRJ200 ER
CRJ200
MTOW 53 000 lb (24 041 kg)
MTOW 51 000 lb (23 133 kg)
MTOW 47 450 lb (21 523 kg)
MAX FUEL 1400 US gal (5300 L)
MAX FUEL 2135 US gal (8082 L)
NOTE
-Still Air Range
-ISA conditions, zero winds
-50 pax and bags @ 200 lb/90.7 kg
Fuel Reserves:
-10 minute taxi allowance
-100nm alternate
-Hold 45 min @ cruise altitude
-Fuel density = 6.7 lb/US gal (0.8028 kg/L)
PAYLOAD (lb)
PAYLOAD (kg)
STILL AIR RANGE (nm)
AIRPORT PLANNING MANUAL
canadair REGIONAL Jet
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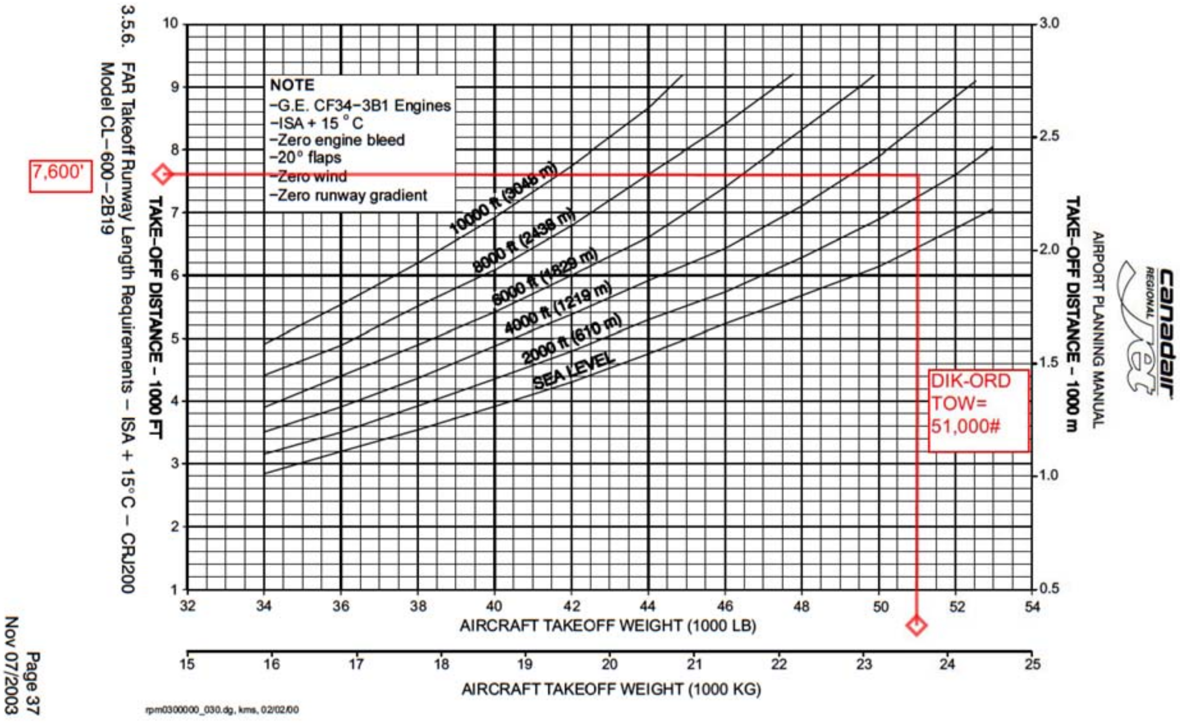
7,600'
3.5.6. FAR Takeoff Runway Length Requirements – ISA + 15°C – CRJ200
Model CL-600-2B19
NOTE
-G.E. CF34-3B1 Engines
-ISA + 15 °C
-Zero engine bleed
-20° flaps
-Zero wind
-Zero runway gradient
10000 ft (3048 m)
8000 ft (2438 m)
6000 ft (1829 m)
4000 ft (1219 m)
2000 ft (610 m)
SEA LEVEL
DIK-ORD
TOW=
51,000#
TAKE-OFF DISTANCE – 1000 FT
TAKE-OFF DISTANCE – 1000 m
AIRCRAFT TAKEOFF WEIGHT (1000 LB)
AIRCRAFT TAKEOFF WEIGHT (1000 KG)
AIRPORT PLANNING MANUAL
canadair REGIONAL Jet
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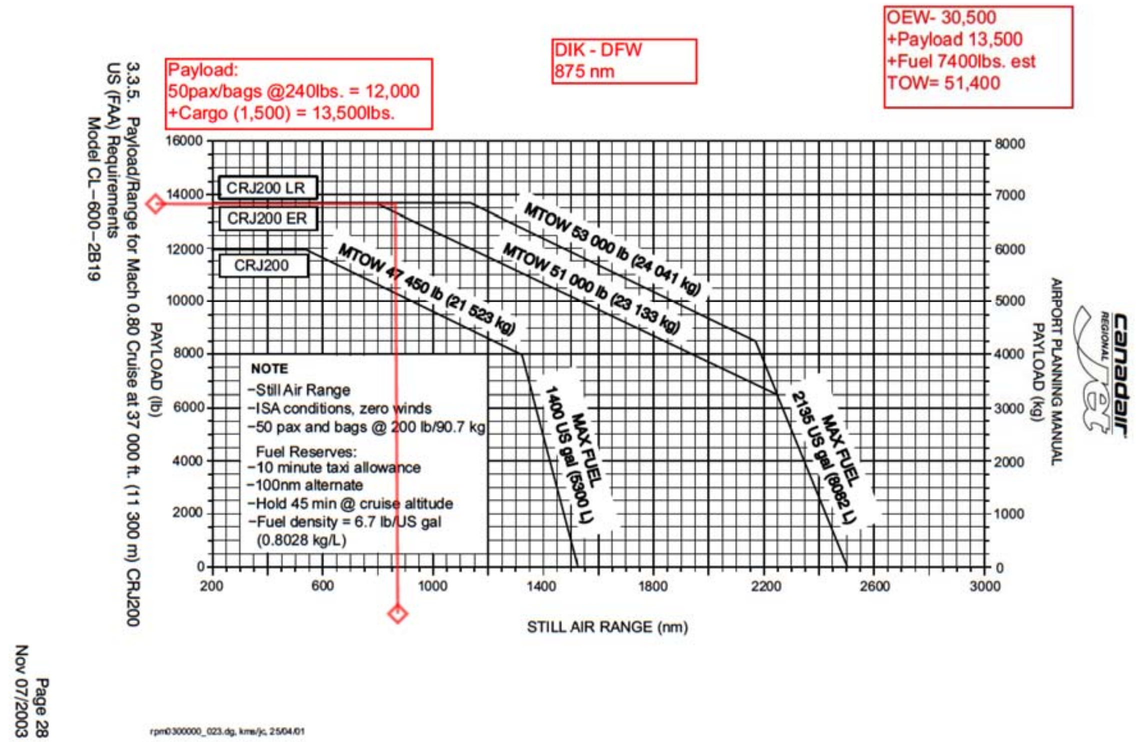
3.3.5. Payload/Range for Mach 0.80 Cruise at 37 000 ft. (11 300 m) CRJ200
US (FAA) Requirements
Model CL–600–2B19
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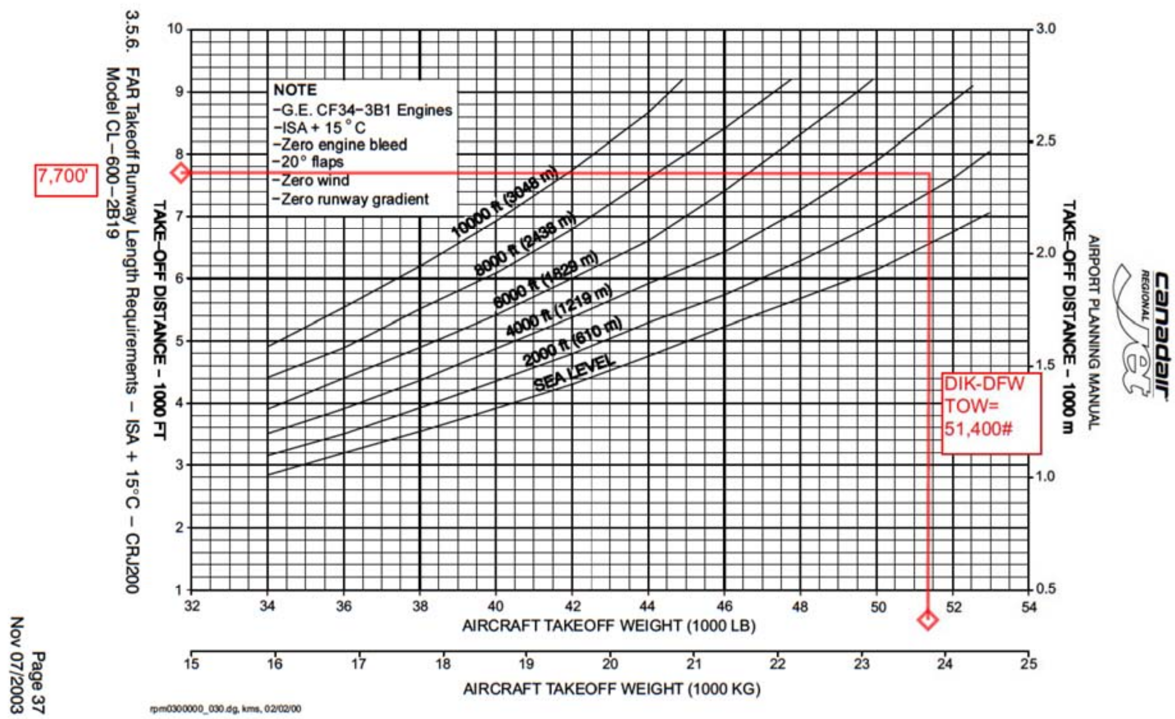
Payload:
50pax/bags @240lbs. = 12,000
+Cargo (1,500) = 13,500lbs.
DIK - DFW
875 nm
OEW- 30,500
+Payload 13,500
+Fuel 7400lbs. est
TOW= 51,400
CRJ200 LR
CRJ200 ER
CRJ200
MTOW 53 000 lb (24 041 kg)
MTOW 51 000 lb (23 133 kg)
MTOW 47 450 lb (21 523 kg)
MAX FUEL 1400 US gal (5300 L)
MAX FUEL 2135 US gal (8082 L)
NOTE
–Still Air Range
–ISA conditions, zero winds
–50 pax and bags @ 200 lb/90.7 kg
Fuel Reserves:
–10 minute taxi allowance
–100nm alternate
–Hold 45 min @ cruise altitude
–Fuel density = 6.7 lb/US gal
(0.8028 kg/L)
PAYLOAD (lb)
PAYLOAD (kg)
STILL AIR RANGE (nm)
canadair REGIONAL Jet
AIRPORT PLANNING MANUAL
rpm0300000_023.dg, kms/jc, 25/04/01


3.5.6. FAR Takeoff Runway Length Requirements – ISA + 15°C – CRJ200
Model CL–600–2B19
Page 37
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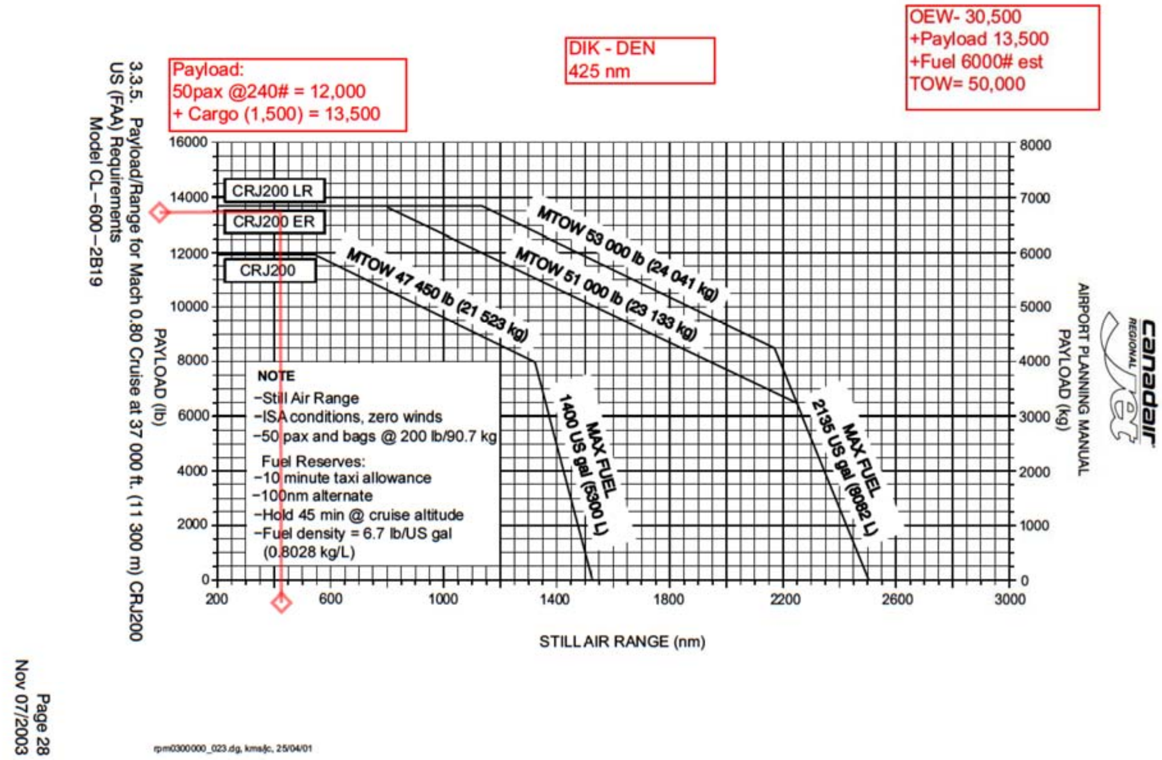
7,700'
NOTE
–G.E. CF34–3B1 Engines
–ISA + 15 °C
–Zero engine bleed
–20° flaps
–Zero wind
–Zero runway gradient
10000 ft (3048 m)
8000 ft (2438 m)
6000 ft (1829 m)
4000 ft (1219 m)
2000 ft (610 m)
SEA LEVEL
DIK-DFW
TOW=
51,400#
TAKE–OFF DISTANCE – 1000 FT
TAKE–OFF DISTANCE – 1000 m
AIRCRAFT TAKEOFF WEIGHT (1000 LB)
AIRCRAFT TAKEOFF WEIGHT (1000 KG)
canadair REGIONAL Jet
AIRPORT PLANNING MANUAL
rpm0300000_030.dg, kms, 02/02/00


3.3.5. Payload/Range for Mach 0.80 Cruise at 37 000 ft. (11 300 m) CRJ200
US (FAA) Requirements
Model CL–600–2B19
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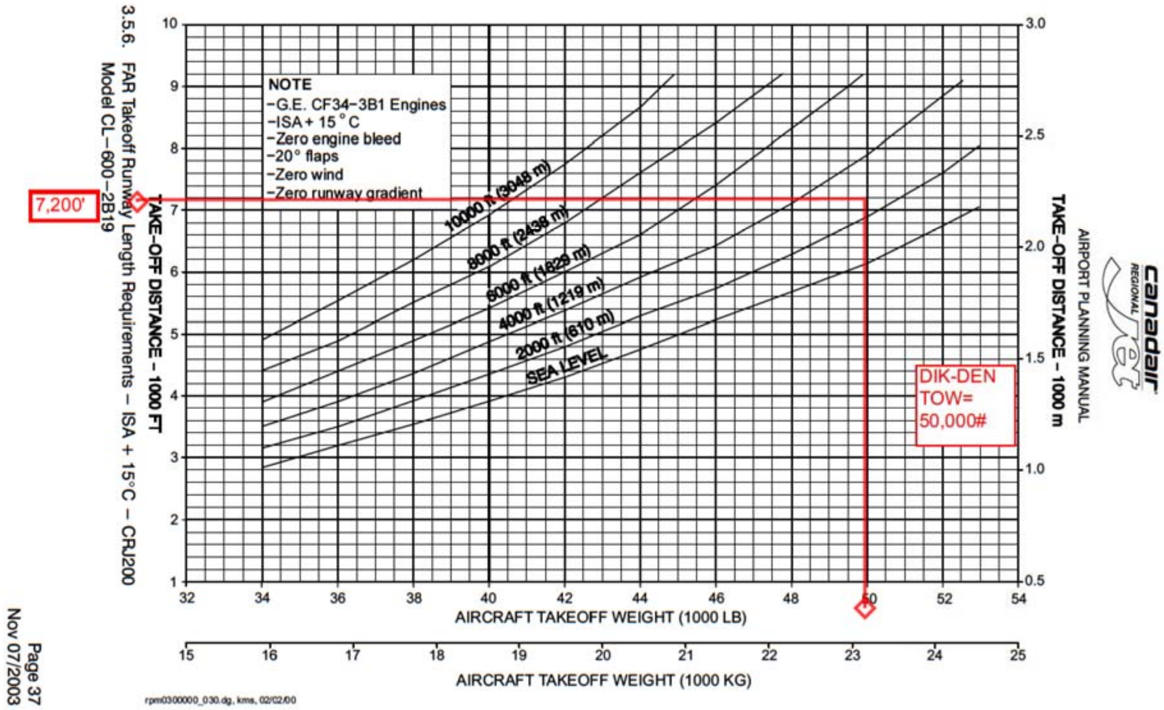
Payload:
50pax @240# = 12,000
+ Cargo (1,500) = 13,500
DIK - DEN
425 nm
OEW- 30,500
+Payload 13,500
+Fuel 6000# est
TOW= 50,000
CRJ200 LR
CRJ200 ER
CRJ200
MTOW 53 000 lb (24 041 kg)
MTOW 51 000 lb (23 133 kg)
MTOW 47 450 lb (21 523 kg)
MAX FUEL 1400 US gal (5300 L)
MAX FUEL 2135 US gal (8082 L)
NOTE
–Still Air Range
–ISA conditions, zero winds
–50 pax and bags @ 200 lb/90.7 kg
Fuel Reserves:
–10 minute taxi allowance
–100nm alternate
–Hold 45 min @ cruise altitude
–Fuel density = 6.7 lb/US gal (0.8028 kg/L)
PAYLOAD (lb)
PAYLOAD (kg)
STILL AIR RANGE (nm)
AIRPORT PLANNING MANUAL
canadair REGIONAL Jet
rpm0300000_023.dg, kms/jc, 25/04/01


3.5.6. FAR Takeoff Runway Length Requirements – ISA + 15°C – CRJ200
Model CL–600–2B19
Page 37
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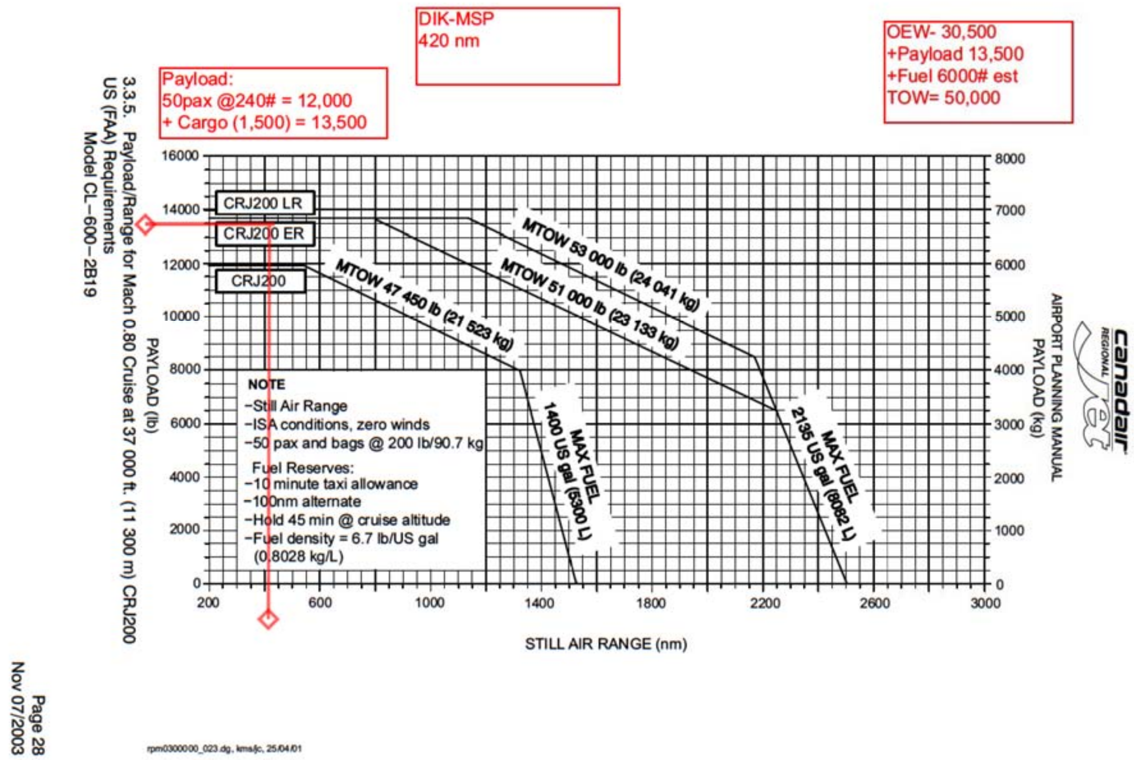
7,200'
NOTE
–G.E. CF34–3B1 Engines
–ISA + 15 °C
–Zero engine bleed
–20° flaps
–Zero wind
–Zero runway gradient
10000 ft (3048 m)
8000 ft (2438 m)
6000 ft (1829 m)
4000 ft (1219 m)
2000 ft (610 m)
SEA LEVEL
DIK-DEN
TOW=
50,000#
TAKE–OFF DISTANCE – 1000 FT
TAKE–OFF DISTANCE – 1000 m
AIRCRAFT TAKEOFF WEIGHT (1000 LB)
AIRCRAFT TAKEOFF WEIGHT (1000 KG)
AIRPORT PLANNING MANUAL
canadair REGIONAL Jet
rpm0300000_030.dg, kms, 02/02/00


DIK-MSP
420 nm
OEW- 30,500
+Payload 13,500
+Fuel 6000# est
TOW= 50,000
Payload:
50pax @240# = 12,000
+ Cargo (1,500) = 13,500
3.5.5. Payload/Range for Mach 0.80 Cruise at 37 000 ft. (11 300 m) CRJ200
US (FAA) Requirements
Model CL−600−2B19
CRJ200 LR
CRJ200 ER
CRJ200
MTOW 53 000 lb (24 041 kg)
MTOW 51 000 lb (23 133 kg)
MTOW 47 450 lb (21 523 kg)
MAX FUEL 1400 US gal (5300 L)
MAX FUEL 2135 US gal (8082 L)
NOTE
−Still Air Range
−ISA conditions, zero winds
−50 pax and bags @ 200 lb/90.7 kg
Fuel Reserves:
−10 minute taxi allowance
−100nm alternate
−Hold 45 min @ cruise altitude
−Fuel density = 6.7 lb/US gal (0.8028 kg/L)
PAYLOAD (lb)
PAYLOAD (kg)
STILL AIR RANGE (nm)
AIRPORT PLANNING MANUAL
canadair REGIONAL Jet
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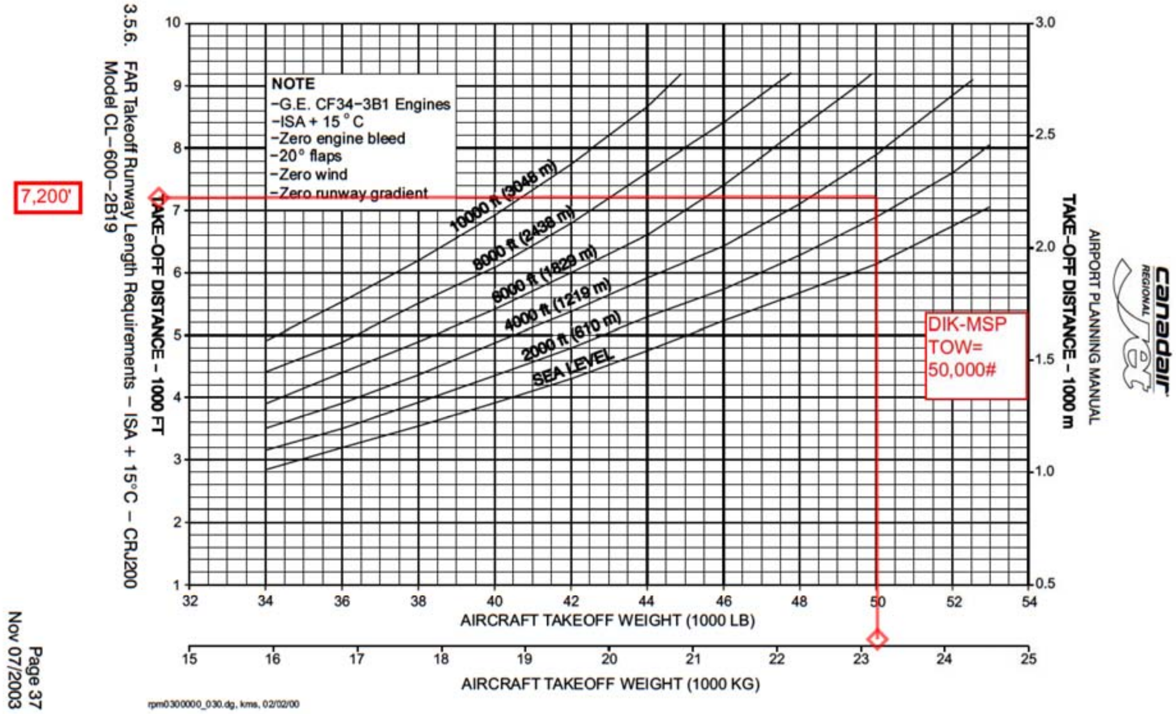
3.5.6. FAR Takeoff Runway Length Requirements – ISA + 15°C – CRJ200
Model CL−600−2B19
7,200'
NOTE
−G.E. CF34−3B1 Engines
−ISA + 15 °C
−Zero engine bleed
−20° flaps
−Zero wind
−Zero runway gradient
10000 ft (3048 m)
8000 ft (2438 m)
6000 ft (1829 m)
4000 ft (1219 m)
2000 ft (610 m)
SEA LEVEL
DIK-MSP
TOW=
50,000#
TAKE−OFF DISTANCE − 1000 FT
TAKE−OFF DISTANCE − 1000 m
AIRCRAFT TAKEOFF WEIGHT (1000 LB)
AIRCRAFT TAKEOFF WEIGHT (1000 KG)
AIRPORT PLANNING MANUAL
canadair REGIONAL Jet
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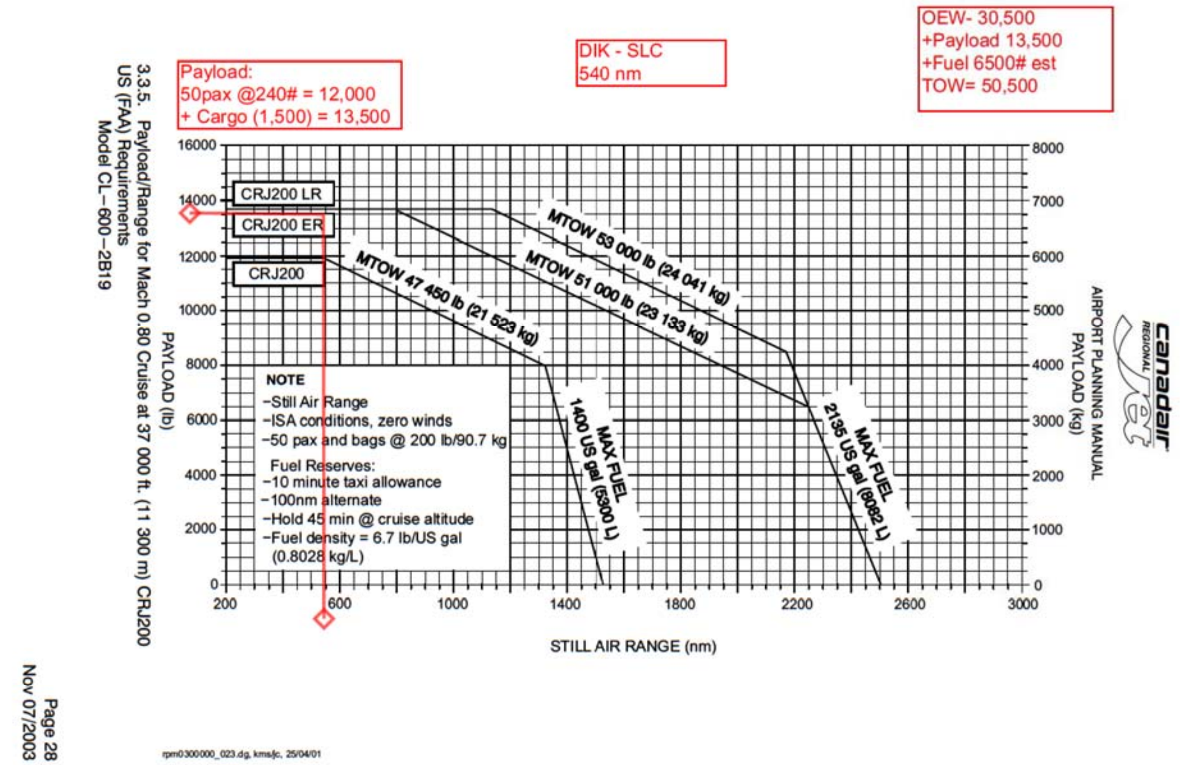
3.3.5. Payload/Range for Mach 0.80 Cruise at 37 000 ft. (11 300 m) CRJ200
US (FAA) Requirements
Model CL-600-2B19
Payload:
50pax @240# = 12,000
+ Cargo (1,500) = 13,500
DIK - SLC
540 nm
OEW- 30,500
+Payload 13,500
+Fuel 6500# est
TOW= 50,500
CRJ200 LR
CRJ200 ER
CRJ200
MTOW 53 000 lb (24 041 kg)
MTOW 51 000 lb (23 133 kg)
MTOW 47 450 lb (21 523 kg)
MAX FUEL 1400 US gal (5300 L)
MAX FUEL 2135 US gal (8082 L)
NOTE
-Still Air Range
-ISA conditions, zero winds
-50 pax and bags @ 200 lb/90.7 kg
Fuel Reserves:
-10 minute taxi allowance
-100nm alternate
-Hold 45 min @ cruise altitude
-Fuel density = 6.7 lb/US gal (0.8028 kg/L)
PAYLOAD (lb)
PAYLOAD (kg)
STILL AIR RANGE (nm)
AIRPORT PLANNING MANUAL
canadair REGIONAL Jet
Page 28
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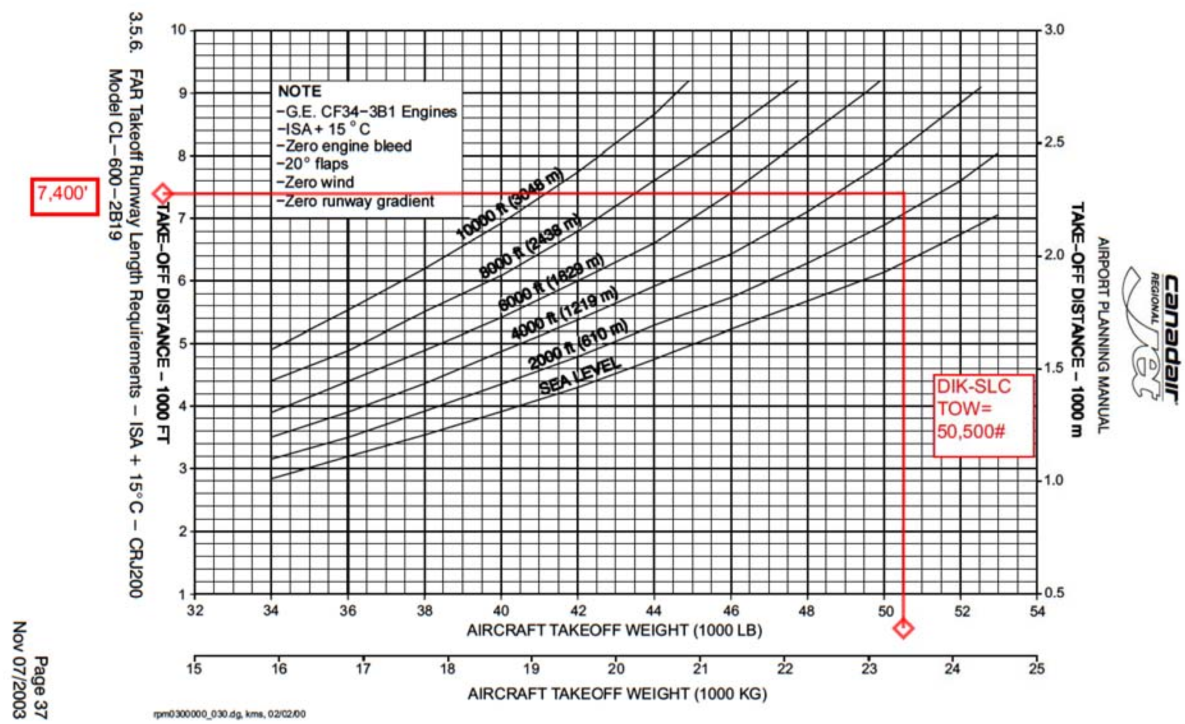
rpm0300000_023.dg, kms/jc, 25/04/01


3.5.6. FAR Takeoff Runway Length Requirements – ISA + 15°C – CRJ200
Model CL-600-2B19
7,400'
NOTE
-G.E. CF34-3B1 Engines
-ISA + 15 °C
-Zero engine bleed
-20° flaps
-Zero wind
-Zero runway gradient
10000 ft (3048 m)
8000 ft (2438 m)
6000 ft (1829 m)
4000 ft (1219 m)
2000 ft (610 m)
SEA LEVEL
DIK-SLC
TOW=
50,500#
TAKE-OFF DISTANCE - 1000 FT
TAKE-OFF DISTANCE - 1000 m
AIRCRAFT TAKEOFF WEIGHT (1000 LB)
AIRCRAFT TAKEOFF WEIGHT (1000 KG)
AIRPORT PLANNING MANUAL
canadair REGIONAL Jet
Page 37
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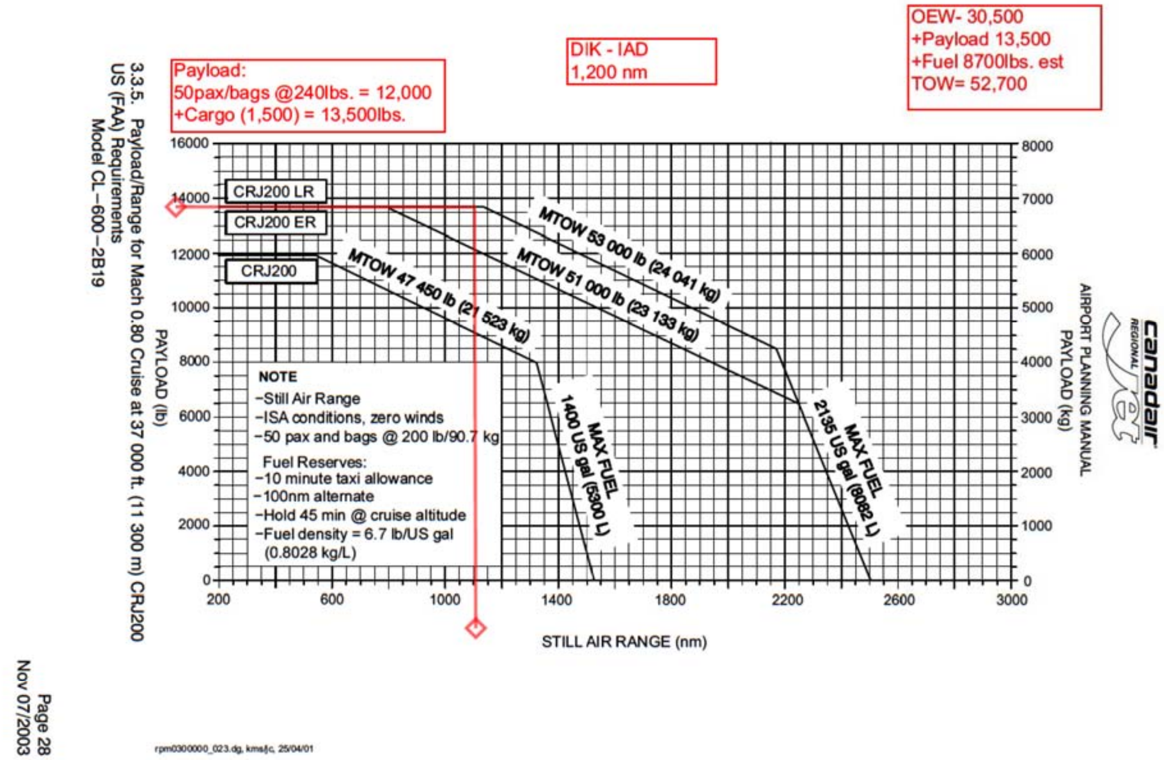
rpm0300000_030.dg, kms, 02/02/00


3.3.5. Payload/Range for Mach 0.80 Cruise at 37 000 ft. (11 300 m) CRJ200
US (FAA) Requirements
Model CL–600–2B19
Payload:
50pax/bags @240lbs. = 12,000
+Cargo (1,500) = 13,500lbs.
DIK - IAD
1,200 nm
OEW- 30,500
+Payload 13,500
+Fuel 8700lbs. est
TOW= 52,700
CRJ200 LR
CRJ200 ER
CRJ200
MTOW 53 000 lb (24 041 kg)
MTOW 51 000 lb (23 133 kg)
MTOW 47 450 lb (21 523 kg)
MAX FUEL 1400 US gal (5300 L)
MAX FUEL 2135 US gal (8082 L)
NOTE
–Still Air Range
–ISA conditions, zero winds
–50 pax and bags @ 200 lb/90.7 kg
Fuel Reserves:
–10 minute taxi allowance
–100nm alternate
–Hold 45 min @ cruise altitude
–Fuel density = 6.7 lb/US gal (0.8028 kg/L)
PAYLOAD (lb)
PAYLOAD (kg)
STILL AIR RANGE (nm)
AIRPORT PLANNING MANUAL
canadair REGIONAL Jet
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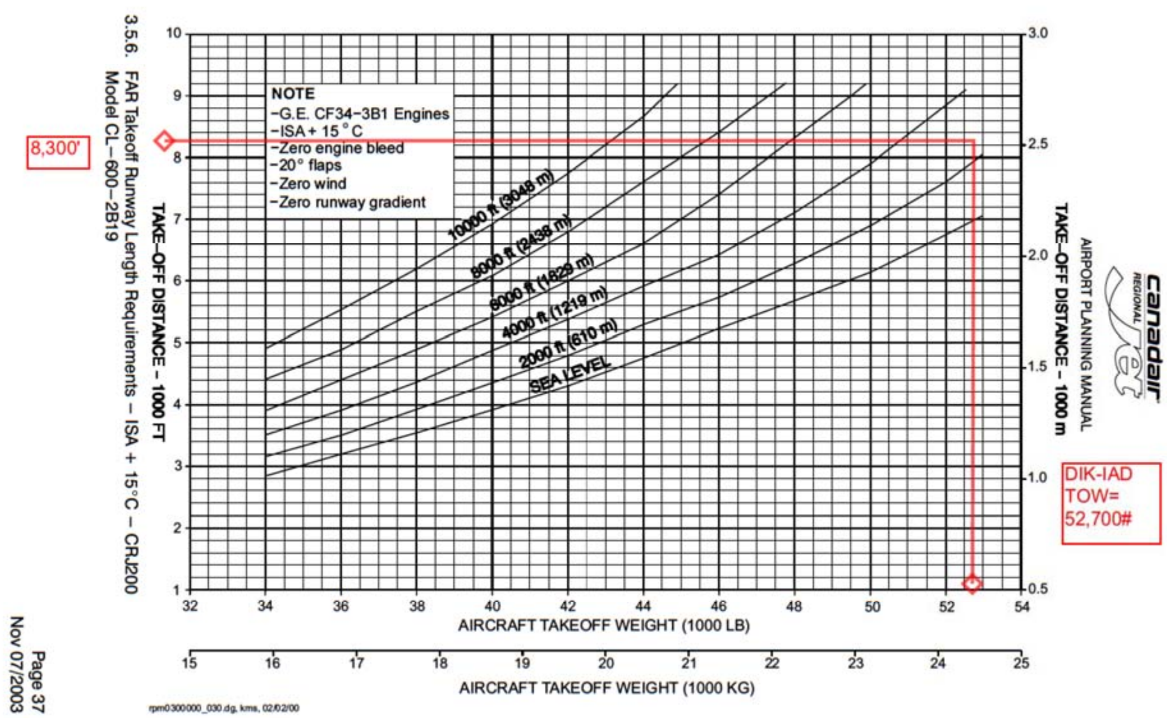
rpm0300000_023.dg, kms/jc, 25/04/01


3.5.6. FAR Takeoff Runway Length Requirements – ISA + 15°C – CRJ200
Model CL–600–2B19
8,300'
NOTE
–G.E. CF34–3B1 Engines
–ISA + 15 °C
–Zero engine bleed
–20° flaps
–Zero wind
–Zero runway gradient
10000 ft (3048 m)
8000 ft (2438 m)
6000 ft (1829 m)
4000 ft (1219 m)
2000 ft (610 m)
SEA LEVEL
TAKE–OFF DISTANCE – 1000 FT
TAKE–OFF DISTANCE – 1000 m
DIK-IAD
TOW=
52,700#
AIRCRAFT TAKEOFF WEIGHT (1000 LB)
AIRCRAFT TAKEOFF WEIGHT (1000 KG)
AIRPORT PLANNING MANUAL
canadair REGIONAL Jet
Page 37
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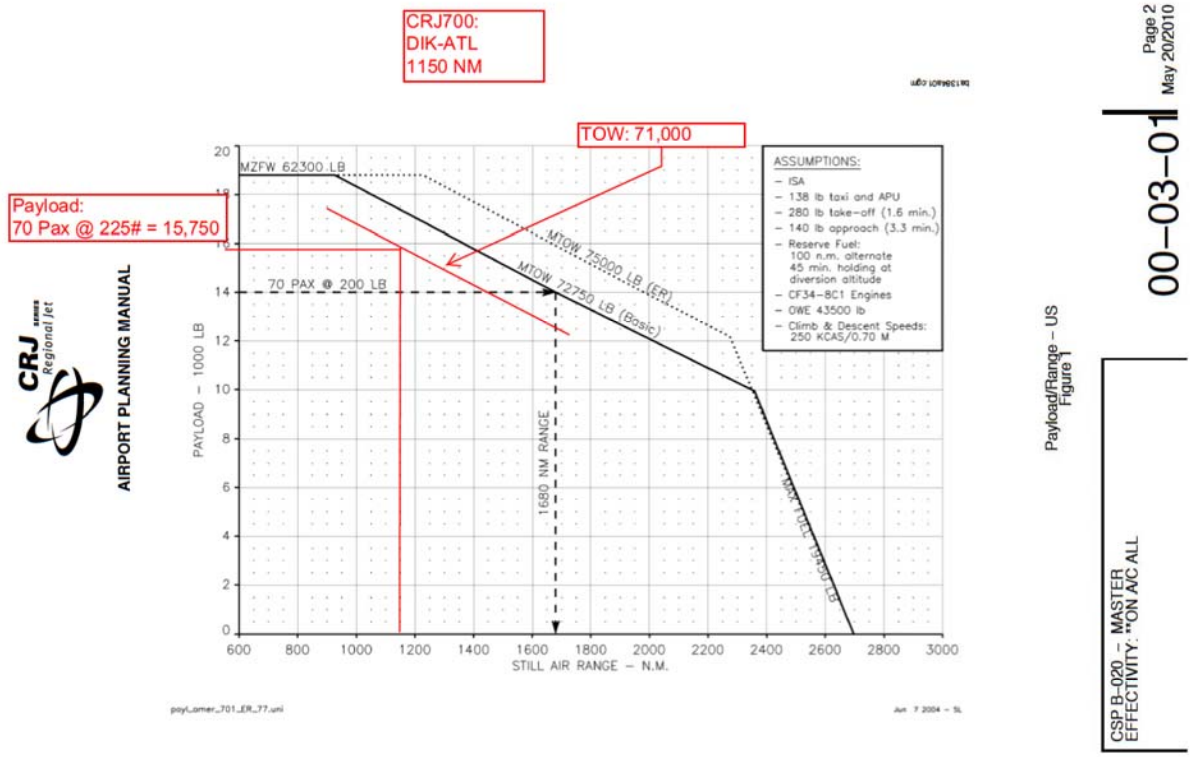
rpm0300000_030.dg, kms, 02/02/00


CRJ700:
DIK-ATL
1150 NM
TOW: 71,000
Payload:
70 Pax @ 225# = 15,750
MZFW 62300 LB
70 PAX @ 200 LB
MTOW 75000 LB (ER)
MTOW 72750 LB (Basic)
1680 NM RANGE
ASSUMPTIONS:
– ISA
– 138 lb taxi and APU
– 280 lb take-off (1.6 min.)
– 140 lb approach (3.3 min.)
– Reserve Fuel:
100 n.m. alternate
45 min. holding at
diversion altitude
– CF34-8C1 Engines
– OWE 43500 lb
– Climb & Descent Speeds:
250 KCAS/0.70 M
PAYLOAD – 1000 LB
STILL AIR RANGE – N.M.
AIRPORT PLANNING MANUAL
Payload/Range – US
Figure 1
CSP B-020 – MASTER
EFFECTIVITY: **ON A/C ALL
00-03-01
Page 2
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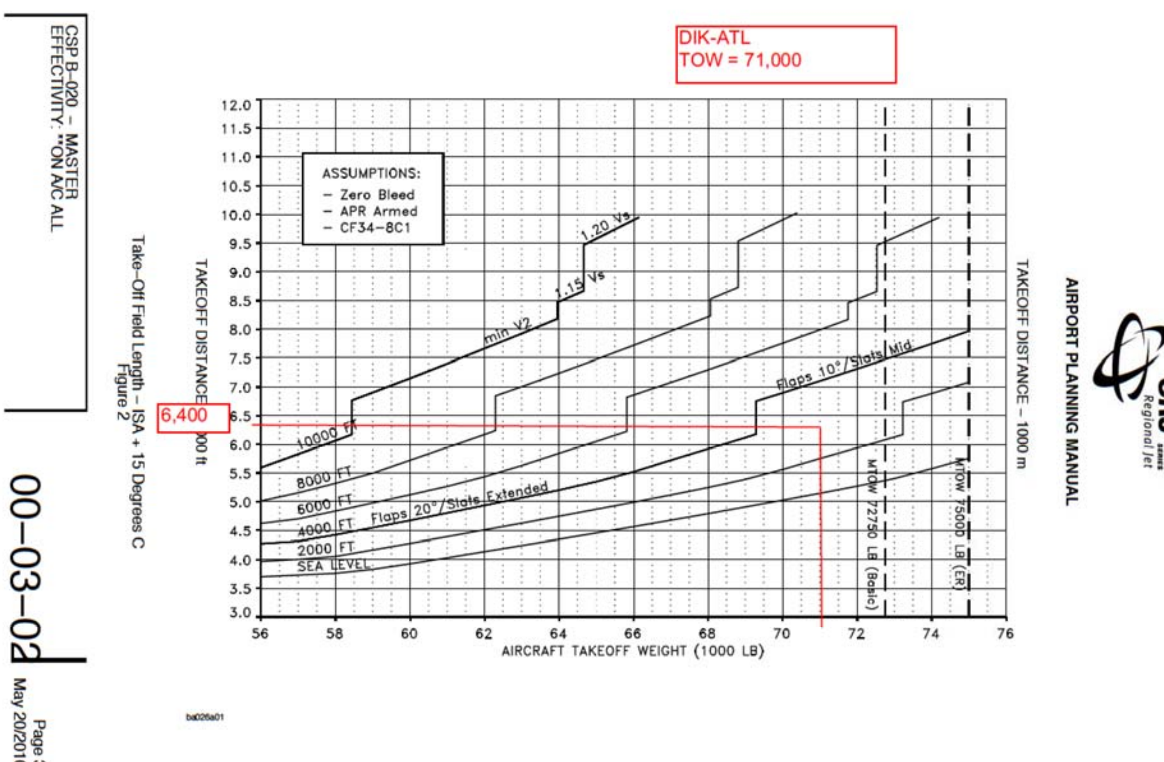
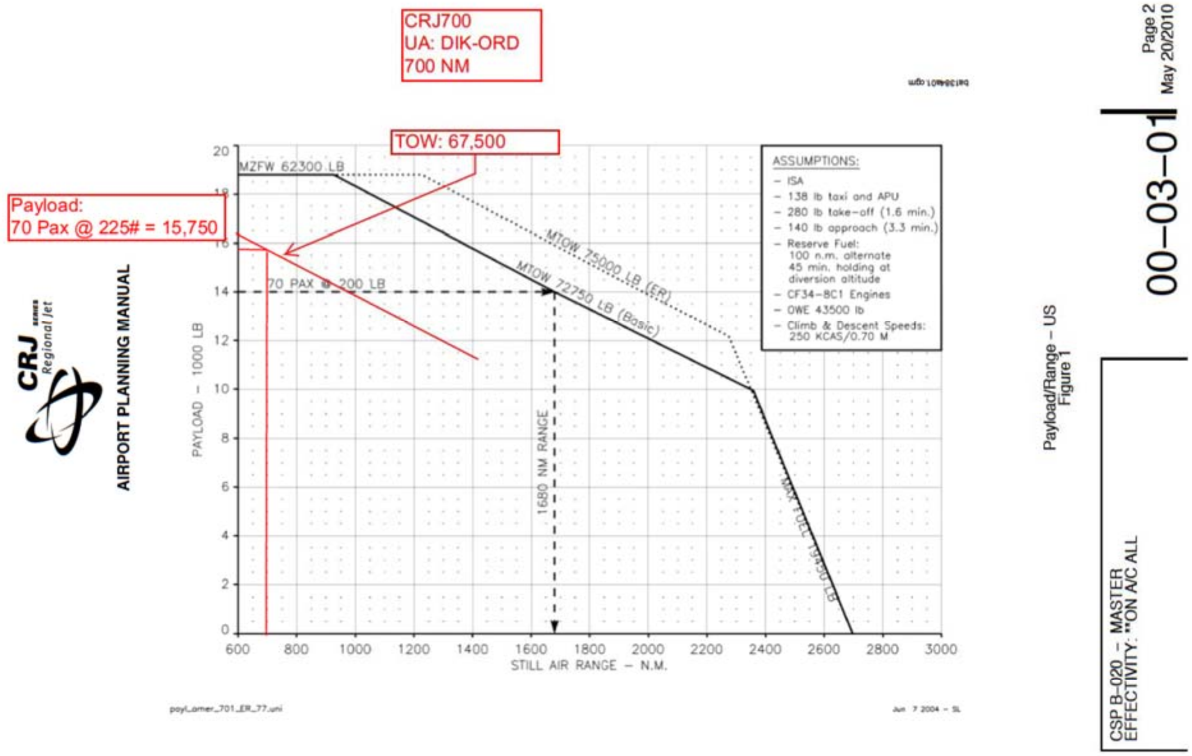
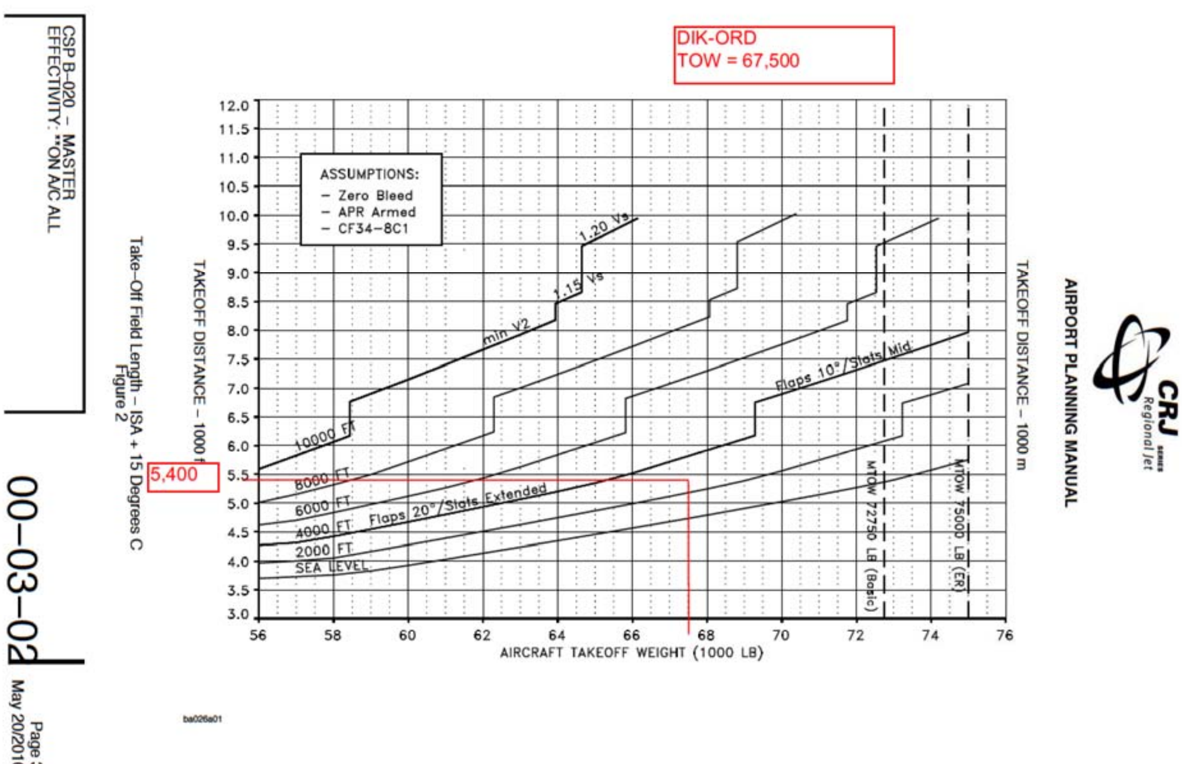

DIK-ATL
TOW = 71,000
6,400
ASSUMPTIONS:
– Zero Bleed
– APR Armed
– CF34-8C1
1.20 Vs
1.15 Vs
min V2
Flaps 10°/Slats Mid
Flaps 20°/Slats Extended
10000 FT
8000 FT
6000 FT
4000 FT
2000 FT
SEA LEVEL
MTOW 72750 LB (Basic)
MTOW 75000 LB (ER)
AIRCRAFT TAKEOFF WEIGHT (1000 LB)
TAKEOFF DISTANCE – 1000 m
AIRPORT PLANNING MANUAL
Take-Off Field Length – ISA + 15 Degrees C
Figure 2
CSP B-020 – MASTER
EFFECTIVITY: **ON A/C ALL
00-03-02
Page 3
May 20/2010


CRJ700
UA: DIK-ORD
700 NM
TOW: 67,500
Payload:
70 Pax @ 225# = 15,750
MZFW 62300 LB
70 PAX @ 200 LB
MTOW 75000 LB (ER)
MTOW 72750 LB (Basic)
1680 NM RANGE
MAX FUEL
ASSUMPTIONS:
– ISA
– 138 lb taxi and APU
– 280 lb take–off (1.6 min.)
– 140 lb approach (3.3 min.)
– Reserve Fuel: 100 n.m. alternate 45 min. holding at diversion altitude
– CF34–8C1 Engines
– OWE 43500 lb
– Climb & Descent Speeds: 250 KCAS/0.70 M
PAYLOAD – 1000 LB
STILL AIR RANGE – N.M.
AIRPORT PLANNING MANUAL
CRJ Regional Jet
Payload/Range – US
Figure 1
00–03–01
Page 2
May 20/2010
CSP B–020 – MASTER
EFFECTIVITY: **ON A/C ALL


DIK-ORD
TOW = 67,500
5,400
ASSUMPTIONS:
– Zero Bleed
– APR Armed
– CF34–8C1
1.20 Vs
1.15 Vs
min V2
Flaps 10°/Slats Mid
Flaps 20°/Slats Extended
10000 FT
8000 FT
6000 FT
4000 FT
2000 FT
SEA LEVEL
MTOW 72750 LB (Basic)
MTOW 75000 LB (ER)
TAKEOFF DISTANCE – 1000 ft
TAKEOFF DISTANCE – 1000 m
AIRCRAFT TAKEOFF WEIGHT (1000 LB)
AIRPORT PLANNING MANUAL
CRJ Regional Jet
Take–Off Field Length – ISA + 15 Degrees C
Figure 2
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Page 3
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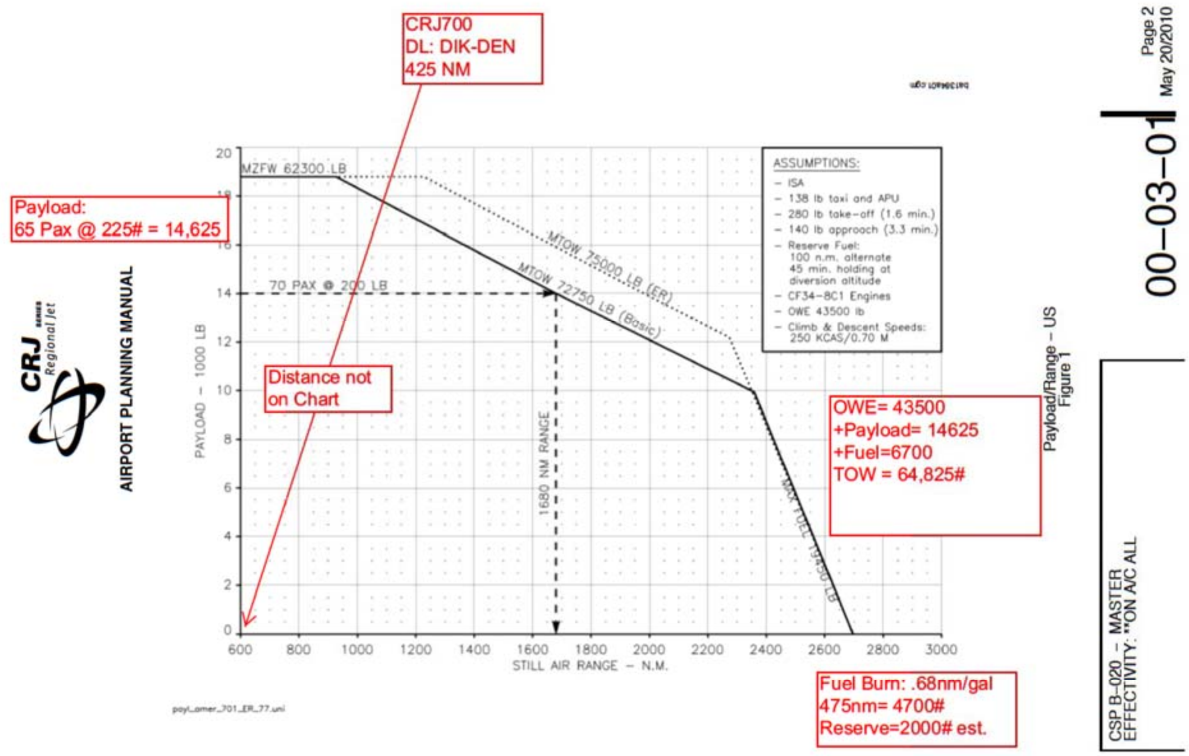
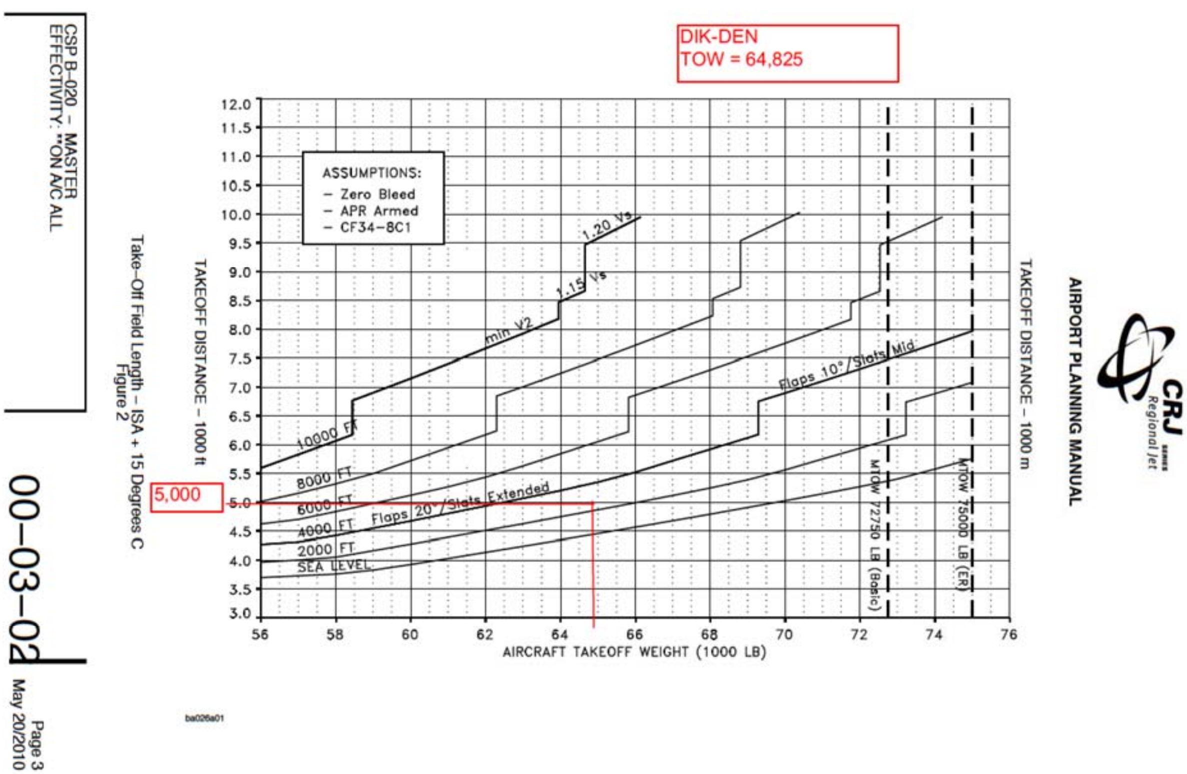
CSP B–020 – MASTER
EFFECTIVITY: **ON A/C ALL


CRJ700
DL: DIK-DEN
425 NM
Payload:
65 Pax @ 225# = 14,625
Distance not
on Chart
OWE= 43500
+Payload= 14625
+Fuel=6700
TOW = 64,825#
Fuel Burn: .68nm/gal
475nm= 4700#
Reserve=2000# est.
MZFW 62300 LB
70 PAX @ 200 LB
MTOW 75000 LB (ER)
MTOW 72750 LB (Basic)
1680 NM RANGE
PAYLOAD – 1000 LB
STILL AIR RANGE – N.M.
ASSUMPTIONS:
– ISA
– 138 lb taxi and APU
– 280 lb take-off (1.6 min.)
– 140 lb approach (3.3 min.)
– Reserve Fuel:
100 n.m. alternate
45 min. holding at
diversion altitude
– CF34-8C1 Engines
– OWE 43500 lb
– Climb & Descent Speeds:
250 KCAS/0.70 M
AIRPORT PLANNING MANUAL
00–03–01
Page 2
May 20/2010
Payload/Range – US
Figure 1
CSP B-020 – MASTER
EFFECTIVITY: **ON A/C ALL


DIK-DEN
TOW = 64,825
5,000
ASSUMPTIONS:
– Zero Bleed
– APR Armed
– CF34-8C1
1.20 Vs
1.15 Vs
min V2
Flaps 10°/Slats Mid
Flaps 20°/Slats Extended
10000 FT
8000 FT
6000 FT
4000 FT
2000 FT
SEA LEVEL
MTOW 72750 LB (Basic)
MTOW 75000 LB (ER)
TAKEOFF DISTANCE – 1000 ft
TAKEOFF DISTANCE – 1000 m
AIRCRAFT TAKEOFF WEIGHT (1000 LB)
AIRPORT PLANNING MANUAL
Take-Off Field Length – ISA + 15 Degrees C
Figure 2
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Page 3
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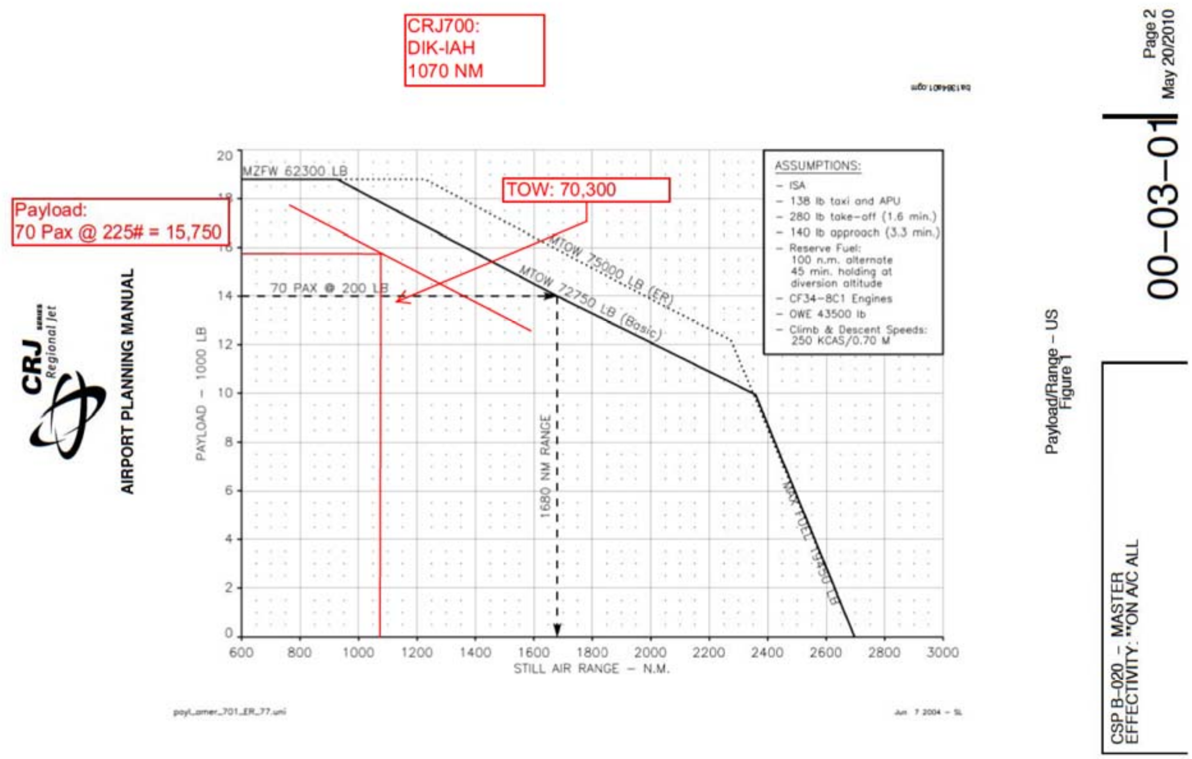
CSP B-020 – MASTER
EFFECTIVITY: **ON A/C ALL


CRJ700:
DIK-IAH
1070 NM
Payload:
70 Pax @ 225# = 15,750
TOW: 70,300
MZFW 62300 LB
70 PAX @ 200 LB
MTOW 75000 LB (ER)
MTOW 72750 LB (Basic)
1680 NM RANGE
MAX FUEL 19450 LB
ASSUMPTIONS:
– ISA
– 138 lb taxi and APU
– 280 lb take-off (1.6 min.)
– 140 lb approach (3.3 min.)
– Reserve Fuel: 100 n.m. alternate 45 min. holding at diversion altitude
– CF34–8C1 Engines
– OWE 43500 lb
– Climb & Descent Speeds: 250 KCAS/0.70 M
PAYLOAD – 1000 LB
STILL AIR RANGE – N.M.
AIRPORT PLANNING MANUAL
Payload/Range – US
Figure 1
CSP B–020 – MASTER
EFFECTIVITY: **ON A/C ALL
00–03–01
Page 2
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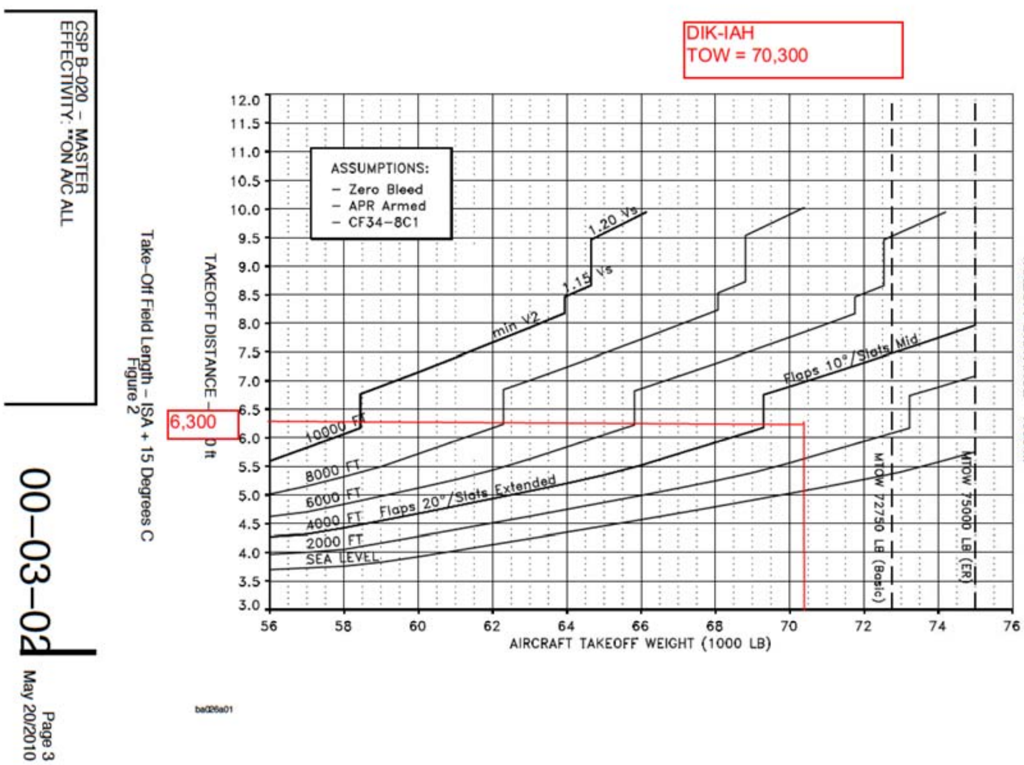
DIK-IAH
TOW = 70,300
6,300
ASSUMPTIONS:
– Zero Bleed
– APR Armed
– CF34–8C1
1.20 Vs
1.15 Vs
min V2
Flaps 10°/Slats Mid
Flaps 20°/Slats Extended
10000 FT
8000 FT
6000 FT
4000 FT
2000 FT
SEA LEVEL
MTOW 72750 LB (Basic)
MTOW 75000 LB (ER)
TAKEOFF DISTANCE – 1000 ft
TAKEOFF DISTANCE – 1000 m
AIRCRAFT TAKEOFF WEIGHT (1000 LB)
AIRPORT PLANNING MANUAL
Take–Off Field Length – ISA + 15 Degrees C
Figure 2
CSP B–020 – MASTER
EFFECTIVITY: **ON A/C ALL
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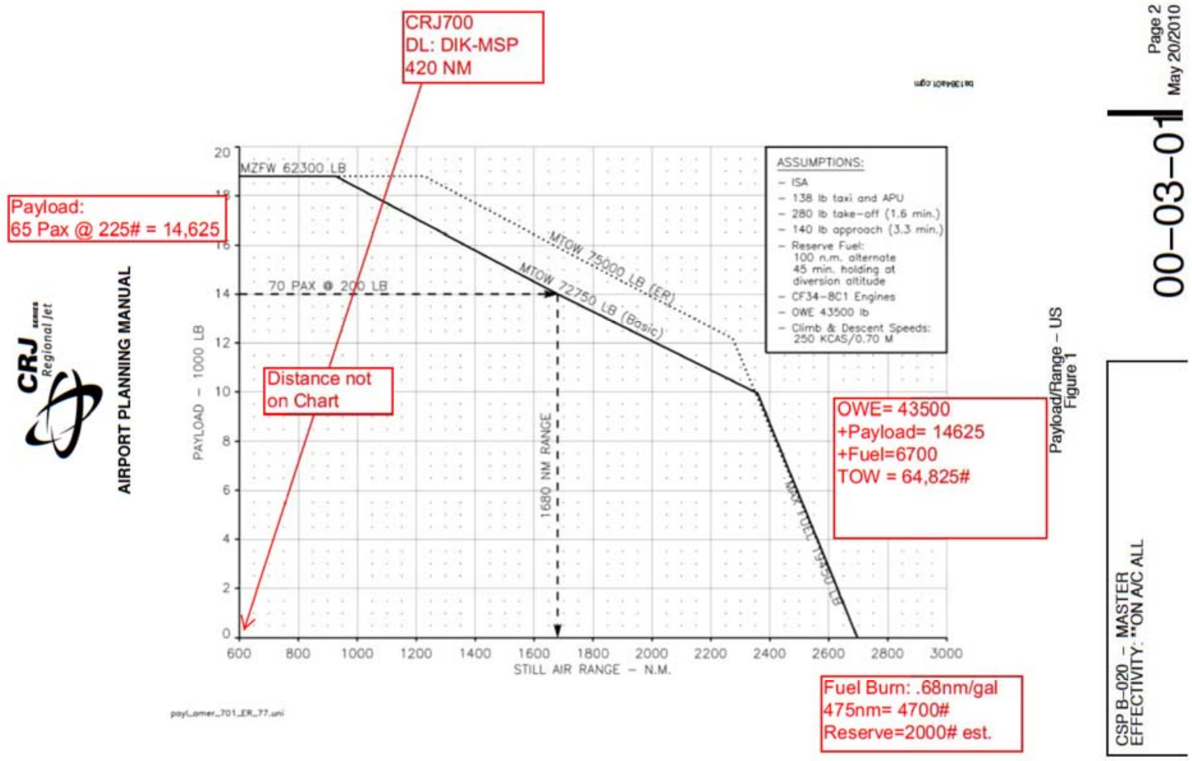
CRJ700
DL: DIK-MSP
420 NM
Payload:
65 Pax @ 225# = 14,625
Distance not
on Chart
OWE= 43500
+Payload= 14625
+Fuel=6700
TOW = 64,825#
Fuel Burn: .68nm/gal
475nm= 4700#
Reserve=2000# est.
AIRPORT PLANNING MANUAL
MZFW 62300 LB
70 PAX @ 200 LB
MTOW 75000 LB (ER)
MTOW 72750 LB (Basic)
1680 NM RANGE
PAYLOAD – 1000 LB
STILL AIR RANGE – N.M.
ASSUMPTIONS:
– ISA
– 138 lb taxi and APU
– 280 lb take-off (1.6 min.)
– 140 lb approach (3.3 min.)
– Reserve Fuel:
100 n.m. alternate
45 min. holding at
diversion altitude
– CF34-8C1 Engines
– OWE 43500 lb
– Climb & Descent Speeds:
250 KCAS/0.70 M
Payload/Range – US
Figure 1
CSP B-020 – MASTER
EFFECTIVITY: **ON A/C ALL
00–03–01
Page 2
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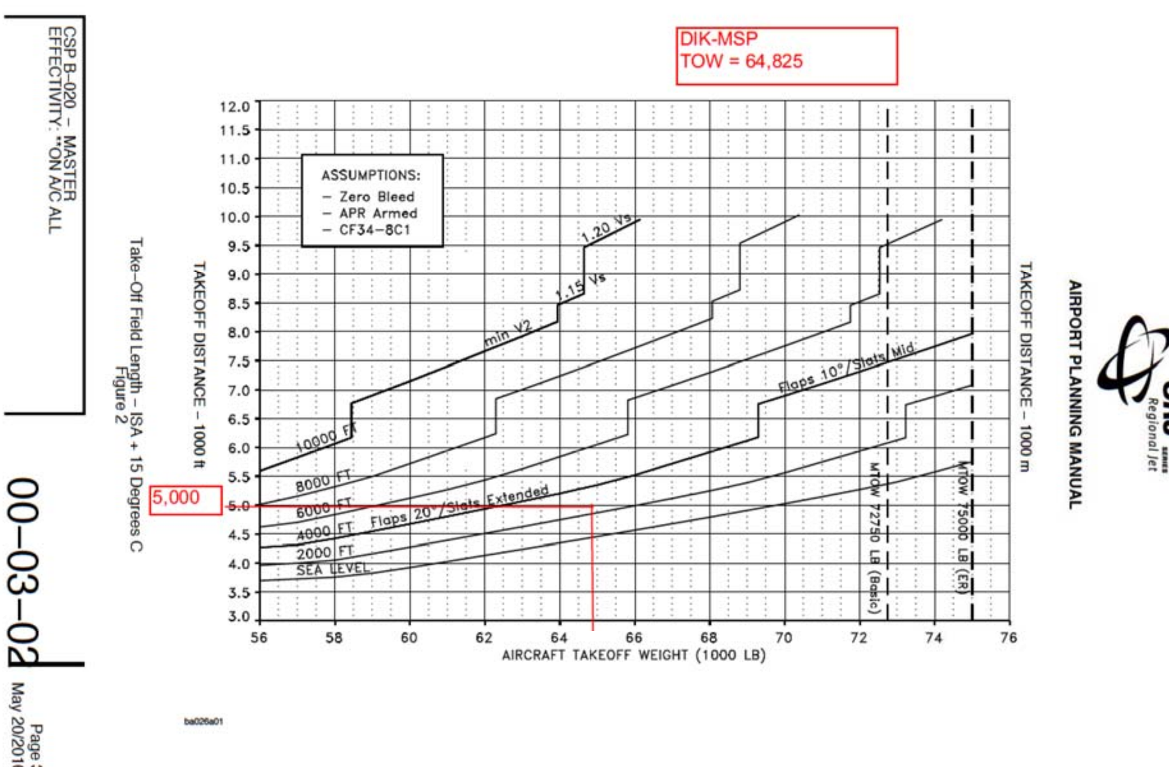
DIK-MSP
TOW = 64,825
5,000
ASSUMPTIONS:
– Zero Bleed
– APR Armed
– CF34–8C1
1.20 Vs
1.15 Vs
min V2
10000 FT
8000 FT
6000 FT
4000 FT
2000 FT
SEA LEVEL
Flaps 20°/Slats Extended
Flaps 10°/Slats Mid
MTOW 72750 LB (Basic)
MTOW 75000 LB (ER)
TAKEOFF DISTANCE – 1000 ft
TAKEOFF DISTANCE – 1000 m
AIRCRAFT TAKEOFF WEIGHT (1000 LB)
AIRPORT PLANNING MANUAL
Take-Off Field Length – ISA + 15 Degrees C
Figure 2
CSP B-020 – MASTER
EFFECTIVITY: **ON A/C ALL
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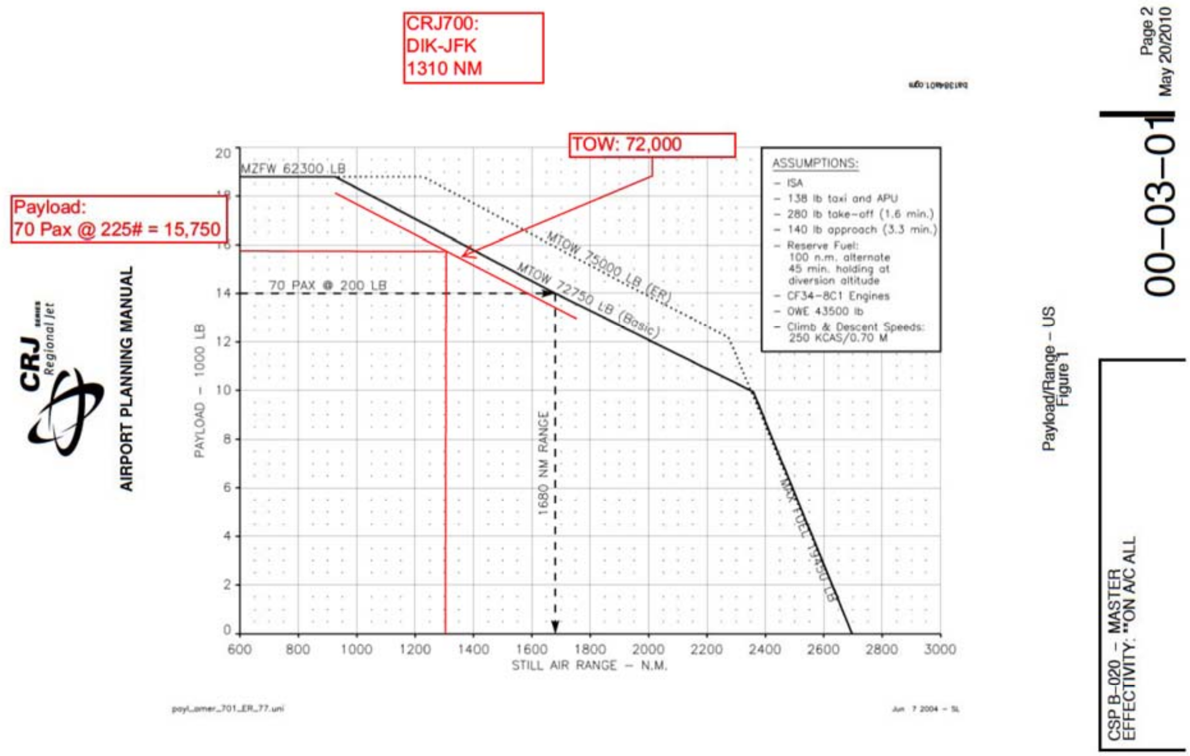
CRJ700:
DIK-JFK
1310 NM
TOW: 72,000
Payload:
70 Pax @ 225# = 15,750
MZFW 62300 LB
70 PAX @ 200 LB
MTOW 75000 LB (ER)
MTOW 72750 LB (Basic)
1680 NM RANGE
PAYLOAD – 1000 LB
STILL AIR RANGE – N.M.
ASSUMPTIONS:
– ISA
– 138 lb taxi and APU
– 280 lb take-off (1.6 min.)
– 140 lb approach (3.3 min.)
– Reserve Fuel: 100 n.m. alternate 45 min. holding at diversion altitude
– CF34-8C1 Engines
– OWE 43500 lb
– Climb & Descent Speeds: 250 KCAS/0.70 M
AIRPORT PLANNING MANUAL
CRJ Regional Jet
00–03–01
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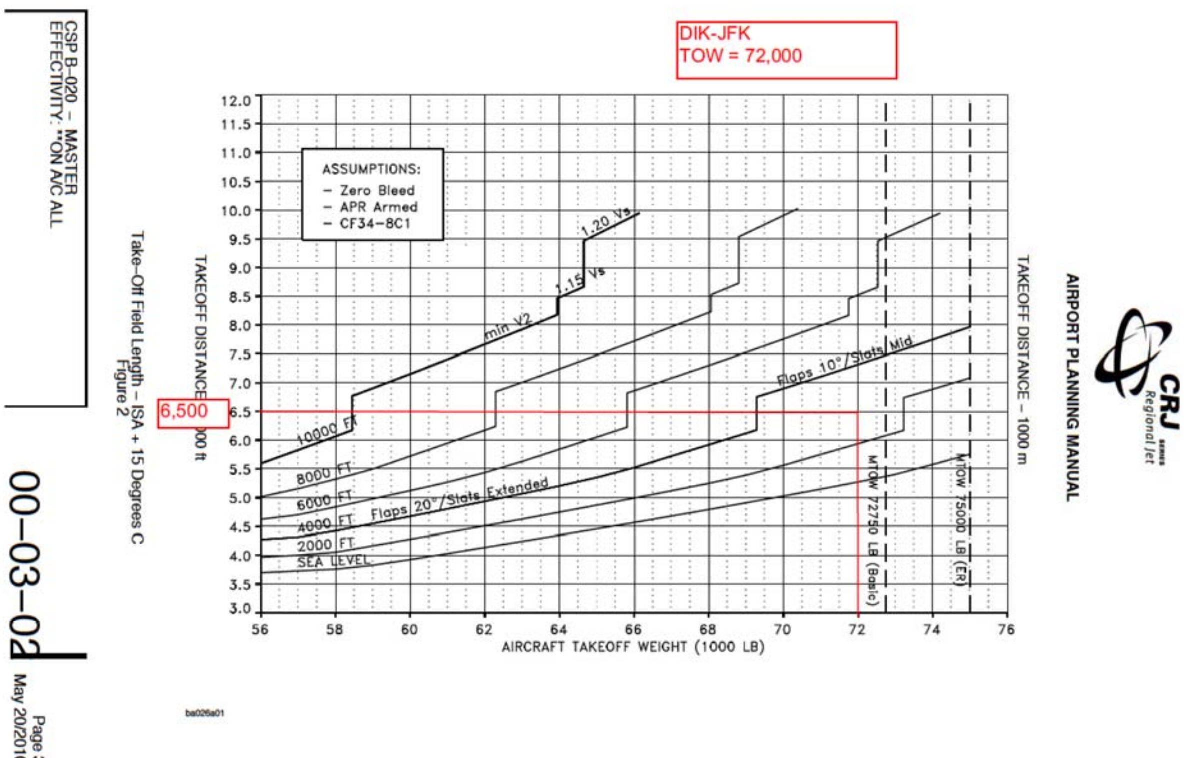
Payload/Range – US
Figure 1
CSP B–020 – MASTER
EFFECTIVITY: **ON A/C ALL


DIK-JFK
TOW = 72,000
6,500
ASSUMPTIONS:
– Zero Bleed
– APR Armed
– CF34–8C1
1.20 Vs
1.15 Vs
min V2
Flaps 10°/Slats Mid
Flaps 20°/Slats Extended
10000 FT
8000 FT
6000 FT
4000 FT
2000 FT
SEA LEVEL
MTOW 72750 LB (Basic)
MTOW 75000 LB (ER)
TAKEOFF DISTANCE – 1000 m
AIRCRAFT TAKEOFF WEIGHT (1000 LB)
AIRPORT PLANNING MANUAL
CRJ Regional Jet
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Page 3
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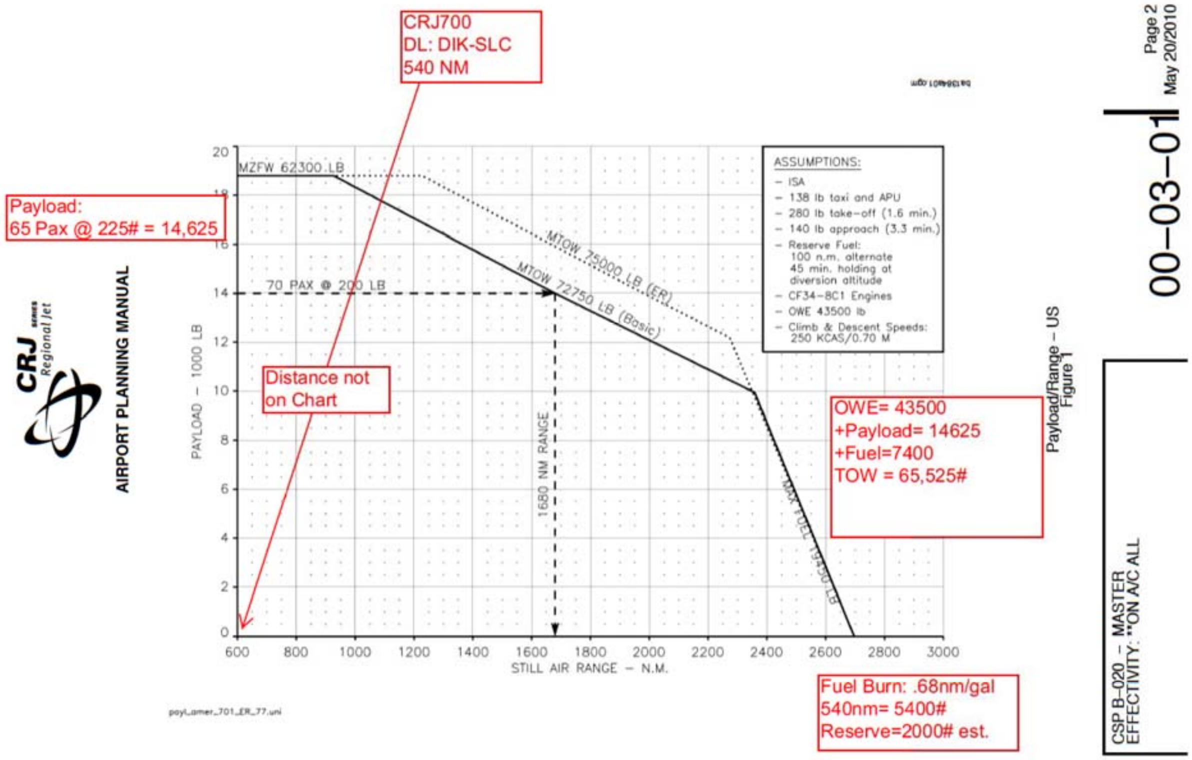
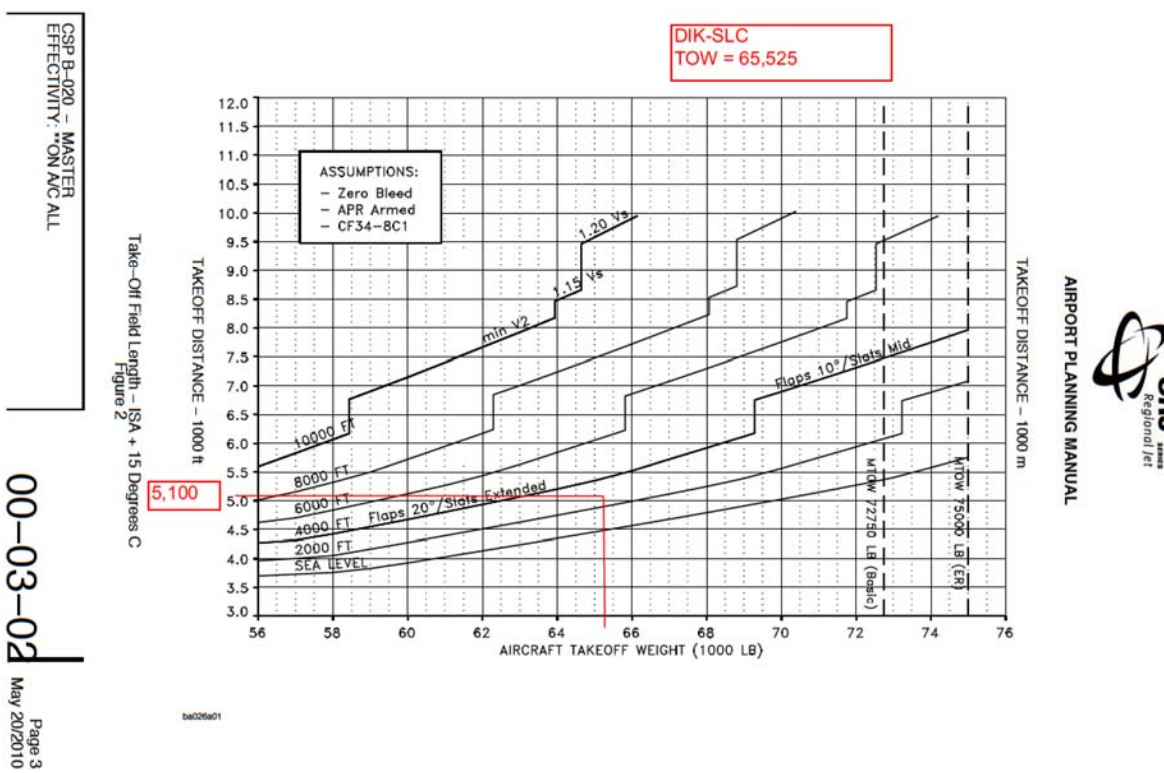
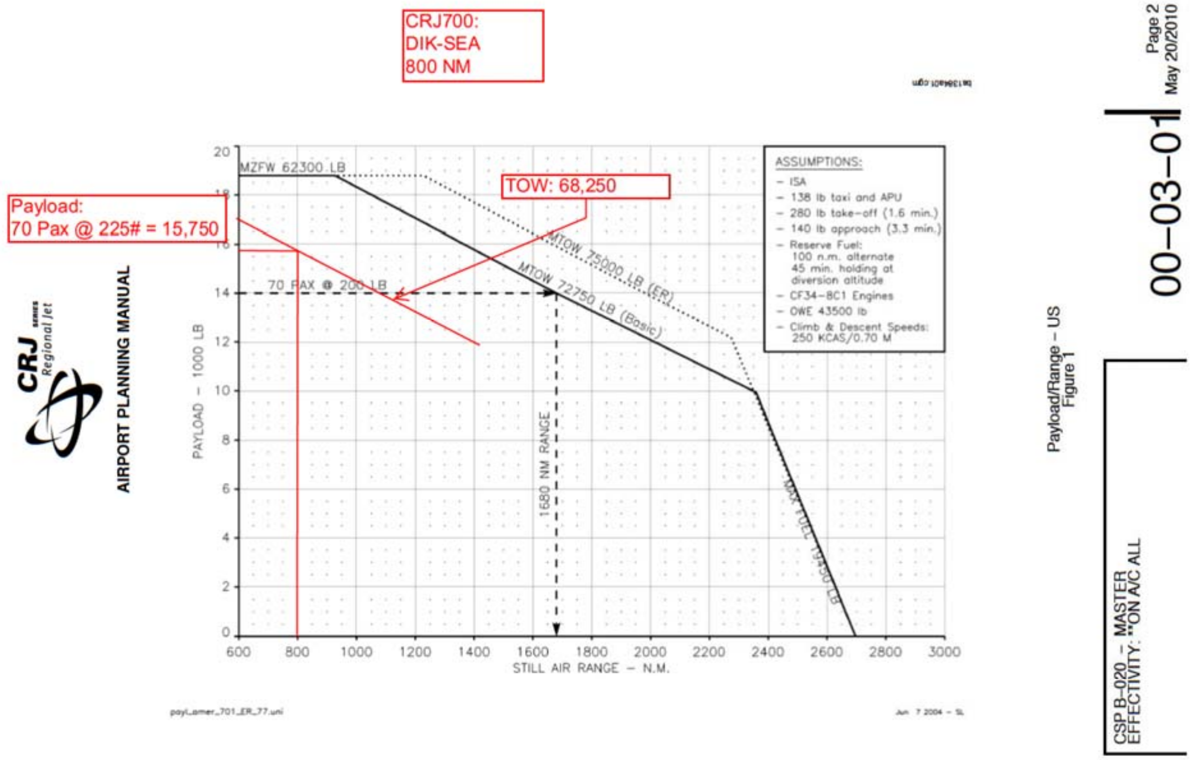
Take-Off Field Length – ISA + 15 Degrees C
Figure 2
CSP B–020 – MASTER
EFFECTIVITY: **ON A/C ALL


CRJ700
DL: DIK-SLC
540 NM
Payload:
65 Pax @ 225# = 14,625
Distance not
on Chart
OWE= 43500
+Payload= 14625
+Fuel=7400
TOW = 65,525#
Fuel Burn: .68nm/gal
540nm= 5400#
Reserve=2000# est.


DIK-SLC
TOW = 65,525
5,100
AIRCRAFT TAKEOFF WEIGHT (1000 LB)


CRJ700:
DIK-SEA
800 NM
Payload:
70 Pax @ 225# = 15,750
TOW: 68,250
MZFW 62300 LB
70 PAX @ 200 LB
MTOW 75000 LB (ER)
MTOW 72750 LB (Basic)
1680 NM RANGE
PAYLOAD – 1000 LB
STILL AIR RANGE – N.M.
ASSUMPTIONS:
– ISA
– 138 lb taxi and APU
– 280 lb take-off (1.6 min.)
– 140 lb approach (3.3 min.)
– Reserve Fuel:
100 n.m. alternate
45 min. holding at
diversion altitude
– CF34-8C1 Engines
– OWE 43500 lb
– Climb & Descent Speeds:
250 KCAS/0.70 M
CRJ Regional Jet
AIRPORT PLANNING MANUAL
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Page 2
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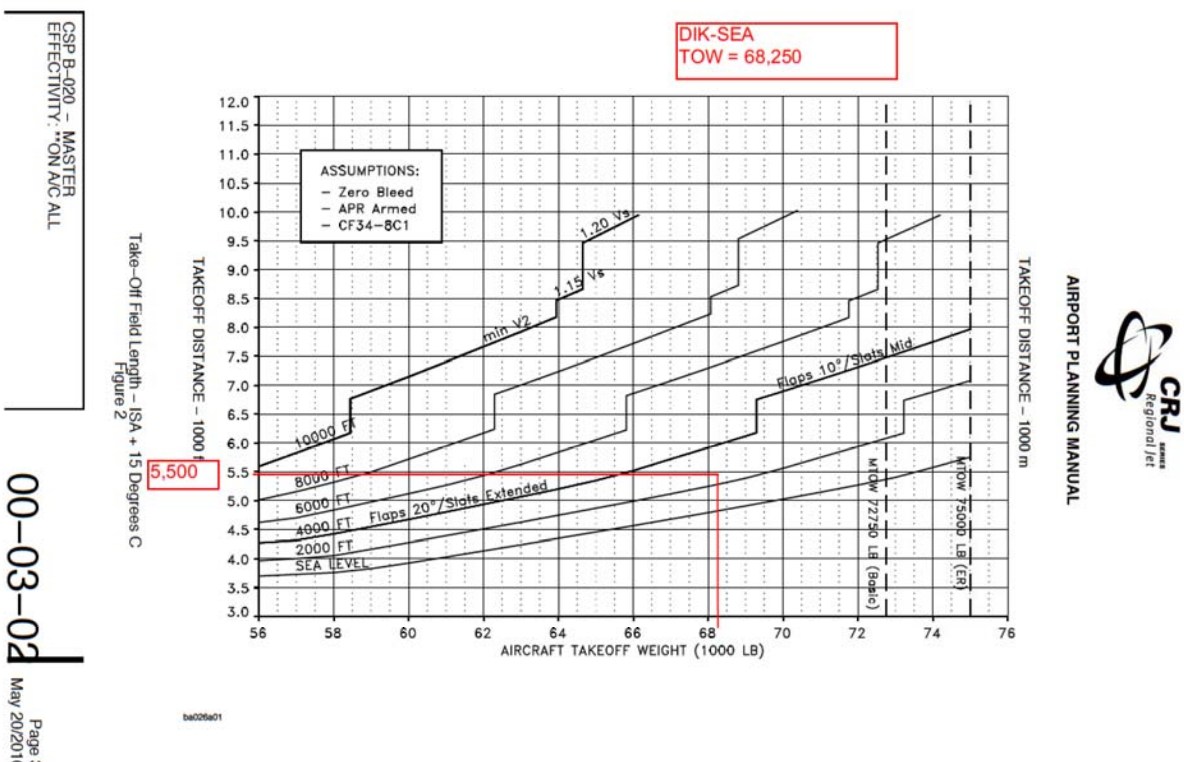
Payload/Range – US
Figure 1
CSP B-020 – MASTER
EFFECTIVITY: **ON A/C ALL


DIK-SEA
TOW = 68,250
5,500
ASSUMPTIONS:
– Zero Bleed
– APR Armed
– CF34-8C1
1.20 Vs
1.15 Vs
min V2
10000 FT
8000 FT
6000 FT
4000 FT
2000 FT
SEA LEVEL
Flaps 20°/Slats Extended
Flaps 10°/Slats Mid
MTOW 72750 LB (Basic)
MTOW 75000 LB (ER)
TAKEOFF DISTANCE – 1000 ft
TAKEOFF DISTANCE – 1000 m
AIRCRAFT TAKEOFF WEIGHT (1000 LB)
CRJ Regional Jet
AIRPORT PLANNING MANUAL
Take-Off Field Length – ISA + 15 Degrees C
Figure 2
CSP B-020 – MASTER
EFFECTIVITY: **ON A/C ALL
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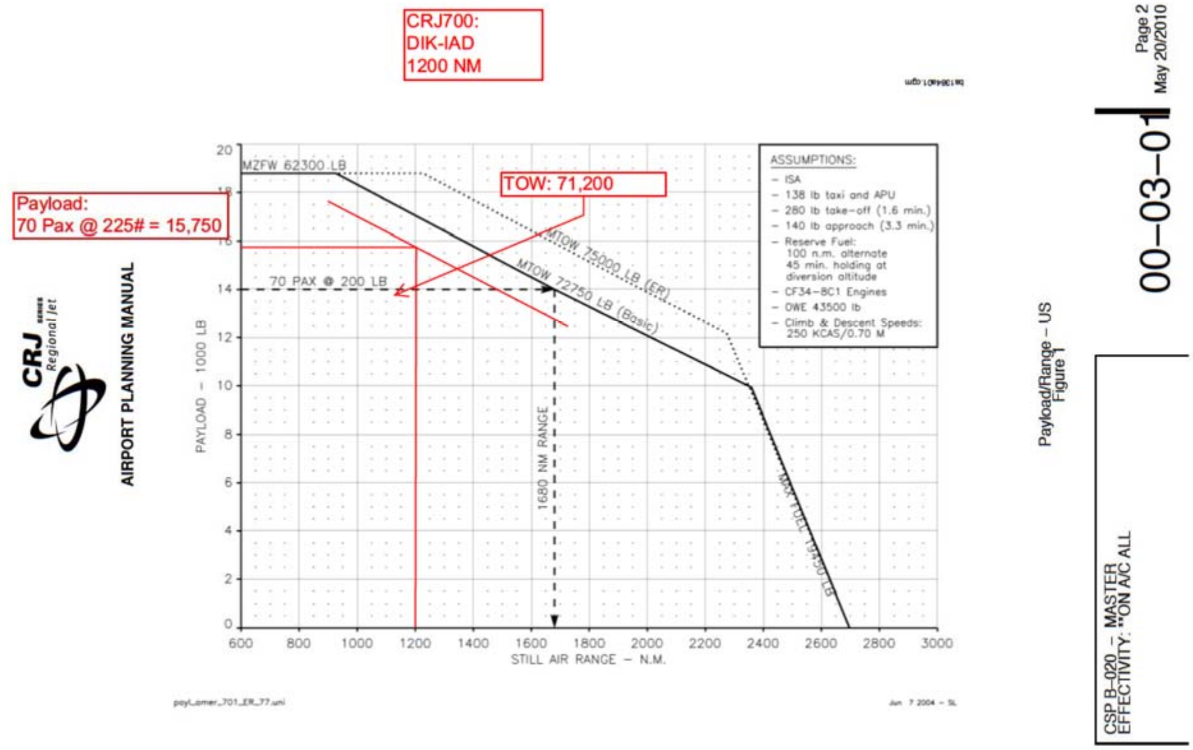
CRJ700:
DIK-IAD
1200 NM
Payload:
70 Pax @ 225# = 15,750
TOW: 71,200
MZFW 62300 LB
70 PAX @ 200 LB
MTOW 75000 LB (ER)
MTOW 72750 LB (Basic)
1680 NM RANGE
ASSUMPTIONS:
– ISA
– 138 lb taxi and APU
– 280 lb take-off (1.6 min.)
– 140 lb approach (3.3 min.)
– Reserve Fuel:
100 n.m. alternate
45 min. holding at
diversion altitude
– CF34-8C1 Engines
– OWE 43500 lb
– Climb & Descent Speeds:
250 KCAS/0.70 M
PAYLOAD – 1000 LB
STILL AIR RANGE – N.M.
AIRPORT PLANNING MANUAL
Payload/Range – US
Figure 1
00–03–01
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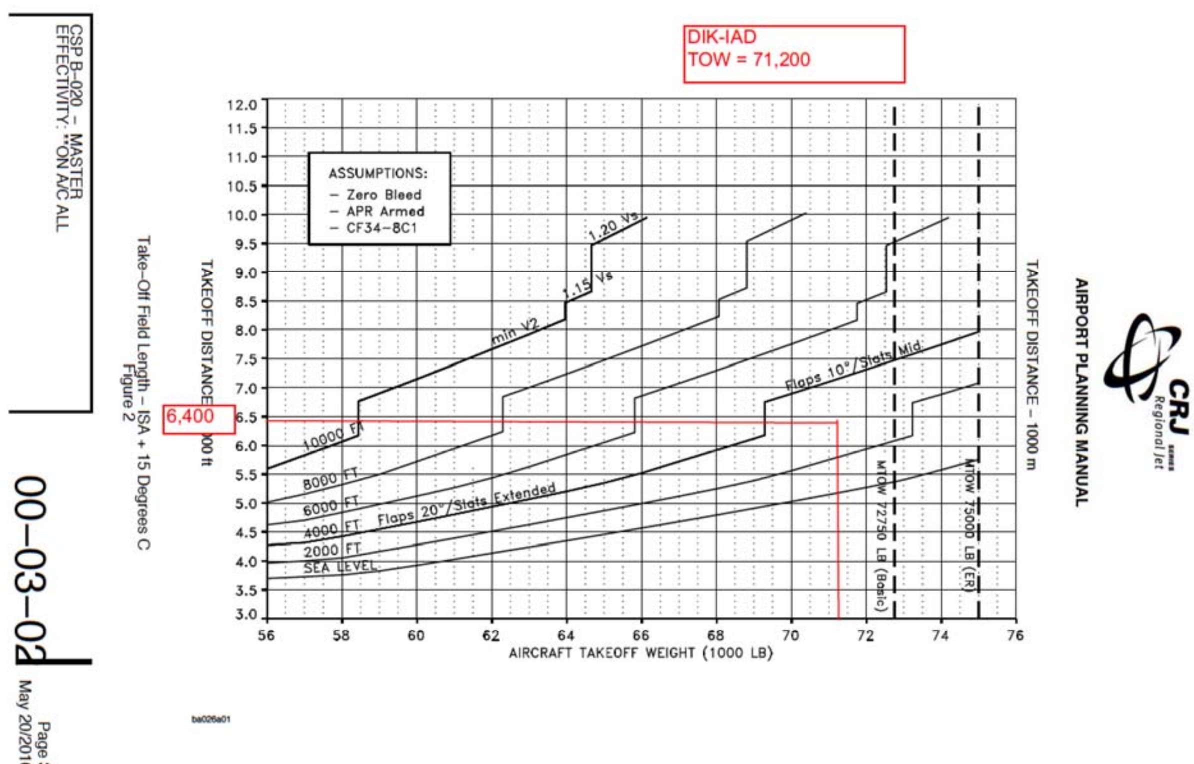
May 20/2010
CSP B–020 – MASTER
EFFECTIVITY: **ON A/C ALL


DIK-IAD
TOW = 71,200
6,400
ASSUMPTIONS:
– Zero Bleed
– APR Armed
– CF34–8C1
1.20 Vs
1.15 Vs
min V2
10000 FT
8000 FT
6000 FT
4000 FT
2000 FT
SEA LEVEL
Flaps 20°/Slats Extended
Flaps 10°/Slats Mid
MTOW 72750 LB (Basic)
MTOW 75000 LB (ER)
TAKEOFF DISTANCE – 1000 m
AIRCRAFT TAKEOFF WEIGHT (1000 LB)
AIRPORT PLANNING MANUAL
Take-Off Field Length – ISA + 15 Degrees C
Figure 2
00–03–02
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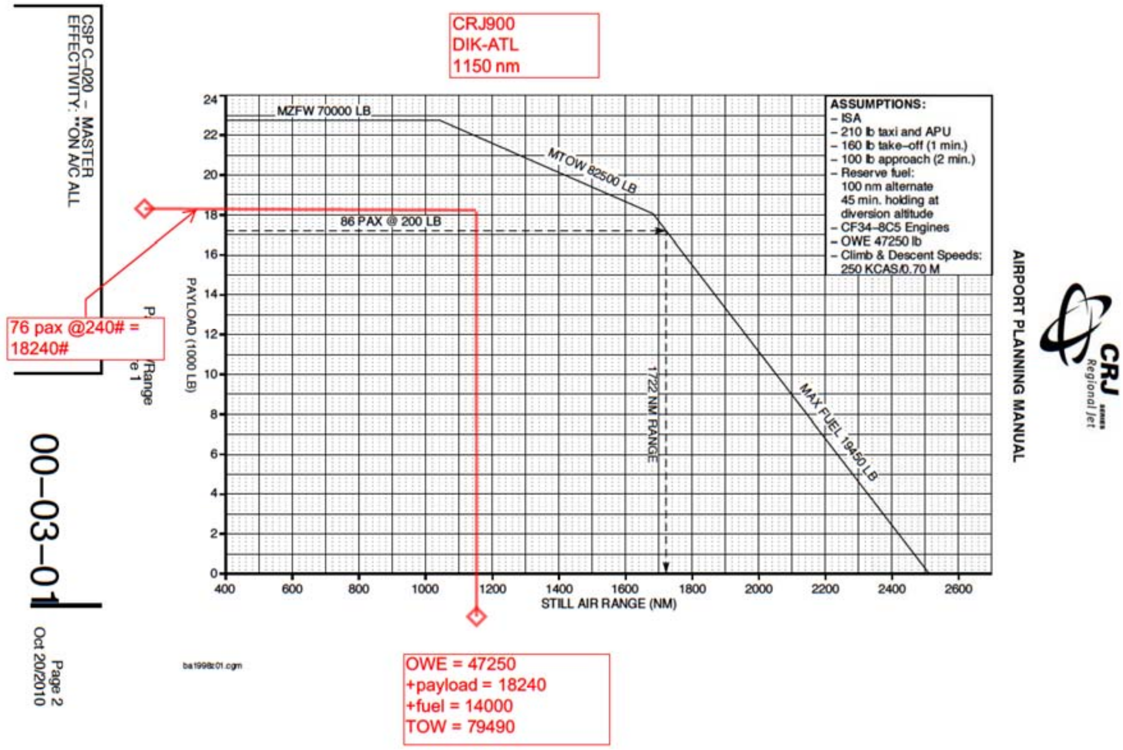
May 20/2010
CSP B–020 – MASTER
EFFECTIVITY: **ON A/C ALL


CRJ900
DIK-ATL
1150 nm
MZFW 70000 LB
MTOW 82500 LB
86 PAX @ 200 LB
1722 NM RANGE
MAX FUEL 19450 LB
PAYLOAD (1000 LB)
STILL AIR RANGE (NM)
ASSUMPTIONS:
– ISA
– 210 lb taxi and APU
– 160 lb take-off (1 min.)
– 100 lb approach (2 min.)
– Reserve fuel:
100 nm alternate
45 min. holding at
diversion altitude
– CF34-8C5 Engines
– OWE 47250 lb
– Climb & Descent Speeds:
250 KCAS/0.70 M
AIRPORT PLANNING MANUAL
CRJ Regional Jet
76 pax @240# =
18240#
OWE = 47250
+payload = 18240
+fuel = 14000
TOW = 79490
CSP C-020 – MASTER
EFFECTIVITY: **ON A/C ALL
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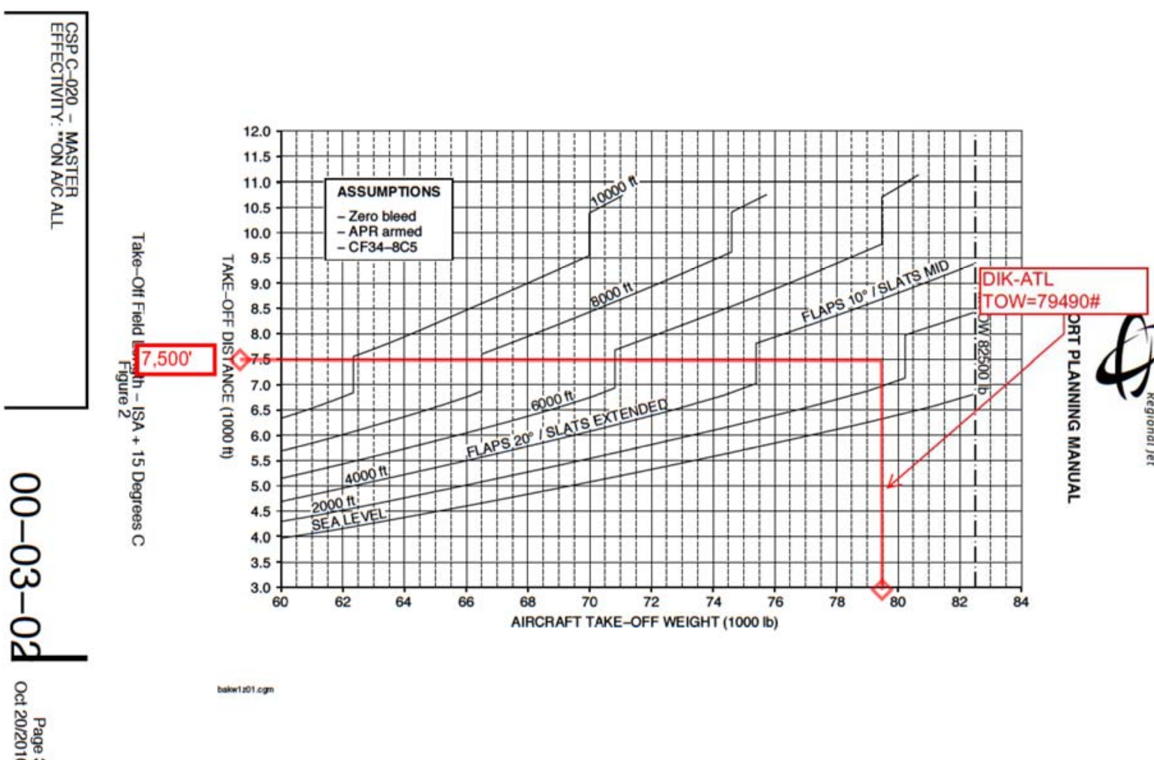
ba1998z01.cgm


ASSUMPTIONS
– Zero bleed
– APR armed
– CF34-8C5
10000 ft
8000 ft
6000 ft
4000 ft
2000 ft
SEA LEVEL
FLAPS 10° / SLATS MID
FLAPS 20° / SLATS EXTENDED
TAKE-OFF DISTANCE (1000 ft)
AIRCRAFT TAKE-OFF WEIGHT (1000 lb)
DIK-ATL
TOW=79490#
7,500'
Take-Off Field Length – ISA + 15 Degrees C
Figure 2
CSP C-020 – MASTER
EFFECTIVITY: **ON A/C ALL
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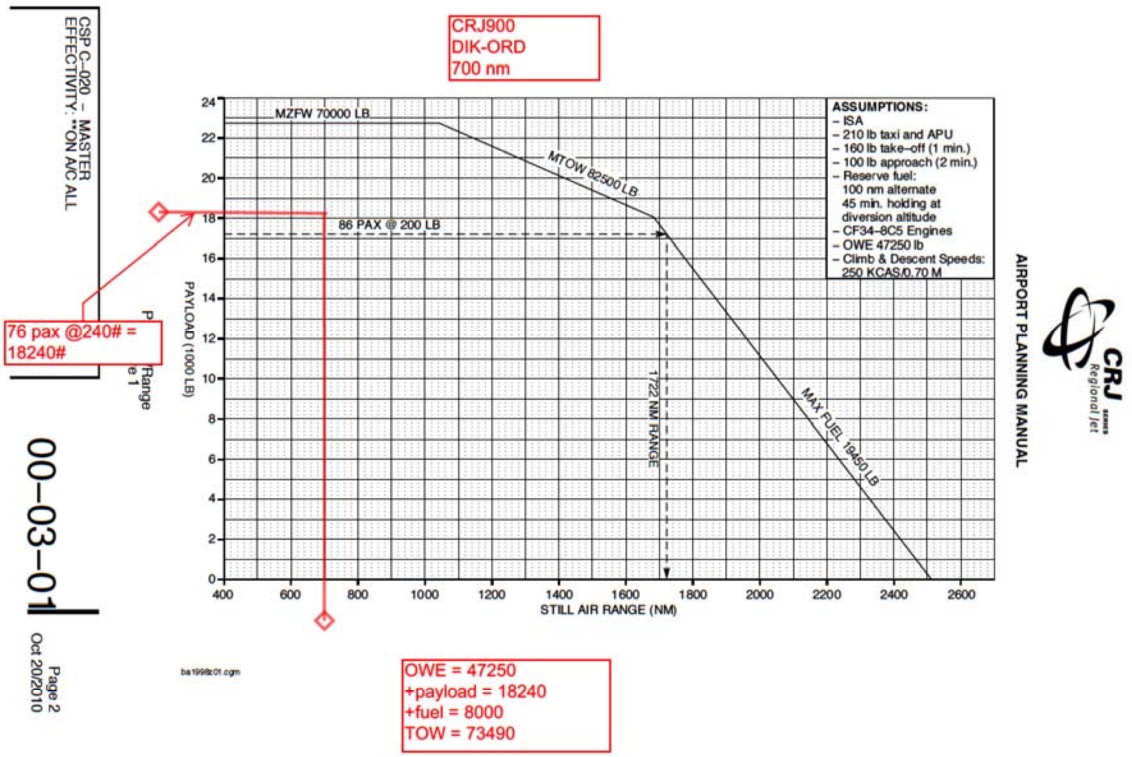
bakw1z01.cgm


CRJ900
DIK-ORD
700 nm
CSP C-020 – MASTER
EFFECTIVITY: **ON A/C ALL
AIRPORT PLANNING MANUAL
CRJ SERIES Regional Jet
MZFW 70000 LB
MTOW 82500 LB
86 PAX @ 200 LB
1722 NM RANGE
MAX FUEL 19450 LB
ASSUMPTIONS:
– ISA
– 210 lb taxi and APU
– 160 lb take–off (1 min.)
– 100 lb approach (2 min.)
– Reserve fuel:
100 nm alternate
45 min. holding at diversion altitude
– CF34–8C5 Engines
– OWE 47250 lb
– Climb & Descent Speeds: 250 KCAS/0.70 M
PAYLOAD (1000 LB)
STILL AIR RANGE (NM)
76 pax @240# = 18240#
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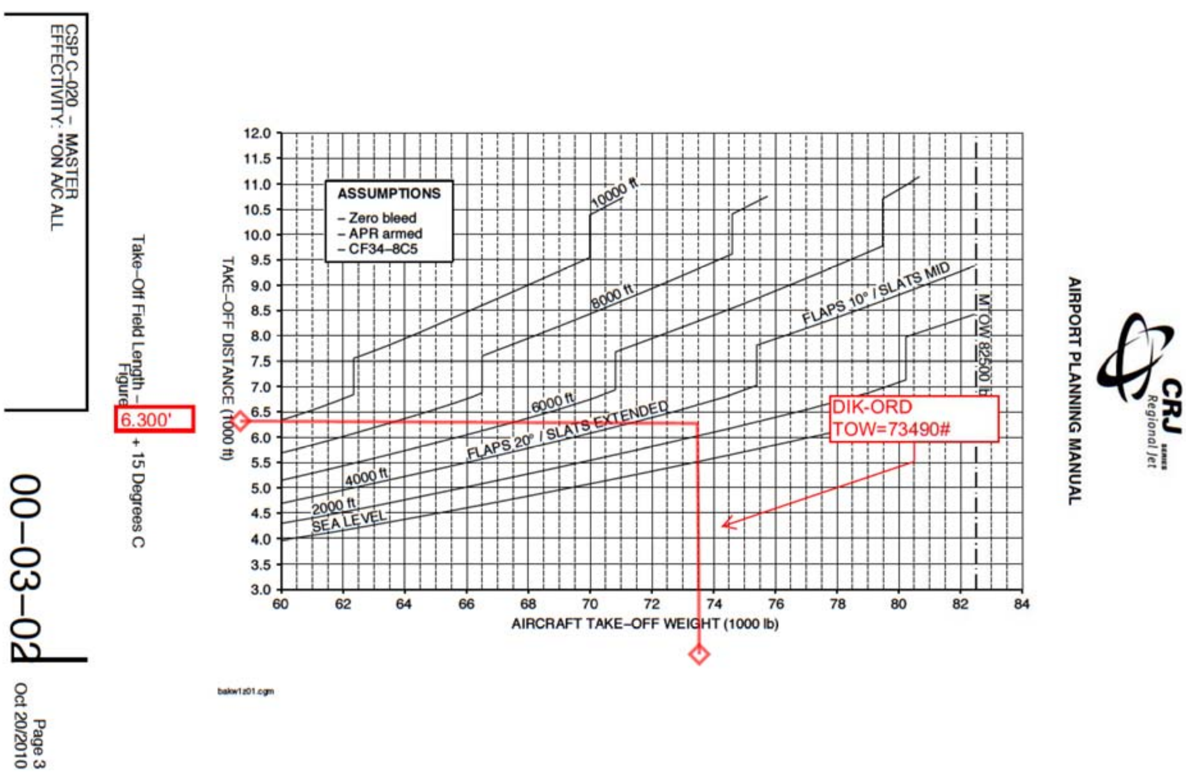
OWE = 47250
+payload = 18240
+fuel = 8000
TOW = 73490


CSP C-020 – MASTER
EFFECTIVITY: **ON A/C ALL
AIRPORT PLANNING MANUAL
CRJ SERIES Regional Jet
Take–Off Field Length – Figure + 15 Degrees C
ASSUMPTIONS
– Zero bleed
– APR armed
– CF34–8C5
10000 ft
8000 ft
6000 ft
4000 ft
2000 ft
SEA LEVEL
FLAPS 10° / SLATS MID
FLAPS 20° / SLATS EXTENDED
MTOW 82500 lb
TAKE–OFF DISTANCE (1000 ft)
AIRCRAFT TAKE–OFF WEIGHT (1000 lb)
6.300'
DIK-ORD
TOW=73490#
00–03–02
Page 3
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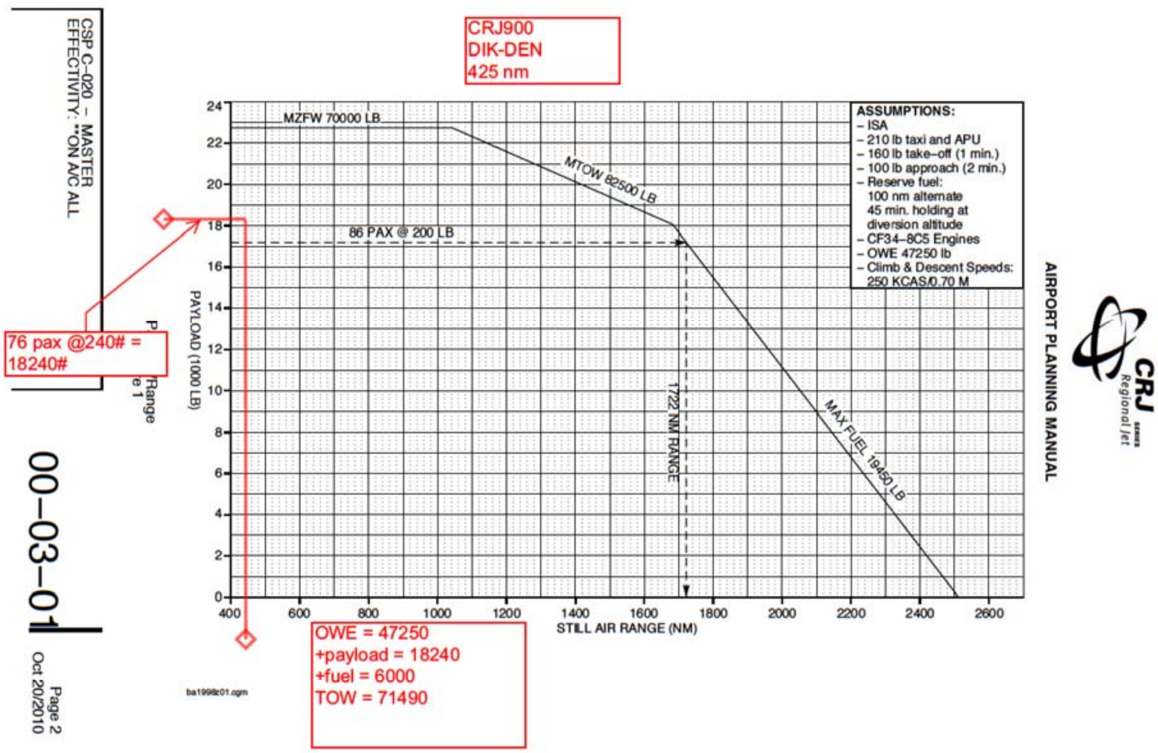

CRJ900
DIK-DEN
425 nm
MZFW 70000 LB
MTOW 82500 LB
86 PAX @ 200 LB
1722 NM RANGE
MAX FUEL 19450 LB
ASSUMPTIONS:
– ISA
– 210 lb taxi and APU
– 160 lb take–off (1 min.)
– 100 lb approach (2 min.)
– Reserve fuel:
100 nm alternate
45 min. holding at
diversion altitude
– CF34–8C5 Engines
– OWE 47250 lb
– Climb & Descent Speeds:
250 KCAS/0.70 M
PAYLOAD (1000 LB)
STILL AIR RANGE (NM)
76 pax @240# =
18240#
OWE = 47250
+payload = 18240
+fuel = 6000
TOW = 71490
AIRPORT PLANNING MANUAL
CSP C–020 – MASTER
EFFECTIVITY: **ON A/C ALL
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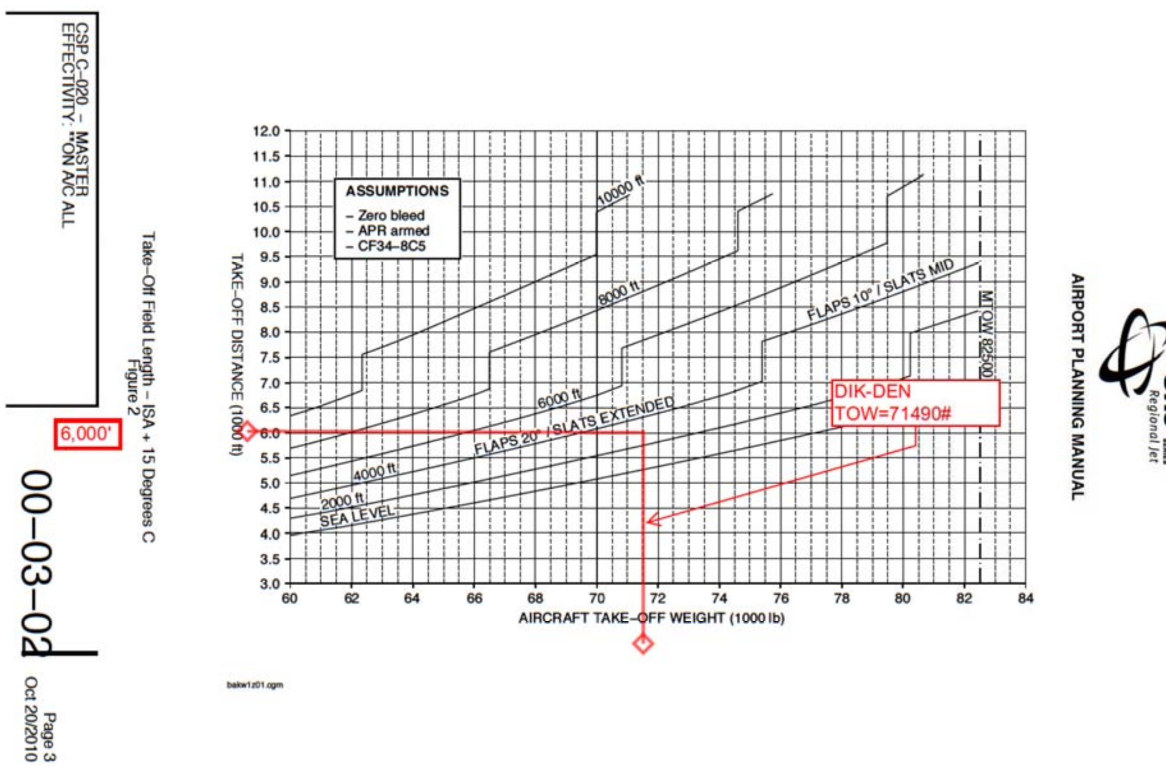
ba1998z01.cgm



ASSUMPTIONS
– Zero bleed
– APR armed
– CF34–8C5
10000 ft
8000 ft
6000 ft
4000 ft
2000 ft
SEA LEVEL
FLAPS 10° / SLATS MID
FLAPS 20° / SLATS EXTENDED
MTOW 82500
TAKE–OFF DISTANCE (1000 ft)
AIRCRAFT TAKE–OFF WEIGHT (1000 lb)
DIK-DEN
TOW=71490#
6,000'
Take–Off Field Length – ISA + 15 Degrees C
Figure 2
AIRPORT PLANNING MANUAL
CSP C–020 – MASTER
EFFECTIVITY: **ON A/C ALL
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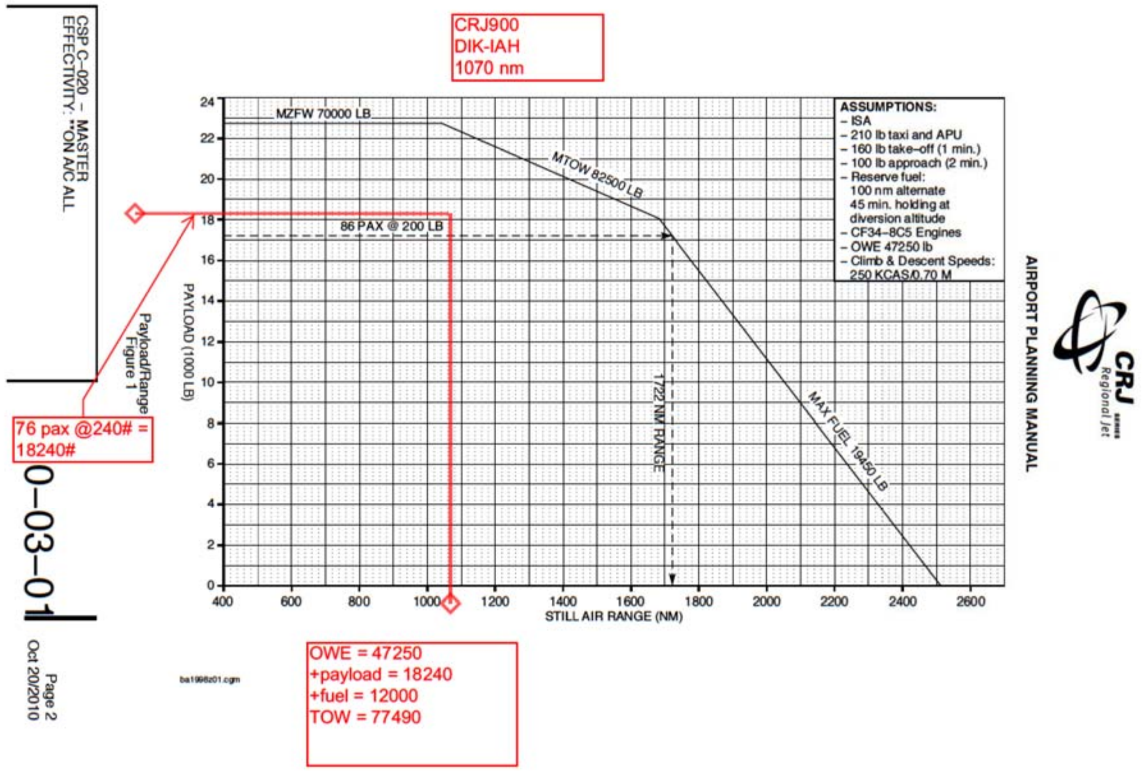
Oct 20/2010
bakw1z01.cgm


CRJ900
DIK-IAH
1070 nm
CSP C–020 – MASTER
EFFECTIVITY: **ON A/C ALL
MZFW 70000 LB
MTOW 82500 LB
86 PAX @ 200 LB
1722 NM RANGE
MAX FUEL 19450 LB
PAYLOAD (1000 LB)
STILL AIR RANGE (NM)
ASSUMPTIONS:
– ISA
– 210 lb taxi and APU
– 160 lb take–off (1 min.)
– 100 lb approach (2 min.)
– Reserve fuel:
100 nm alternate
45 min. holding at diversion altitude
– CF34–8C5 Engines
– OWE 47250 lb
– Climb & Descent Speeds: 250 KCAS/0.70 M
AIRPORT PLANNING MANUAL
Payload/Range
Figure 1
76 pax @240# = 18240#
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Page 2
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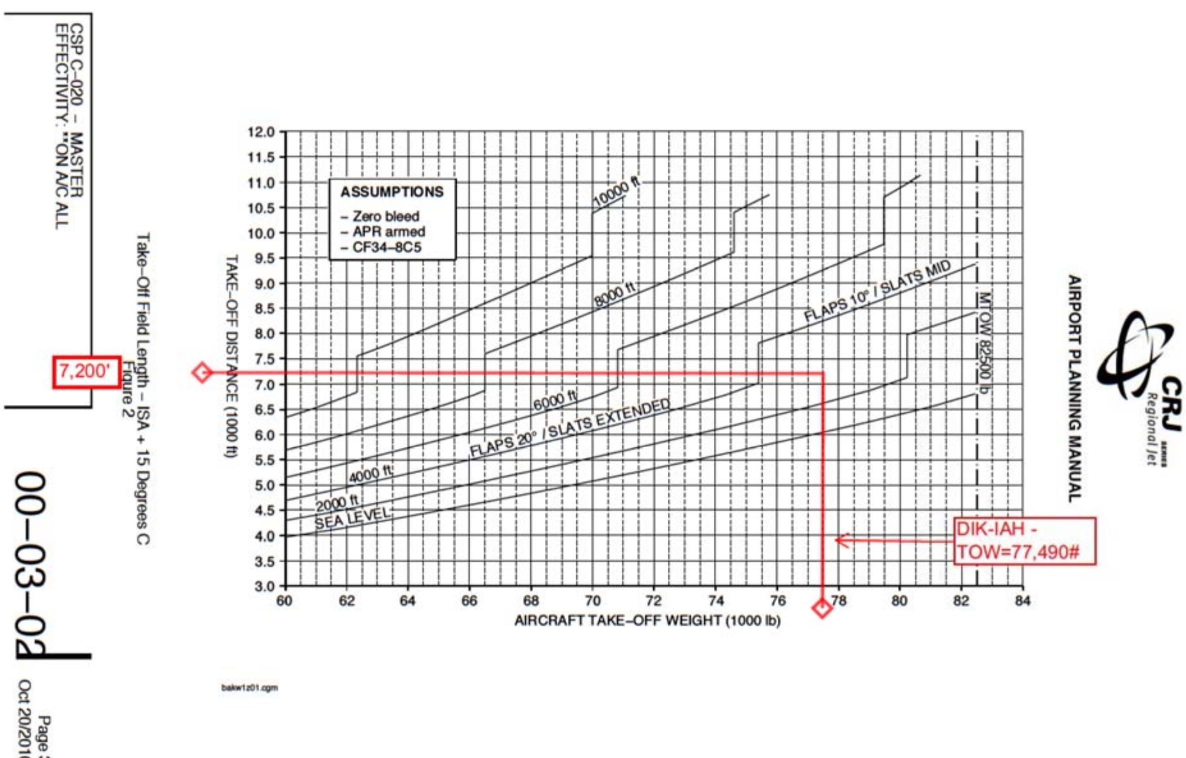
OWE = 47250
+payload = 18240
+fuel = 12000
TOW = 77490


CSP C–020 – MASTER
EFFECTIVITY: **ON A/C ALL
ASSUMPTIONS
– Zero bleed
– APR armed
– CF34–8C5
10000 ft
8000 ft
6000 ft
4000 ft
2000 ft
SEA LEVEL
FLAPS 10° / SLATS MID
FLAPS 20° / SLATS EXTENDED
MTOW 82500 lb
TAKE–OFF DISTANCE (1000 ft)
AIRCRAFT TAKE–OFF WEIGHT (1000 lb)
AIRPORT PLANNING MANUAL
Take–Off Field Length – ISA + 15 Degrees C
Figure 2
7,200'
DIK-IAH -
TOW=77,490#
00–03–02
Page 3
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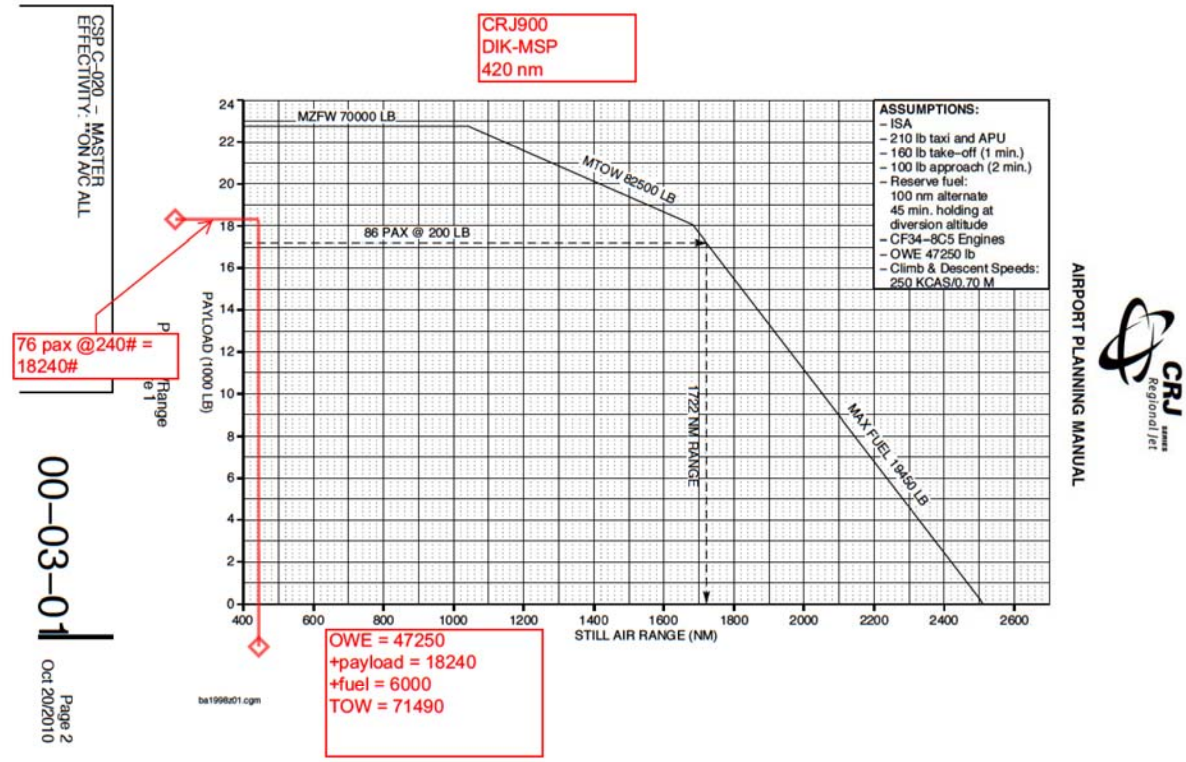
CRJ900
DIK-MSP
420 nm
CSP C-020 – MASTER
EFFECTIVITY: **ON A/C ALL
AIRPORT PLANNING MANUAL
MZFW 70000 LB
MTOW 82500 LB
86 PAX @ 200 LB
1722 NM RANGE
MAX FUEL 19450 LB
PAYLOAD (1000 LB)
STILL AIR RANGE (NM)
ASSUMPTIONS:
– ISA
– 210 lb taxi and APU
– 160 lb take-off (1 min.)
– 100 lb approach (2 min.)
– Reserve fuel:
100 nm alternate
45 min. holding at
diversion altitude
– CF34–8C5 Engines
– OWE 47250 lb
– Climb & Descent Speeds:
250 KCAS/0.70 M
76 pax @240# =
18240#
OWE = 47250
+payload = 18240
+fuel = 6000
TOW = 71490
00–03–01
Page 2
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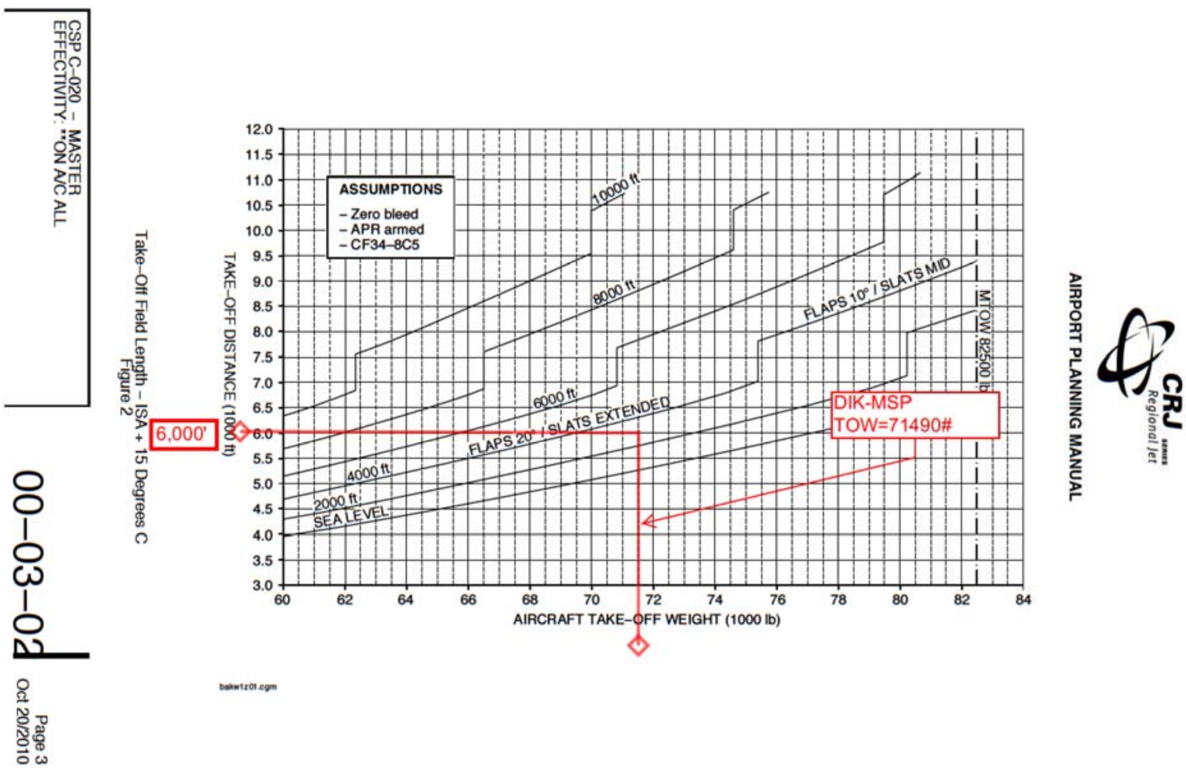
ba1998z01.cgm


CSP C-020 – MASTER
EFFECTIVITY: **ON A/C ALL
AIRPORT PLANNING MANUAL
Take–Off Field Length – ISA + 15 Degrees C
Figure 2
ASSUMPTIONS
– Zero bleed
– APR armed
– CF34–8C5
10000 ft
8000 ft
6000 ft
4000 ft
2000 ft
SEA LEVEL
FLAPS 10° / SLATS MID
FLAPS 20° / SLATS EXTENDED
MTOW 82500 lb
TAKE–OFF DISTANCE (1000 ft)
AIRCRAFT TAKE–OFF WEIGHT (1000 lb)
6,000'
DIK-MSP
TOW=71490#
00–03–02
Page 3
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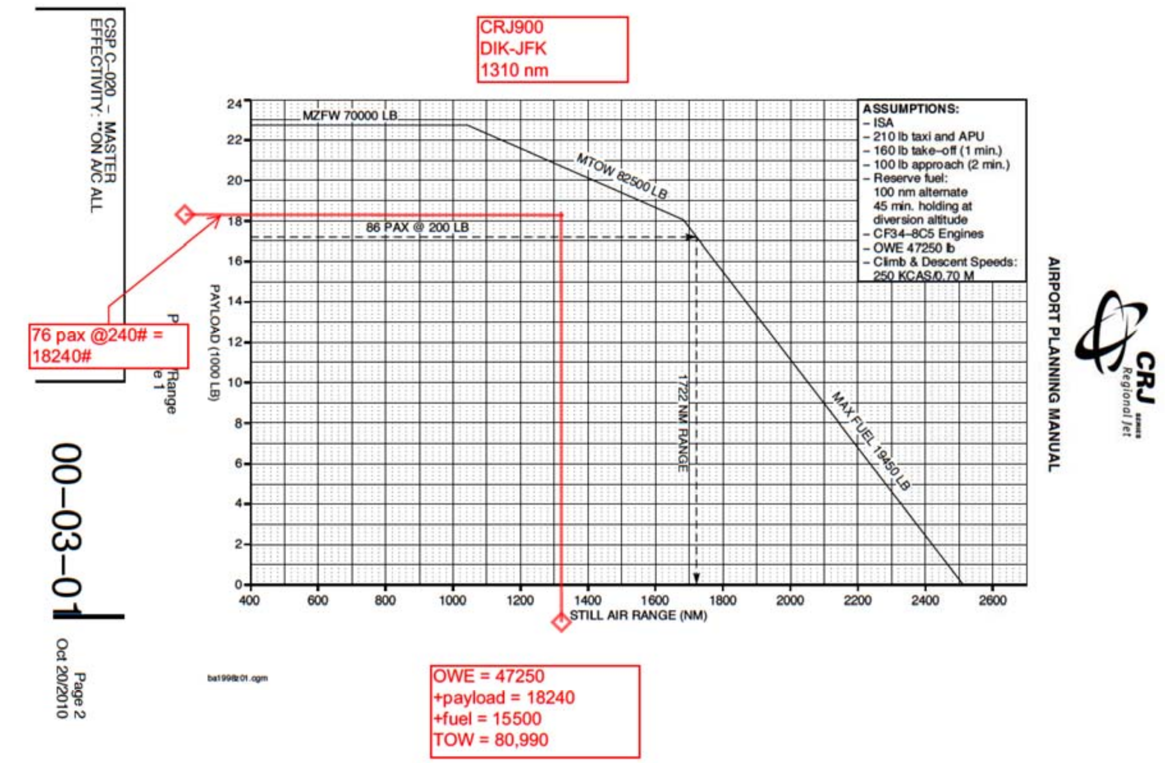
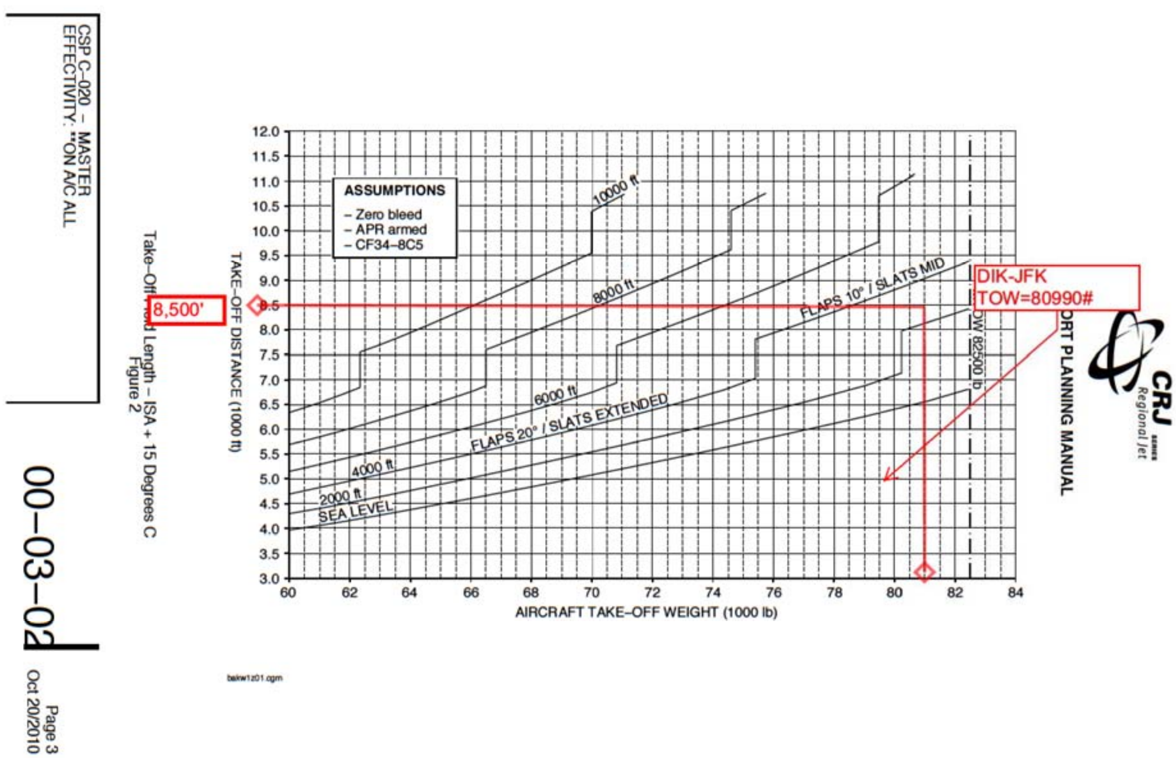
bakw1z01.cgm


CRJ900
DIK-JFK
1310 nm
76 pax @240# =
18240#
OWE = 47250
+payload = 18240
+fuel = 15500
TOW = 80,990
CSP C–020 – MASTER
EFFECTIVITY: **ON A/C ALL
AIRPORT PLANNING MANUAL
ASSUMPTIONS:
– ISA
– 210 lb taxi and APU
– 160 lb take–off (1 min.)
– 100 lb approach (2 min.)
– Reserve fuel:
100 nm alternate
45 min. holding at
diversion altitude
– CF34–8C5 Engines
– OWE 47250 lb
– Climb & Descent Speeds:
250 KCAS/0.70 M
MZFW 70000 LB
MTOW 82500 LB
86 PAX @ 200 LB
1722 NM RANGE
MAX FUEL 19450 LB
PAYLOAD (1000 LB)
STILL AIR RANGE (NM)
00–03–01
Page 2
Oct 20/2010


8,500'
DIK-JFK
TOW=80990#
CSP C–020 – MASTER
EFFECTIVITY: **ON A/C ALL
Take–Off Field Length – ISA + 15 Degrees C
Figure 2
ASSUMPTIONS
– Zero bleed
– APR armed
– CF34–8C5
10000 ft
8000 ft
6000 ft
4000 ft
2000 ft
SEA LEVEL
FLAPS 10° / SLATS MID
FLAPS 20° / SLATS EXTENDED
TAKE–OFF DISTANCE (1000 ft)
AIRCRAFT TAKE–OFF WEIGHT (1000 lb)
00–03–02
Page 3
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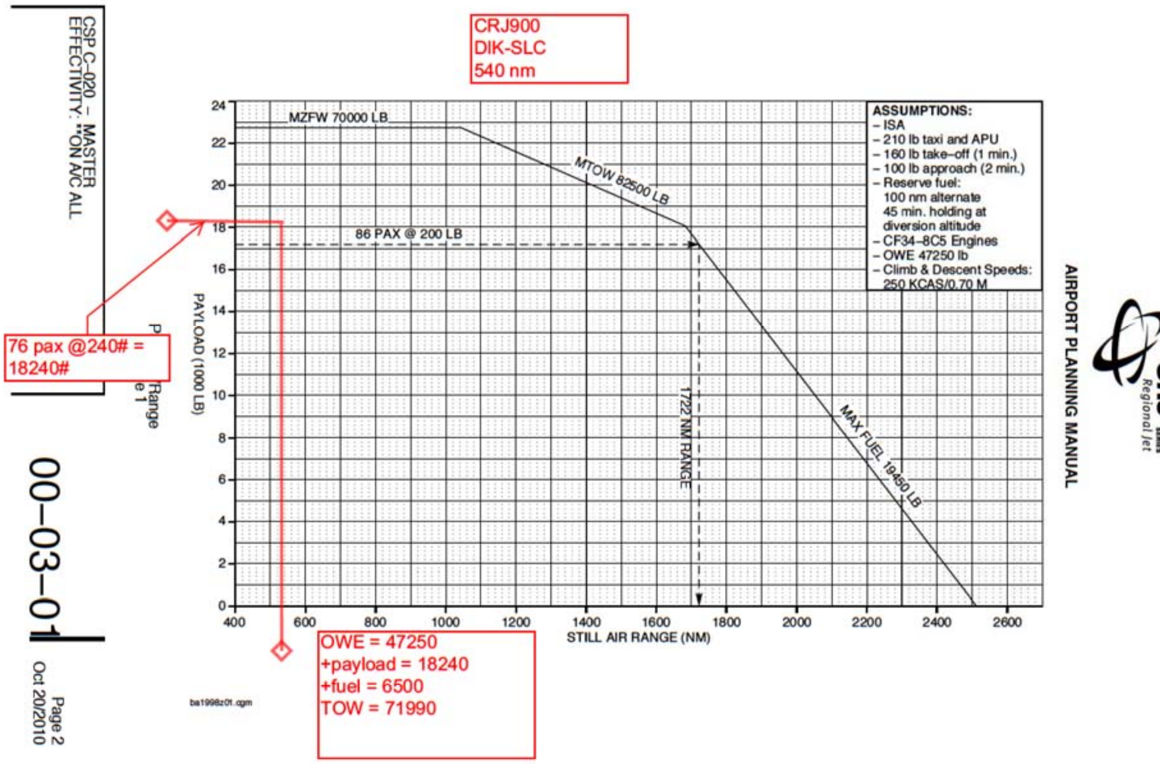
CRJ900
DIK-SLC
540 nm
76 pax @240# =
18240#
OWE = 47250
+payload = 18240
+fuel = 6500
TOW = 71990
MZFW 70000 LB
MTOW 82500 LB
86 PAX @ 200 LB
1722 NM RANGE
MAX FUEL 19450 LB
PAYLOAD (1000 LB)
STILL AIR RANGE (NM)
ASSUMPTIONS:
– ISA
– 210 lb taxi and APU
– 160 lb take–off (1 min.)
– 100 lb approach (2 min.)
– Reserve fuel:
100 nm alternate
45 min. holding at
diversion altitude
– CF34–8C5 Engines
– OWE 47250 lb
– Climb & Descent Speeds:
250 KCAS/0.70 M
AIRPORT PLANNING MANUAL
CSP C–020 – MASTER
EFFECTIVITY: **ON A/C ALL
00–03–01
Page 2
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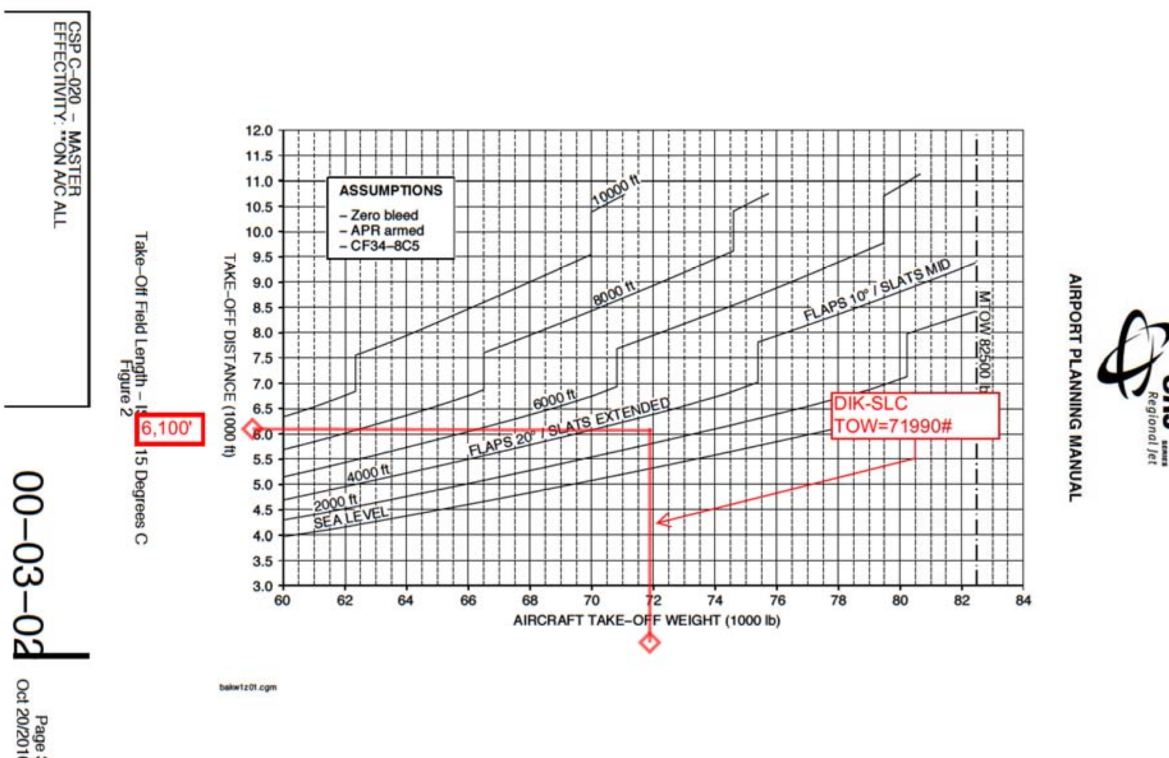
6,100'
DIK-SLC
TOW=71990#
ASSUMPTIONS
– Zero bleed
– APR armed
– CF34–8C5
10000 ft
8000 ft
6000 ft
4000 ft
2000 ft
SEA LEVEL
FLAPS 10° / SLATS MID
FLAPS 20° / SLATS EXTENDED
MTOW 82500 lb
TAKE–OFF DISTANCE (1000 ft)
AIRCRAFT TAKE–OFF WEIGHT (1000 lb)
Take–Off Field Length – ISA + 15 Degrees C
Figure 2
AIRPORT PLANNING MANUAL
CSP C–020 – MASTER
EFFECTIVITY: **ON A/C ALL
00–03–02
Page 3
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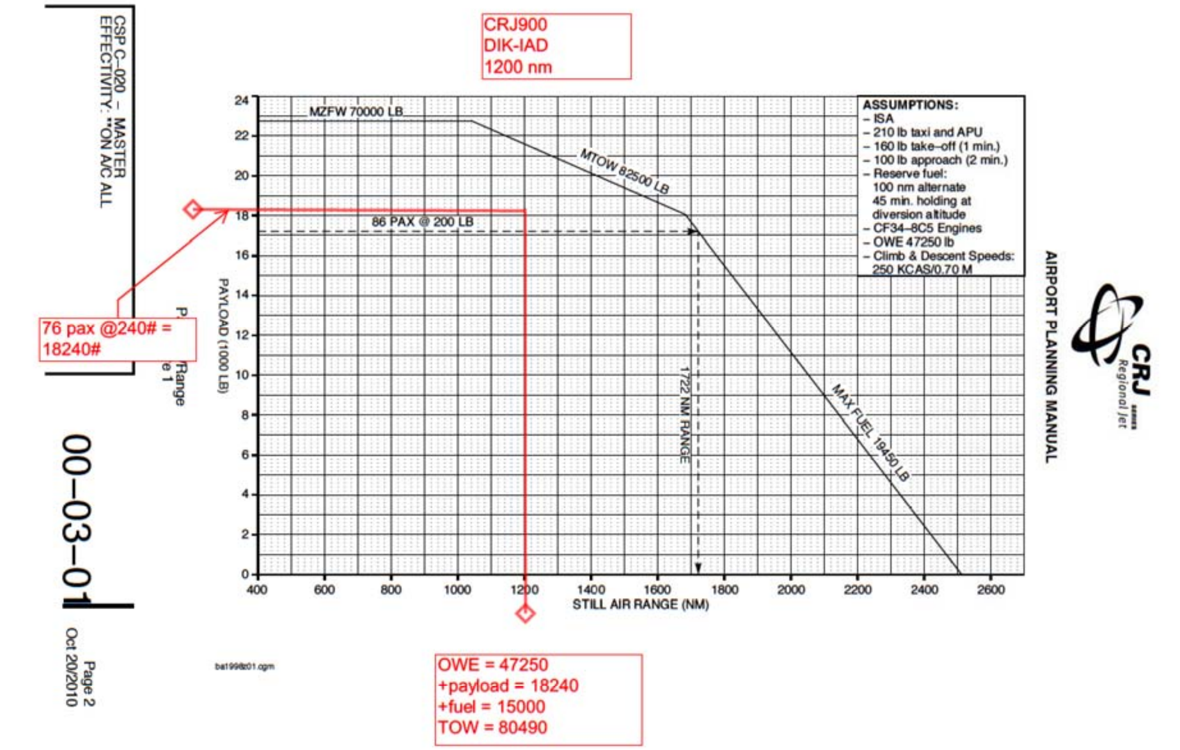
CRJ900
DIK-IAD
1200 nm
MZFW 70000 LB
MTOW 82500 LB
86 PAX @ 200 LB
1722 NM RANGE
MAX FUEL 19450 LB
ASSUMPTIONS:
– ISA
– 210 lb taxi and APU
– 160 lb take–off (1 min.)
– 100 lb approach (2 min.)
– Reserve fuel:
100 nm alternate
45 min. holding at
diversion altitude
– CF34–8C5 Engines
– OWE 47250 lb
– Climb & Descent Speeds:
250 KCAS/0.70 M
PAYLOAD (1000 LB)
STILL AIR RANGE (NM)
76 pax @240# =
18240#
OWE = 47250
+payload = 18240
+fuel = 15000
TOW = 80490
AIRPORT PLANNING MANUAL
CRJ Regional Jet
CSP C–020 – MASTER
EFFECTIVITY: **ON A/C ALL
00–03–01
Page 2
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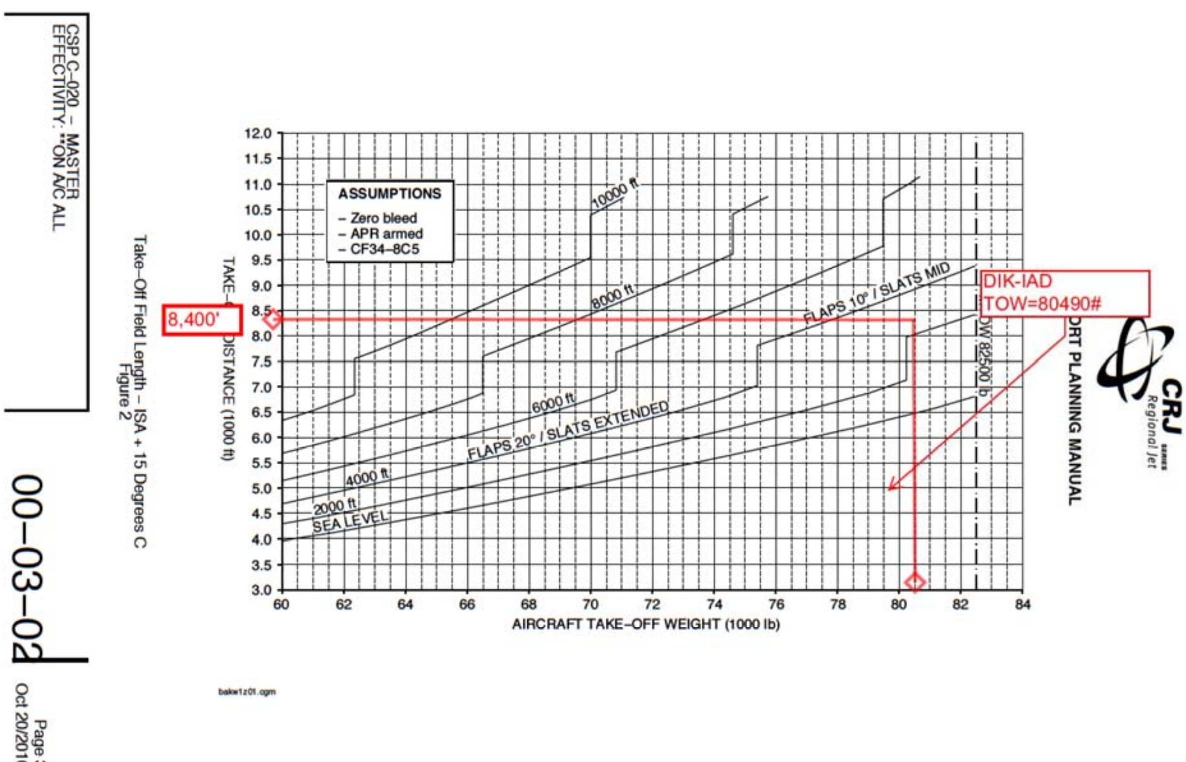
ba1998z01.cgm


ASSUMPTIONS
– Zero bleed
– APR armed
– CF34–8C5
10000 ft
8000 ft
6000 ft
4000 ft
2000 ft
SEA LEVEL
FLAPS 10° / SLATS MID
FLAPS 20° / SLATS EXTENDED
DIK-IAD
TOW=80490#
8,400'
AIRCRAFT TAKE–OFF WEIGHT (1000 lb)
Take–Off Field Length – ISA + 15 Degrees C
Figure 2
CSP C–020 – MASTER
EFFECTIVITY: **ON A/C ALL
00–03–02
Page 3
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EMB145 EMBRAER **AIRPORT PLANNING MANUAL**

DIK - ORD (700 NM)
50 Passengers @240lbs/PAX

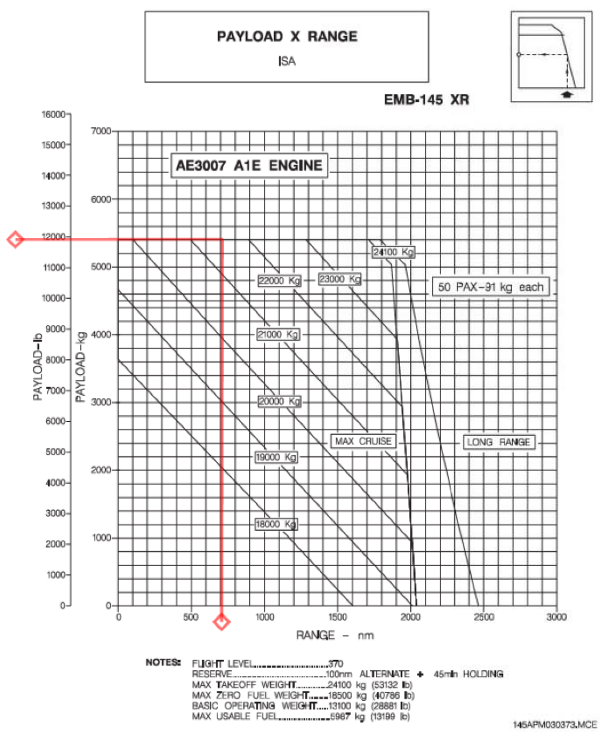


Figure 3.2.1 - Payload x Range for Long Range Cruise at 37,000 ft, Engine with Thrust Reverser
Sheet 9

REV G

3-10

EMB145 EMBRAER **AIRPORT PLANNING MANUAL**

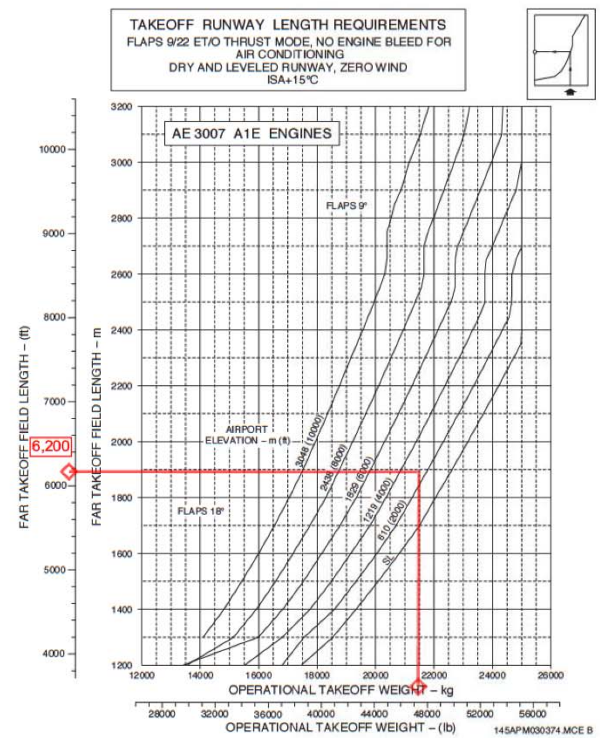


Figure 3.3.2 - FAR Takeoff Runway Length Requirements - ISA + 15°C Conditions
Sheet 3

REV J

3-17

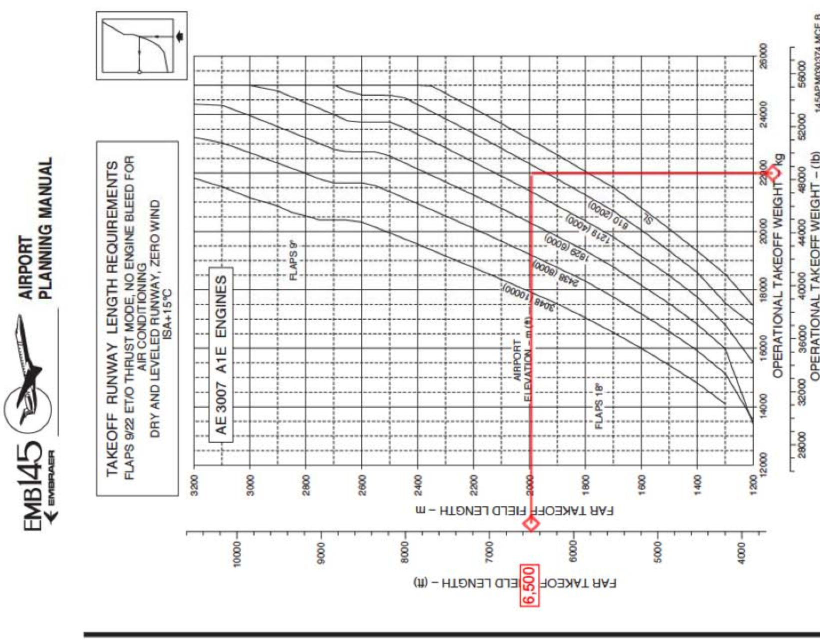


Figure 3.3.2 - FAR Takeoff Runway Length Requirements - ISA + 15°C Conditions
Sheet 3

3-17

REV J

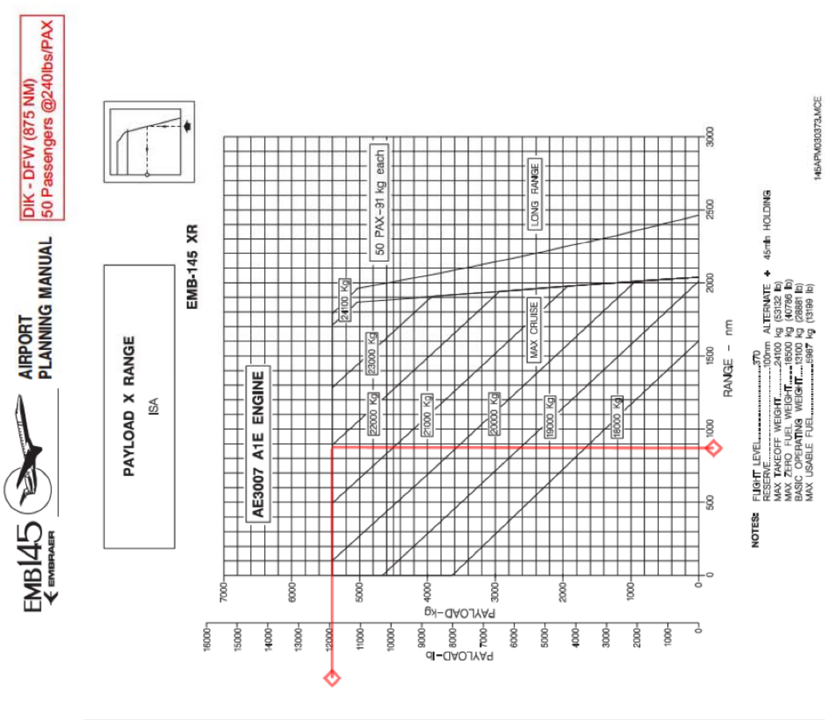


Figure 3.2.1 - Payload x Range for Long Range Cruise at 37,000 ft, Engine with Thrust Reverser
Sheet 9

3-10

REV G

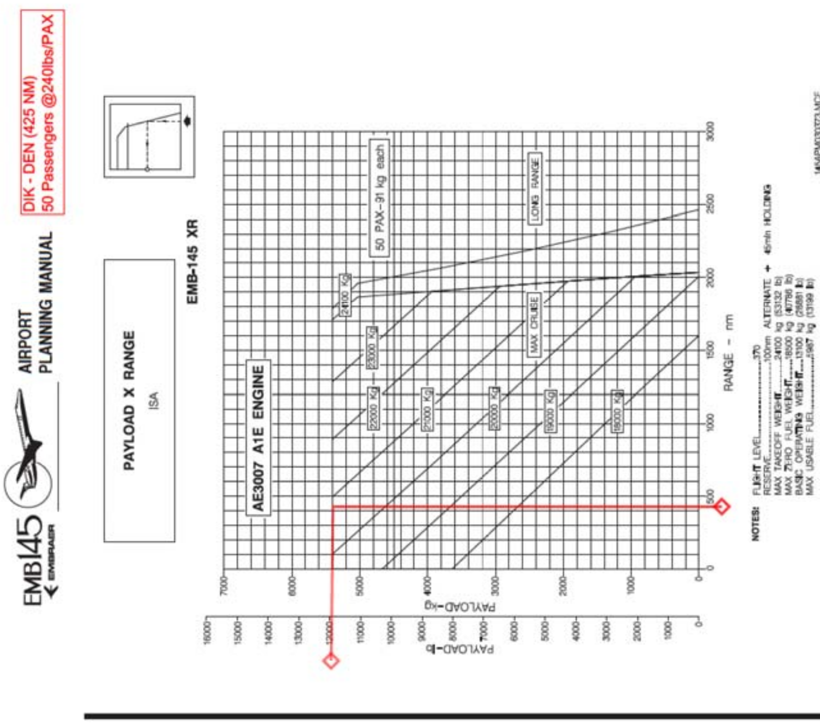


Figure 3.2.1 - Payload x Range for Long Range Cruise at 37,000 ft, Engine with Thrust Reverser
Sheet 9

3-10

REV G

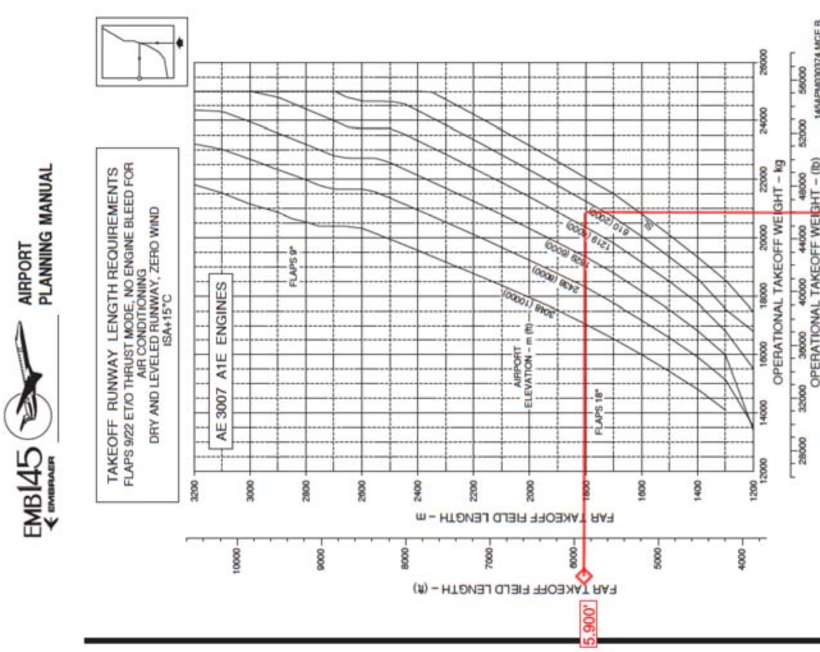


Figure 3.3.2 - FAR Takeoff Runway Length Requirements - ISA + 15°C Conditions
Sheet 3

3-17

REV J

EMB145 EMBRAER AIRPORT PLANNING MANUAL

DIK - IAH (1070 NM)
50 Passengers @240lbs/PAX

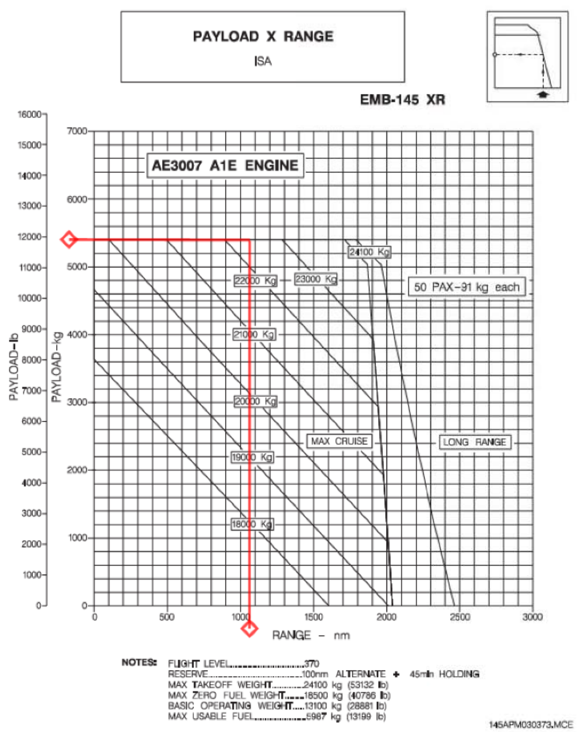


Figure 3.2.1 - Payload x Range for Long Range Cruise at 37,000 ft, Engine with Thrust Reverser
Sheet 9

REV G

3-10

EMB145 EMBRAER AIRPORT PLANNING MANUAL

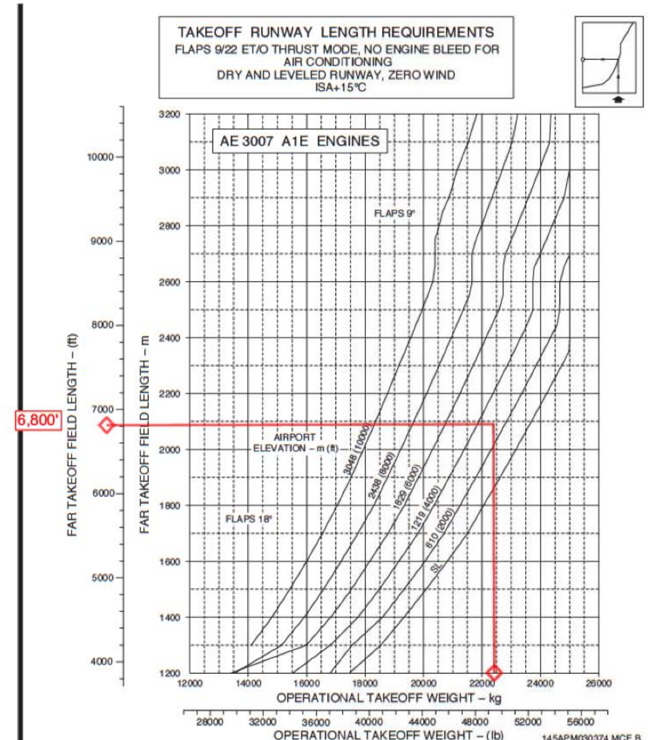
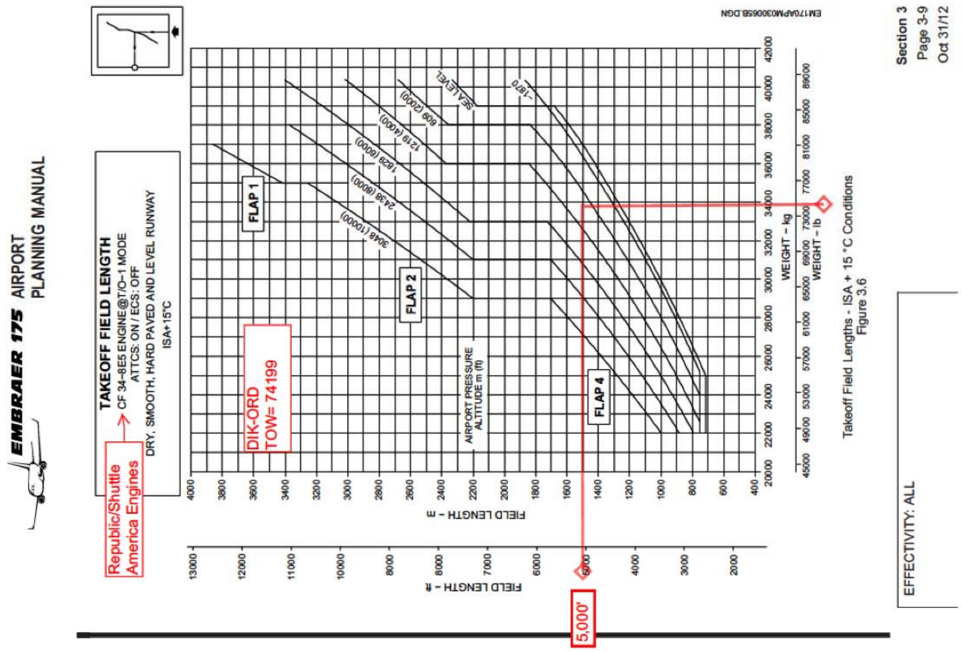


Figure 3.3.2 - FAR Takeoff Runway Length Requirements - ISA + 15°C Conditions
Sheet 3

REV J

3-17


EMBRAER 175 AIRPORT PLANNING MANUAL
TAKEOFF FIELD LENGTH
CF 34-8E5 ENGINE@T/O-1 MODE
ATTCS: ON / ECS: OFF
DRY, SMOOTH, HARD PAVED AND LEVEL RUNWAY
ISA+15°C
Republic/Shuttle America Engines
DIK-ORD
TOW= 74199
FLAP 1
FLAP 2
FLAP 4
AIRPORT PRESSURE ALTITUDE m (ft)
3048 (10000)
2438 (8000)
1829 (6000)
1219 (4000)
609 (2000)
SEA LEVEL
-187.0
FIELD LENGTH - m
FIELD LENGTH - ft
WEIGHT - kg
WEIGHT - lb
5,000'
Takeoff Field Lengths - ISA + 15 °C Conditions
Figure 3.6
EFFECTIVITY: ALL
Section 3
Page 3-9
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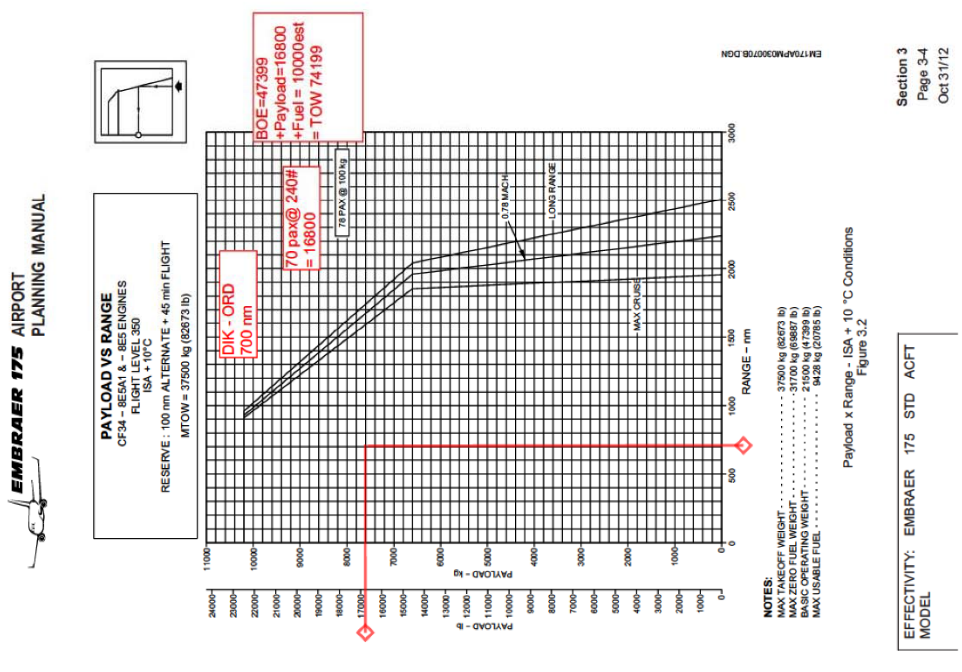
EMBRAER 175 AIRPORT PLANNING MANUAL
PAYLOAD VS RANGE
CF34 - 8E5A1 & - 8E5 ENGINES
FLIGHT LEVEL 350
ISA + 10°C
RESERVE : 100 nm ALTERNATE + 45 min FLIGHT
MTOW = 37500 kg (82673 lb)
DIK - ORD
700 nm
70 pax@ 240#
= 16800
BOE=47399
+Payload=16800
+Fuel = 10000est
= TOW 74199
78 PAX @ 100 kg
0.78 MACH
LONG RANGE
MAX CRUISE
PAYLOAD - kg
PAYLOAD - lb
RANGE - nm
NOTES:
MAX TAKEOFF WEIGHT 37500 kg (82673 lb)
MAX ZERO FUEL WEIGHT 31700 kg (69887 lb)
BASIC OPERATING WEIGHT 21500 kg (47399 lb)
MAX USABLE FUEL 9428 kg (20785 lb)
Payload x Range - ISA + 10 °C Conditions
Figure 3.2
EFFECTIVITY: EMBRAER 175 STD ACFT MODEL
Section 3
Page 3-4
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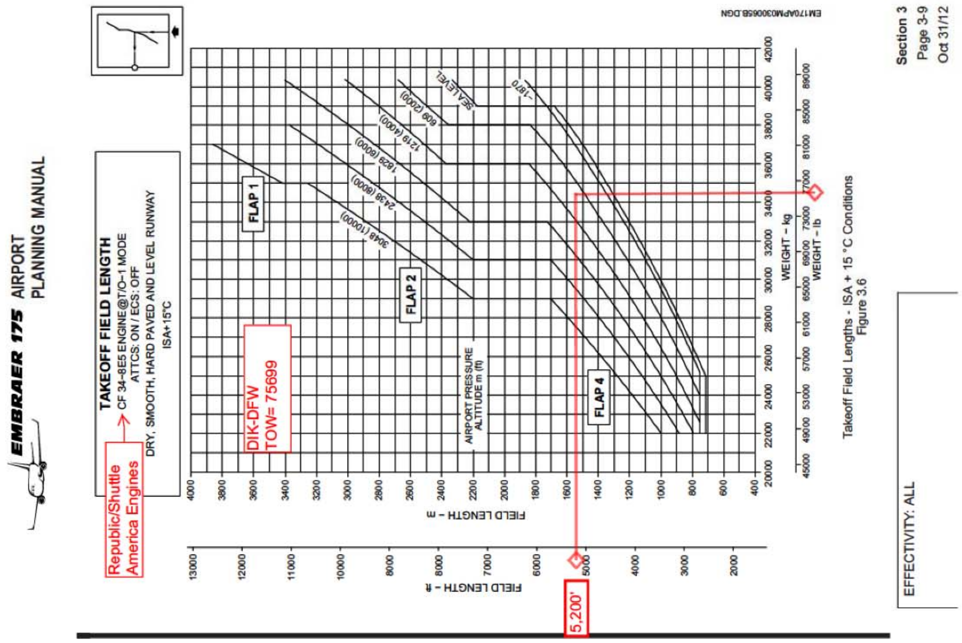
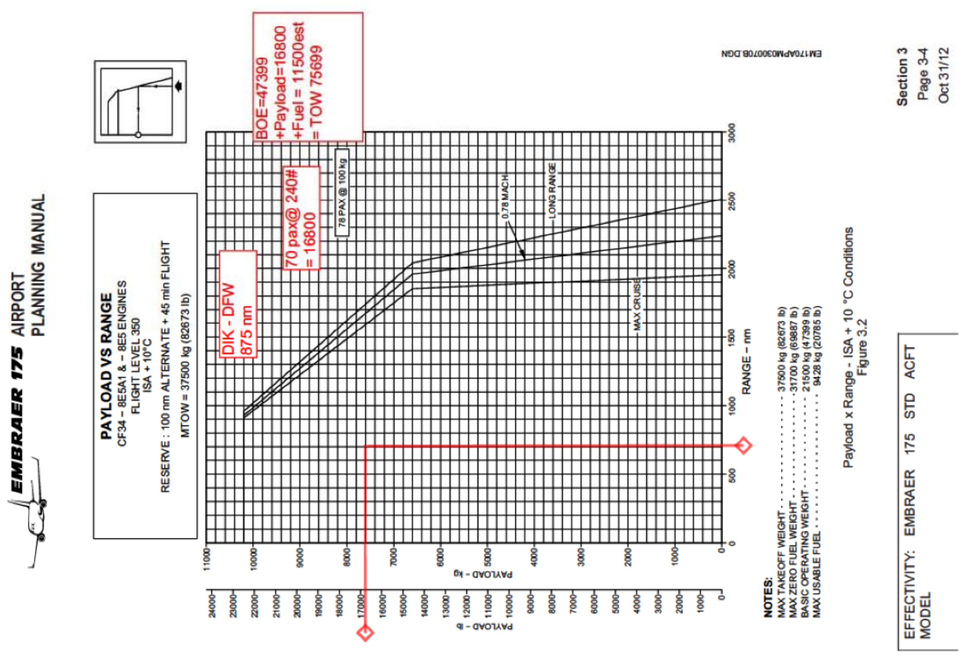
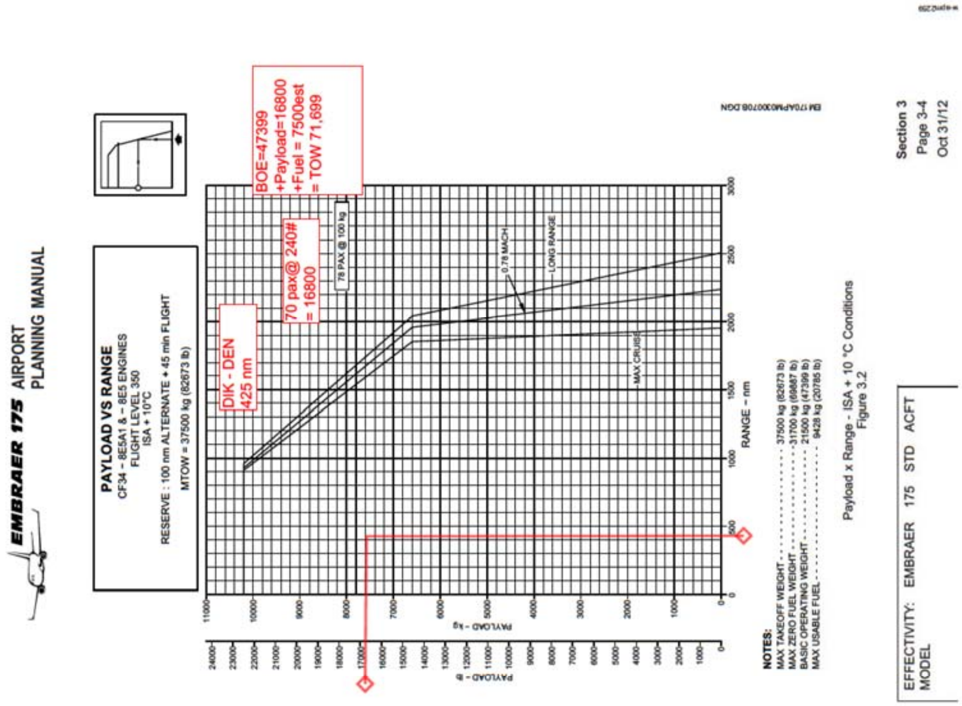
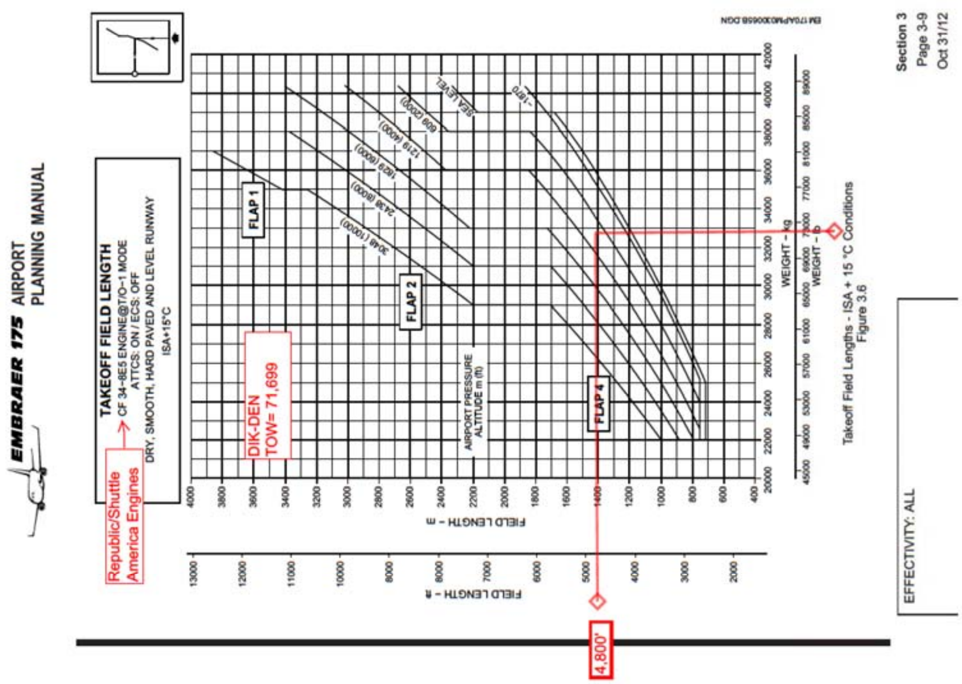
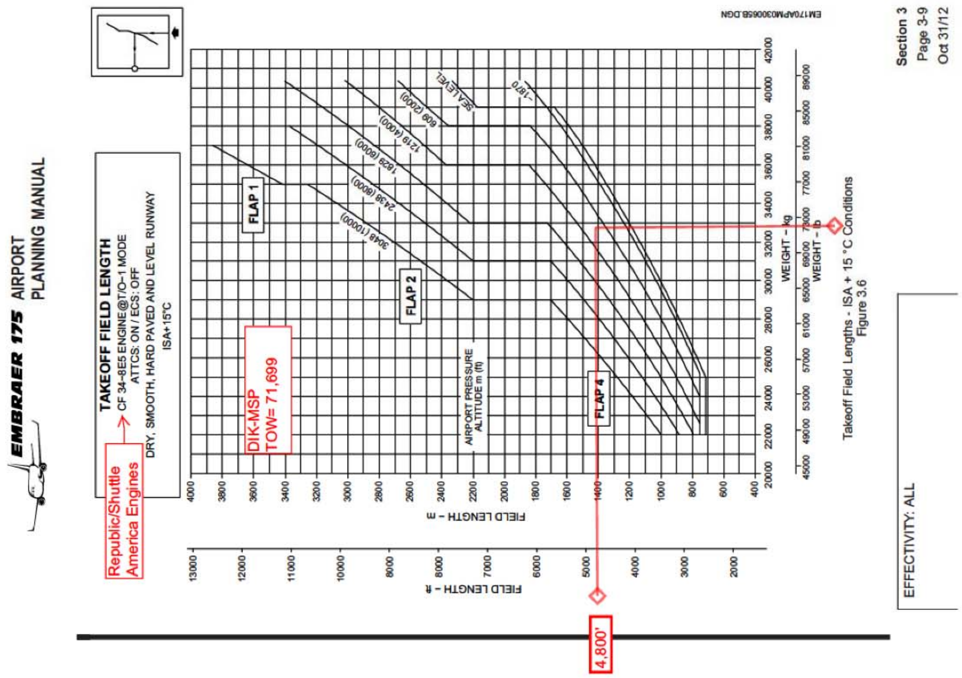

EMBRAER 175 AIRPORT PLANNING MANUAL
TAKEOFF FIELD LENGTH
CF 34-8E5 ENGINE@T/O-1 MODE
ATTCS: ON / ECS: OFF
DRY, SMOOTH, HARD PAVED AND LEVEL RUNWAY
ISA+15°C
Republic/Shuttle America Engines
DIK-DFW TOW= 75699
5,200'
FLAP 1
FLAP 2
FLAP 4
AIRPORT PRESSURE ALTITUDE m (ft)
FIELD LENGTH – m
FIELD LENGTH – ft
WEIGHT – kg
WEIGHT – lb
EFFECTIVITY: ALL
Takeoff Field Lengths - ISA + 15 °C Conditions
Figure 3.6
Section 3
Page 3-9
Oct 31/12


EMBRAER 175 AIRPORT PLANNING MANUAL
PAYLOAD VS RANGE
CF34 – 8E5A1 & – 8E5 ENGINES
FLIGHT LEVEL 350
ISA + 10°C
RESERVE : 100 nm ALTERNATE + 45 min FLIGHT
MTOW = 37500 kg (82673 lb)
DIK - DFW 875 nm
70 pax@ 240# = 16800
BOE=47399 +Payload=16800 +Fuel = 11500est = TOW 75699
78 PAX @ 100 kg
0.78 MACH
LONG RANGE
MAX CRUISE
PAYLOAD – kg
PAYLOAD – lb
RANGE – nm
NOTES:
MAX TAKEOFF WEIGHT 37500 kg (82673 lb)
MAX ZERO FUEL WEIGHT 31700 kg (69887 lb)
BASIC OPERATING WEIGHT 21500 kg (47399 lb)
MAX USABLE FUEL 9428 kg (20785 lb)
EFFECTIVITY: EMBRAER 175 STD ACFT MODEL
Payload x Range - ISA + 10 °C Conditions
Figure 3.2
Section 3
Page 3-4
Oct 31/12


EMBRAER 175 AIRPORT PLANNING MANUAL
PAYLOAD VS RANGE
CF34 - 8E5A1 & - 8E5 ENGINES
FLIGHT LEVEL 350
ISA + 10°C
RESERVE : 100 nm ALTERNATE + 45 min FLIGHT
MTOW = 37500 kg (82673 lb)
BOE=47399
+Payload=16800
+Fuel = 7500est
= TOW 71,699
70 pax@ 240#
= 16800
DIK - DEN
425 nm
78 PAX @ 100 kg
0.78 MACH
LONG RANGE
MAX CRUISE
PAYLOAD - kg
PAYLOAD - lb
RANGE - nm
NOTES:
MAX TAKEOFF WEIGHT - 37500 kg (82673 lb)
MAX ZERO FUEL WEIGHT - 31700 kg (69887 lb)
BASIC OPERATING WEIGHT - 21500 kg (47399 lb)
MAX USABLE FUEL - 9428 kg (20785 lb)
Payload x Range - ISA + 10 °C Conditions
Figure 3.2
EFFECTIVITY: EMBRAER 175 STD ACFT
MODEL
Section 3
Page 3-4
Oct 31/12


EMBRAER 175 AIRPORT PLANNING MANUAL
TAKEOFF FIELD LENGTH
Republic/Shuttle America Engines
CF 34-8E5 ENGINE@T/O-1 MODE
ATTCS: ON / ECS: OFF
DRY, SMOOTH, HARD PAVED AND LEVEL RUNWAY
ISA+15°C
DIK-DEN
TOW= 71,699
FLAP 1
FLAP 2
FLAP 4
AIRPORT PRESSURE ALTITUDE m (ft)
SEA LEVEL
FIELD LENGTH - m
FIELD LENGTH - ft
WEIGHT - kg
WEIGHT - lb
4,800'
Takeoff Field Lengths - ISA + 15 °C Conditions
Figure 3.6
EFFECTIVITY: ALL
Section 3
Page 3-9
Oct 31/12


EMBRAER 175 AIRPORT PLANNING MANUAL
TAKEOFF FIELD LENGTH
CF 34-8E5 ENGINE@T/O-1 MODE
ATTCS: ON / ECS: OFF
DRY, SMOOTH, HARD PAVED AND LEVEL RUNWAY
ISA+15°C
Republic/Shuttle America Engines
DIK-MSP
TOW= 71,699
4,800'
FLAP 1
FLAP 2
FLAP 4
AIRPORT PRESSURE ALTITUDE m (ft)
FIELD LENGTH – m
FIELD LENGTH – ft
WEIGHT – kg
WEIGHT – lb
Takeoff Field Lengths - ISA + 15 °C Conditions
Figure 3.6
EFFECTIVITY: ALL
Section 3
Page 3-9
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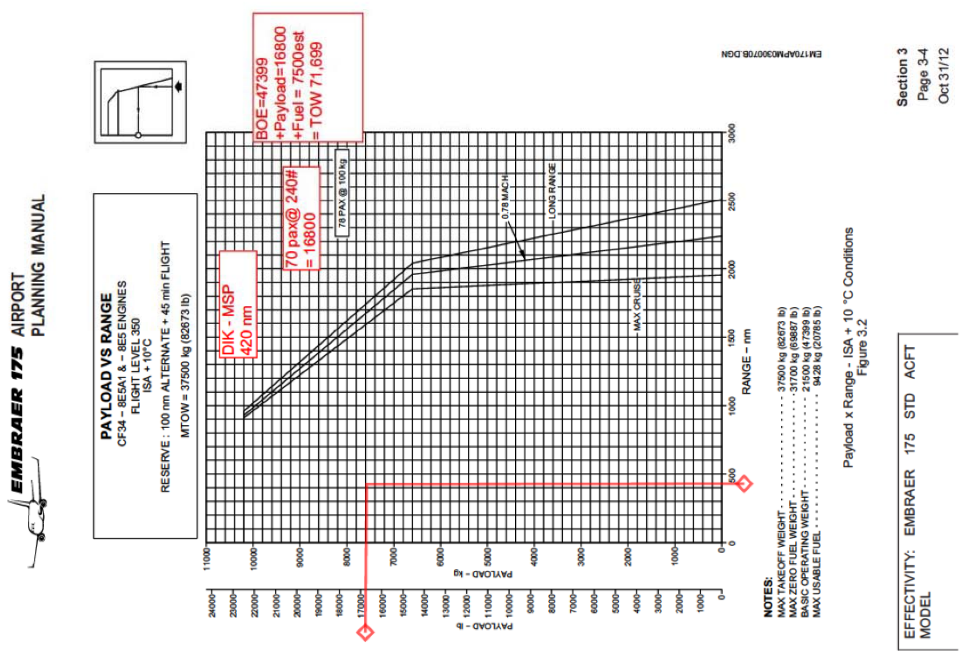
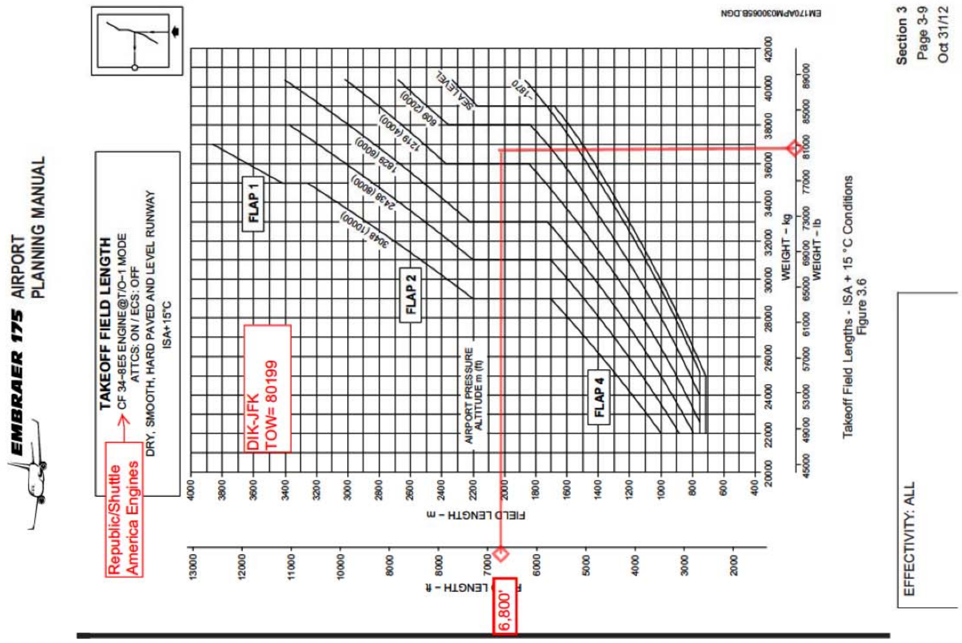

EMBRAER 175 AIRPORT PLANNING MANUAL
PAYLOAD VS RANGE
CF34 – 8E5A1 & – 8E5 ENGINES
FLIGHT LEVEL 350
ISA + 10°C
RESERVE : 100 nm ALTERNATE + 45 min FLIGHT
MTOW = 37500 kg (82673 lb)
DIK - MSP
420 nm
70 pax@ 240#
= 16800
BOE=47399
+Payload=16800
+Fuel = 7500est
= TOW 71,699
78 PAX @ 100 kg
0.78 MACH
LONG RANGE
MAX CRUISE
PAYLOAD – kg
PAYLOAD – lb
RANGE – nm
NOTES:
MAX TAKEOFF WEIGHT . . . . . 37500 kg (82673 lb)
MAX ZERO FUEL WEIGHT . . . . . 31700 kg (69887 lb)
BASIC OPERATING WEIGHT . . . . . 21500 kg (47399 lb)
MAX USABLE FUEL . . . . . 9428 kg (20785 lb)
Payload x Range - ISA + 10 °C Conditions
Figure 3.2
EFFECTIVITY: EMBRAER 175 STD ACFT MODEL
Section 3
Page 3-4
Oct 31/12


EMBRAER 175 AIRPORT PLANNING MANUAL
TAKEOFF FIELD LENGTH
CF 34-8E5 ENGINE@T/O-1 MODE
ATTCS: ON / ECS: OFF
DRY, SMOOTH, HARD PAVED AND LEVEL RUNWAY
ISA+15°C
Republic/Shuttle America Engines
DIK-JFK
TOW= 80199
FLAP 1
FLAP 2
FLAP 4
AIRPORT PRESSURE ALTITUDE m (ft)
FIELD LENGTH – m
FIELD LENGTH – ft
6,800'
WEIGHT – kg
WEIGHT – lb
Takeoff Field Lengths - ISA + 15 °C Conditions
Figure 3.6
EFFECTIVITY: ALL
Section 3
Page 3-9
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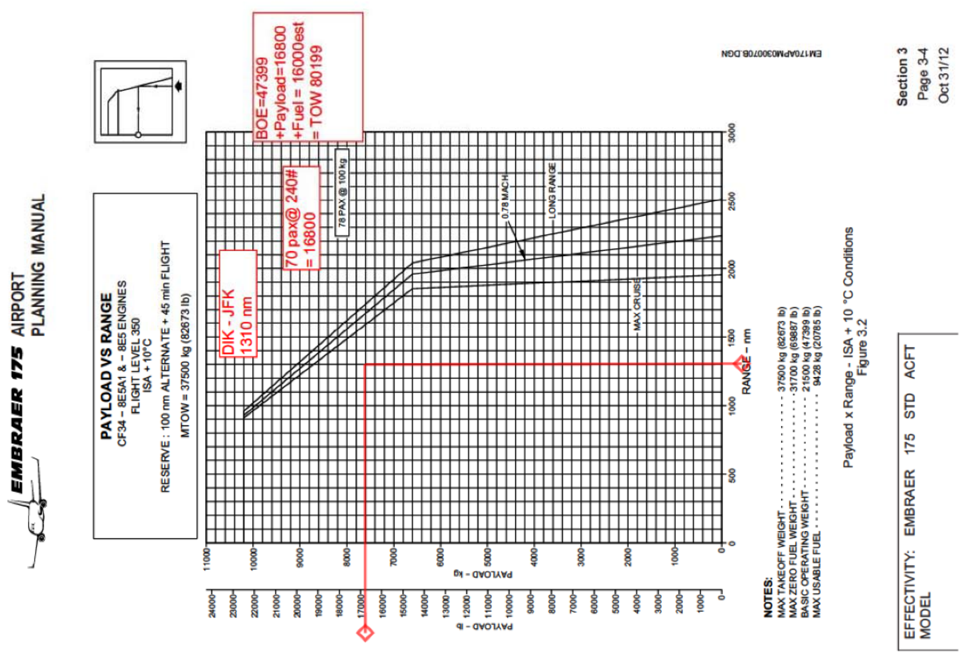
EMBRAER 175 AIRPORT PLANNING MANUAL
PAYLOAD VS RANGE
CF34 – 8E5A1 & – 8E5 ENGINES
FLIGHT LEVEL 350
ISA + 10°C
RESERVE : 100 nm ALTERNATE + 45 min FLIGHT
MTOW = 37500 kg (82673 lb)
DIK - JFK
1310 nm
70 pax@ 240#
= 16800
BOE=47399
+Payload=16800
+Fuel = 16000est
= TOW 80199
78 PAX @ 100 kg
0.78 MACH
LONG RANGE
MAX CRUISE
PAYLOAD – kg
PAYLOAD – lb
RANGE – nm
NOTES:
MAX TAKEOFF WEIGHT . . . . . 37500 kg (82673 lb)
MAX ZERO FUEL WEIGHT . . . . . 31700 kg (69887 lb)
BASIC OPERATING WEIGHT . . . . . 21500 kg (47399 lb)
MAX USABLE FUEL . . . . . 9428 kg (20785 lb)
Payload x Range - ISA + 10 °C Conditions
Figure 3.2
EFFECTIVITY: EMBRAER 175 STD ACFT MODEL
Section 3
Page 3-4
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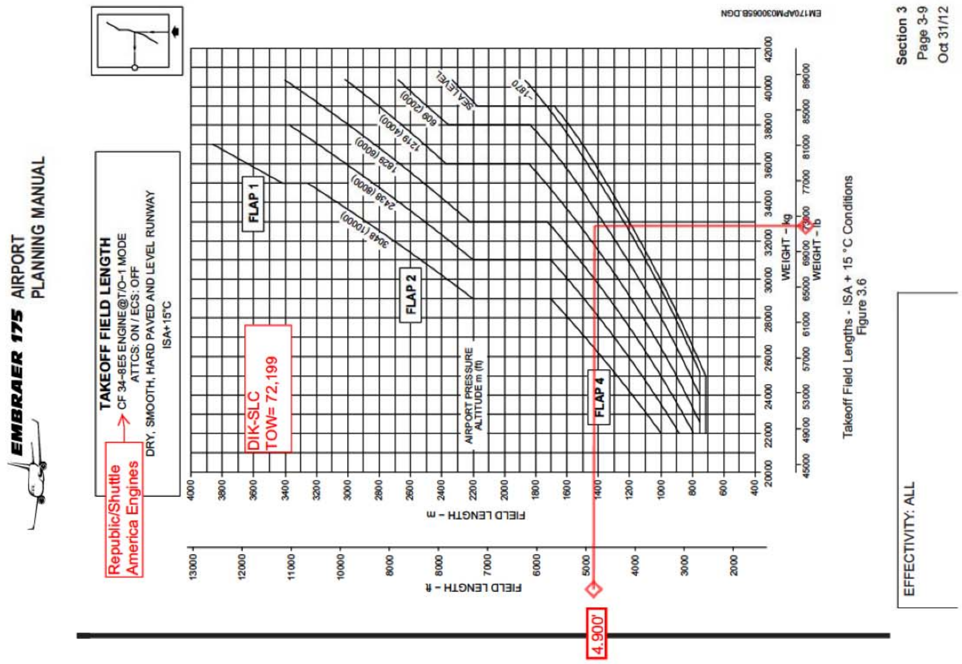
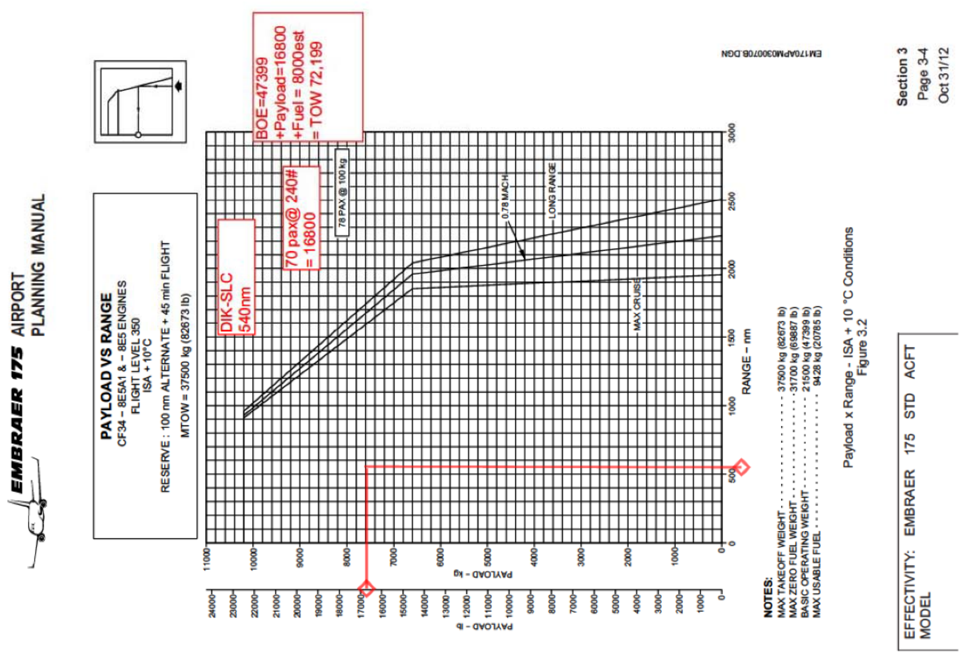

EMBRAER 175 AIRPORT PLANNING MANUAL
TAKEOFF FIELD LENGTH
CF 34-8E5 ENGINE@T/O-1 MODE
ATTCS: ON / ECS: OFF
DRY, SMOOTH, HARD PAVED AND LEVEL RUNWAY
ISA+15°C
Republic/Shuttle America Engines
DIK-SLC TOW= 72,199
FLAP 1
FLAP 2
FLAP 4
AIRPORT PRESSURE ALTITUDE m (ft)
FIELD LENGTH - m
FIELD LENGTH - ft
WEIGHT - kg
WEIGHT - lb
4,900'
Takeoff Field Lengths - ISA + 15 °C Conditions
Figure 3.6
EFFECTIVITY: ALL
Section 3
Page 3-9
Oct 31/12

EMBRAER 175 AIRPORT PLANNING MANUAL
PAYLOAD VS RANGE
CF34 - 8E5A1 & - 8E5 ENGINES
FLIGHT LEVEL 350
ISA + 10°C
RESERVE : 100 nm ALTERNATE + 45 min FLIGHT
MTOW = 37500 kg (82673 lb)
DIK-SLC 540nm
70 pax@ 240# = 16800
BOE=47399
+Payload=16800
+Fuel = 8000est
= TOW 72,199
78 PAX @ 100 kg
0.78 MACH
LONG RANGE
MAX CRUISE
PAYLOAD - kg
PAYLOAD - lb
RANGE - nm
Payload x Range - ISA + 10 °C Conditions
Figure 3.2
EFFECTIVITY: EMBRAER 175 STD ACFT MODEL
Section 3
Page 3-4
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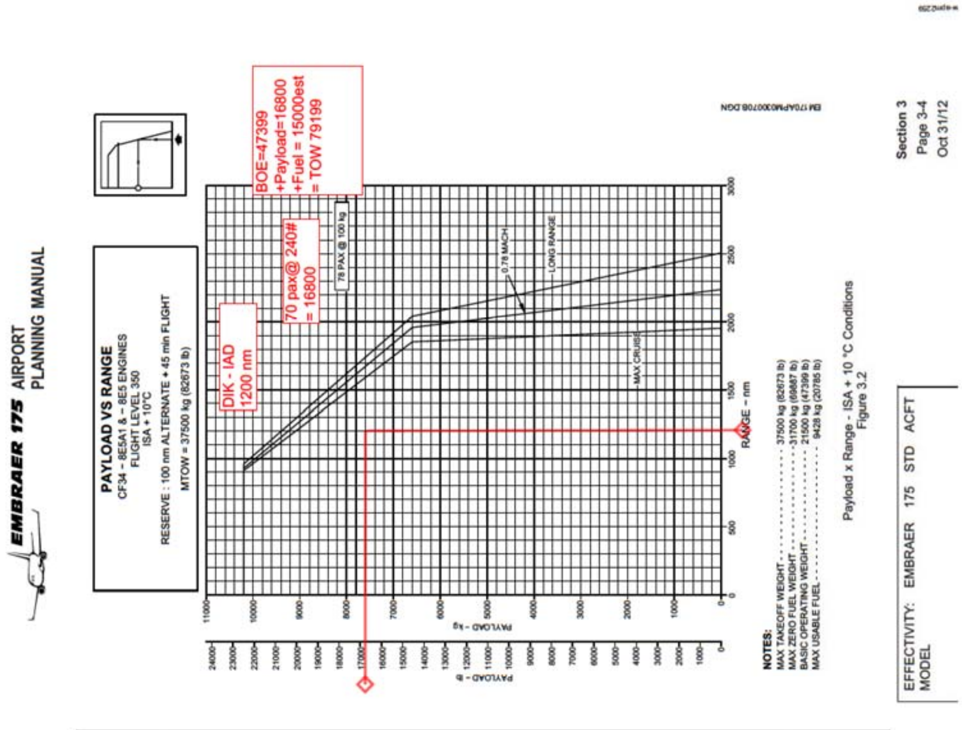
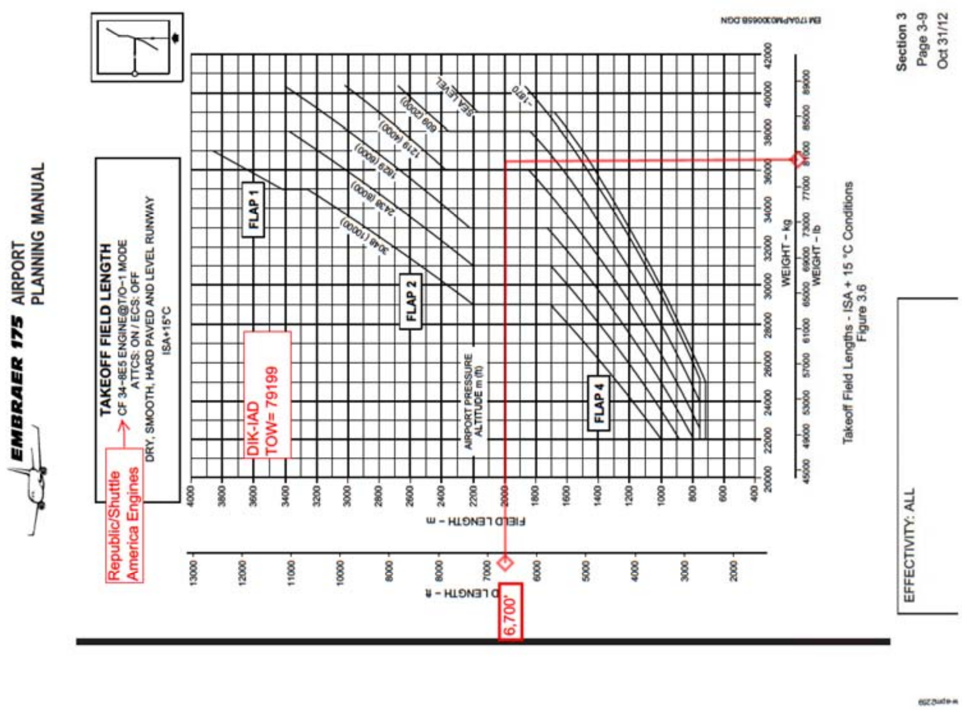
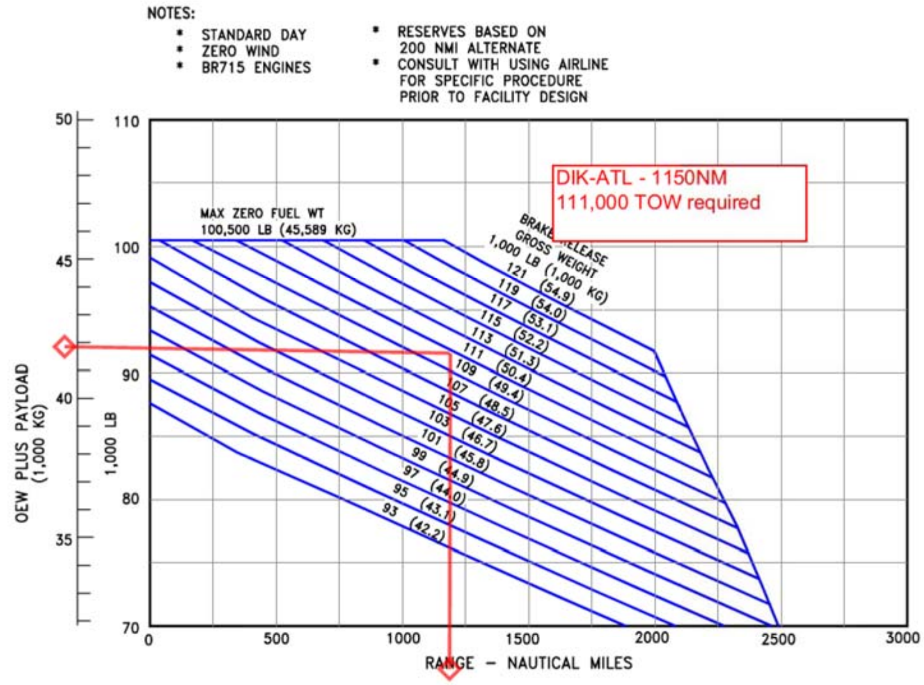

EMBRAER 175 AIRPORT PLANNING MANUAL
PAYLOAD VS RANGE
CF34 - 8E5A1 & - 8E5 ENGINES
FLIGHT LEVEL 350
ISA + 10°C
RESERVE : 100 nm ALTERNATE + 45 min FLIGHT
MTOW = 37500 kg (82673 lb)
BOE=47399
+Payload=16800
+Fuel = 15000est
= TOW 79199
70 pax@ 240#
= 16800
78 PAX @ 100 kg
DIK - IAD
1200 nm
0.78 MACH
LONG RANGE
MAX CRUISE
PAYLOAD - kg
PAYLOAD - lb
RANGE - nm
NOTES:
MAX TAKEOFF WEIGHT - 37500 kg (82673 lb)
MAX ZERO FUEL WEIGHT - 31700 kg (69887 lb)
BASIC OPERATING WEIGHT - 21500 kg (47399 lb)
MAX USABLE FUEL - 9428 kg (20785 lb)
Payload x Range - ISA + 10 °C Conditions
Figure 3.2
EFFECTIVITY: EMBRAER 175 STD ACFT
MODEL
Section 3
Page 3-4
Oct 31/12


EMBRAER 175 AIRPORT PLANNING MANUAL
TAKEOFF FIELD LENGTH
CF 34-8E5 ENGINE@T/O-1 MODE
ATTCS: ON / ECS: OFF
DRY, SMOOTH, HARD PAVED AND LEVEL RUNWAY
ISA+15°C
Republic/Shuttle America Engines
DIK-IAD
TOW= 79199
FLAP 1
FLAP 2
FLAP 4
AIRPORT PRESSURE ALTITUDE m (ft)
SEA LEVEL
FIELD LENGTH - m
FIELD LENGTH - ft
6,700'
WEIGHT - kg
WEIGHT - lb
Takeoff Field Lengths - ISA + 15 °C Conditions
Figure 3.6
EFFECTIVITY: ALL
Section 3
Page 3-9
Oct 31/12

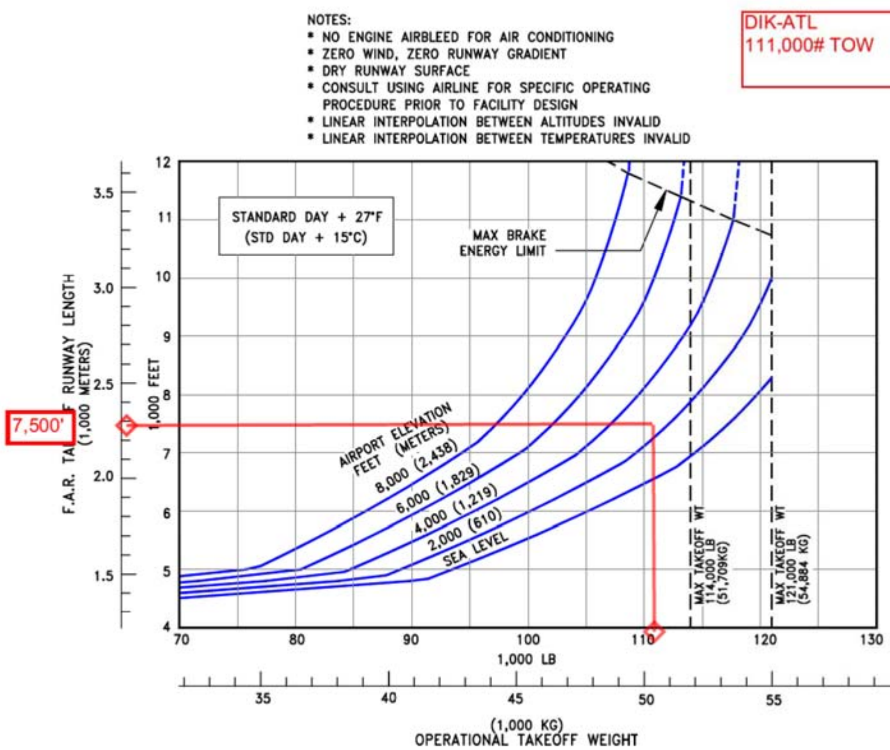
3.2. PAYLOAD/RANGE FOR LONG-RANGE CRUISE
MODEL 717-200



D6-58330

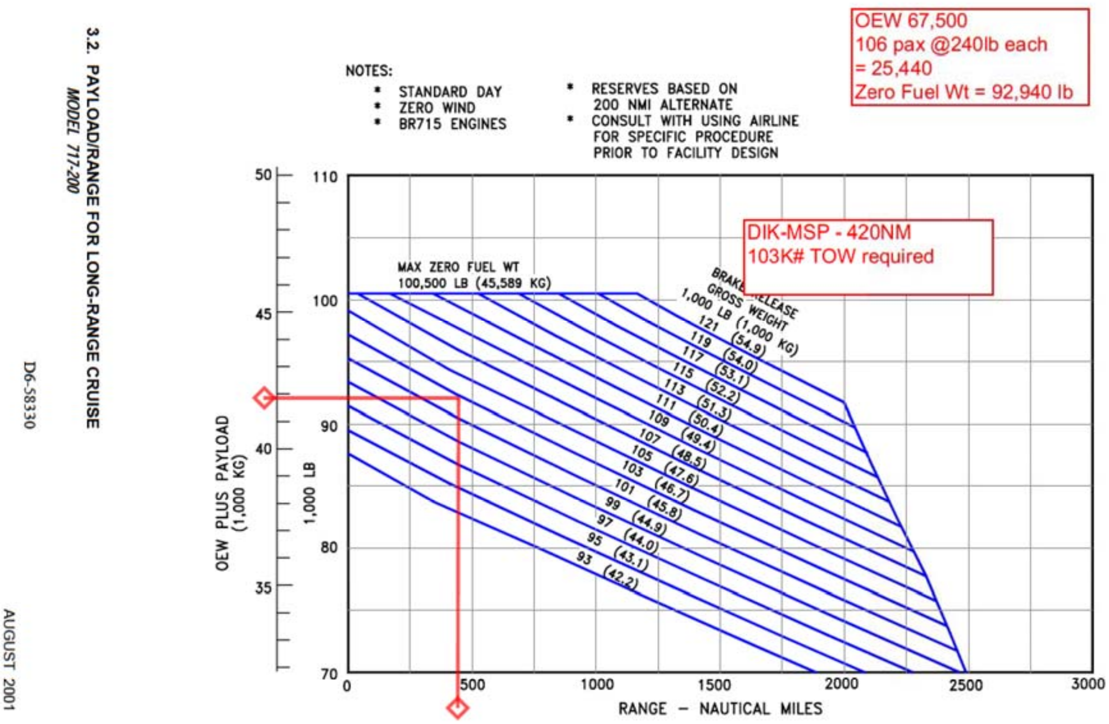
AUGUST 2001 23

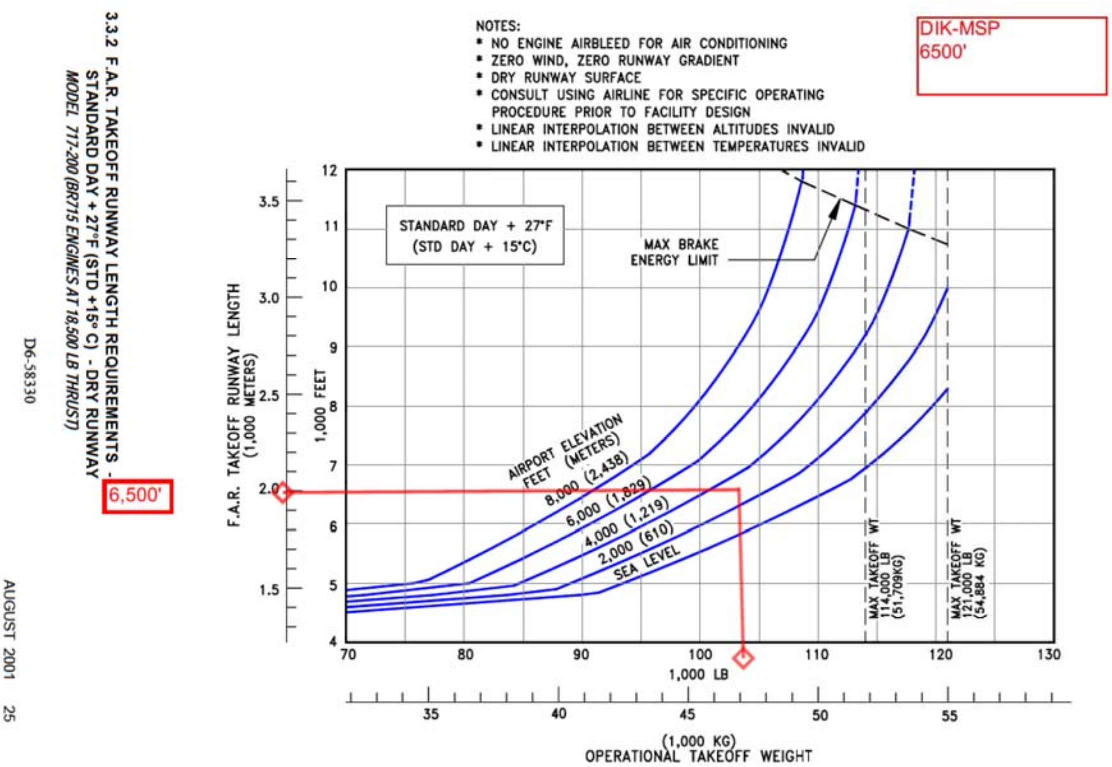
3.3.2 F.A.R. TAKEOFF RUNWAY LENGTH REQUIREMENTS - STANDARD DAY + 27°F (STD +15° C) - DRY RUNWAY
MODEL 717-200 (BR715 ENGINES AT 18,500 LB THRUST)



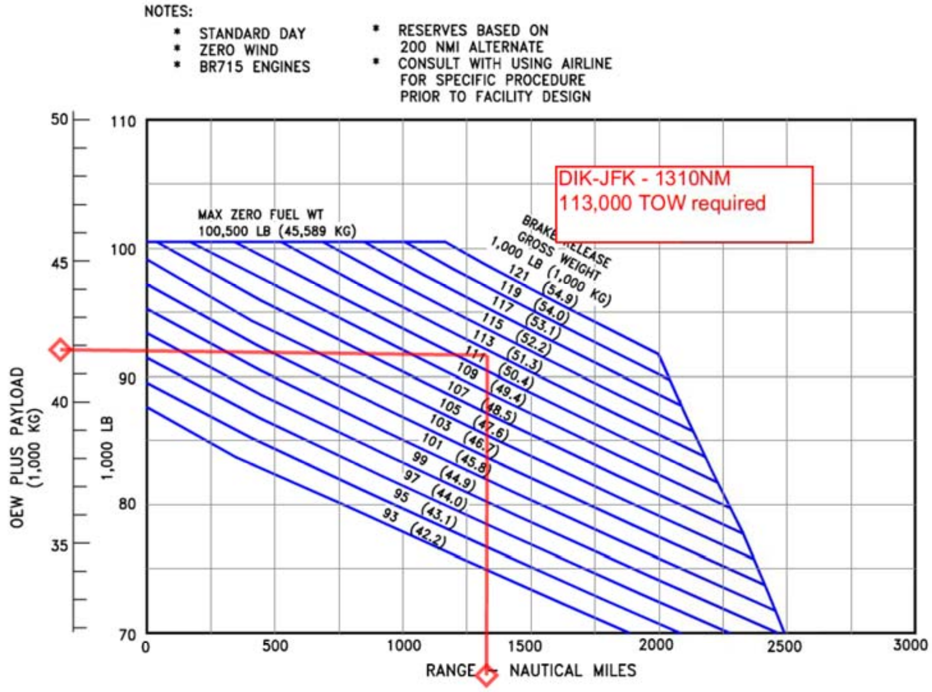
D6-58330

AUGUST 2001 25


3.2. PAYLOAD/RANGE FOR LONG-RANGE CRUISE
MODEL 717-200
D6-58330
AUGUST 2001 23
OEW 67,500
106 pax @240lb each
= 25,440
Zero Fuel Wt = 92,940 lb
NOTES:
STANDARD DAY
ZERO WIND
BR715 ENGINES
RESERVES BASED ON 200 NMI ALTERNATE
CONSULT WITH USING AIRLINE FOR SPECIFIC PROCEDURE PRIOR TO FACILITY DESIGN
DIK-MSP - 420NM
103K# TOW required
MAX ZERO FUEL WT
100,500 LB (45,589 KG)
BRAKE RELEASE GROSS WEIGHT
1,000 LB (1,000 KG)
121 (54.9)
119 (54.0)
117 (53.1)
115 (52.2)
113 (51.3)
111 (50.4)
109 (49.4)
107 (48.5)
105 (47.6)
103 (46.7)
101 (45.8)
99 (44.9)
97 (44.0)
95 (43.1)
93 (42.2)
OEW PLUS PAYLOAD (1,000 KG)
1,000 LB
RANGE – NAUTICAL MILES

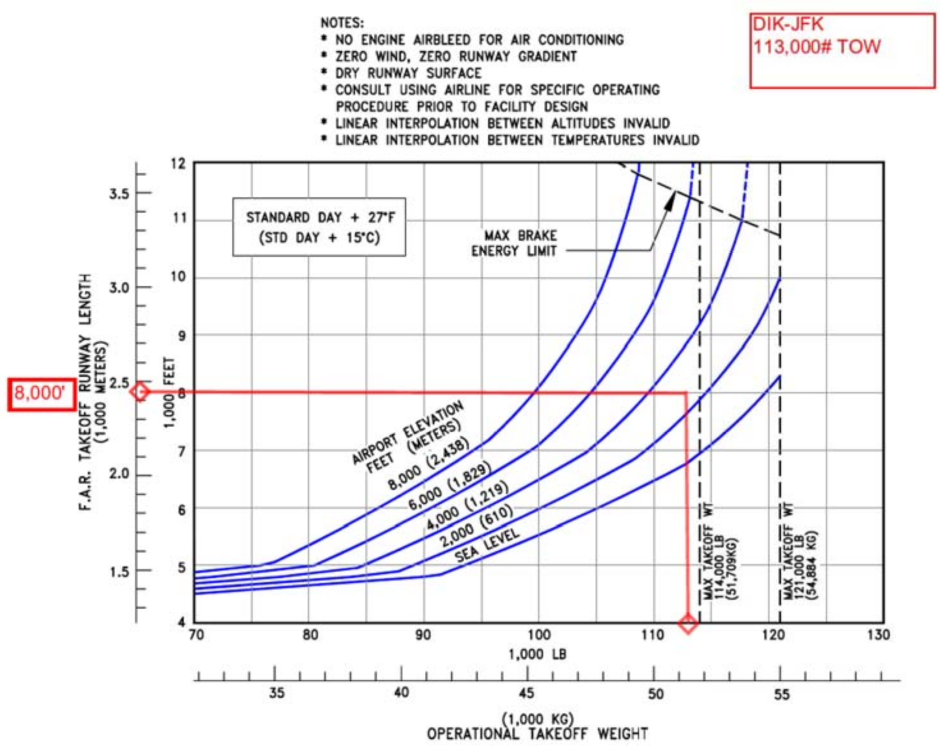

3.3.2 F.A.R. TAKEOFF RUNWAY LENGTH REQUIREMENTS - STANDARD DAY + 27°F (STD +15° C) - DRY RUNWAY
MODEL 717-200 (BR715 ENGINES AT 18,500 LB THRUST)
D6-58330
AUGUST 2001 25
6,500'
NOTES:
NO ENGINE AIRBLEED FOR AIR CONDITIONING
ZERO WIND, ZERO RUNWAY GRADIENT
DRY RUNWAY SURFACE
CONSULT USING AIRLINE FOR SPECIFIC OPERATING PROCEDURE PRIOR TO FACILITY DESIGN
LINEAR INTERPOLATION BETWEEN ALTITUDES INVALID
LINEAR INTERPOLATION BETWEEN TEMPERATURES INVALID
DIK-MSP
6500'
STANDARD DAY + 27°F
(STD DAY + 15°C)
MAX BRAKE ENERGY LIMIT
AIRPORT ELEVATION
FEET (METERS)
8,000 (2,438)
6,000 (1,829)
4,000 (1,219)
2,000 (610)
SEA LEVEL
MAX TAKEOFF WT 114,000 LB (51,709KG)
MAX TAKEOFF WT 121,000 LB (54,884 KG)
F.A.R. TAKEOFF RUNWAY LENGTH (1,000 METERS)
1,000 FEET
1,000 LB
(1,000 KG)
OPERATIONAL TAKEOFF WEIGHT

3.2. PAYLOAD/RANGE FOR LONG-RANGE CRUISE
MODEL 717-200



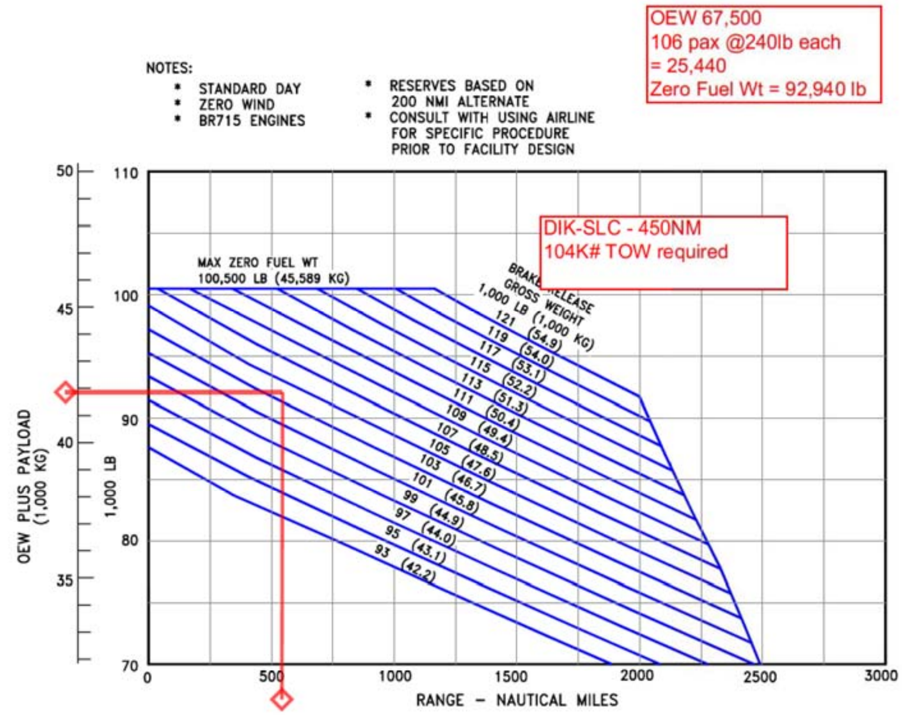
D6-58330 AUGUST 2001 23

3.3.2 F.A.R. TAKEOFF RUNWAY LENGTH REQUIREMENTS - STANDARD DAY + 27°F (STD +15°C) - DRY RUNWAY
MODEL 717-200 (BR715 ENGINES AT 18,500 LB THRUST)



D6-58330 AUGUST 2001 25

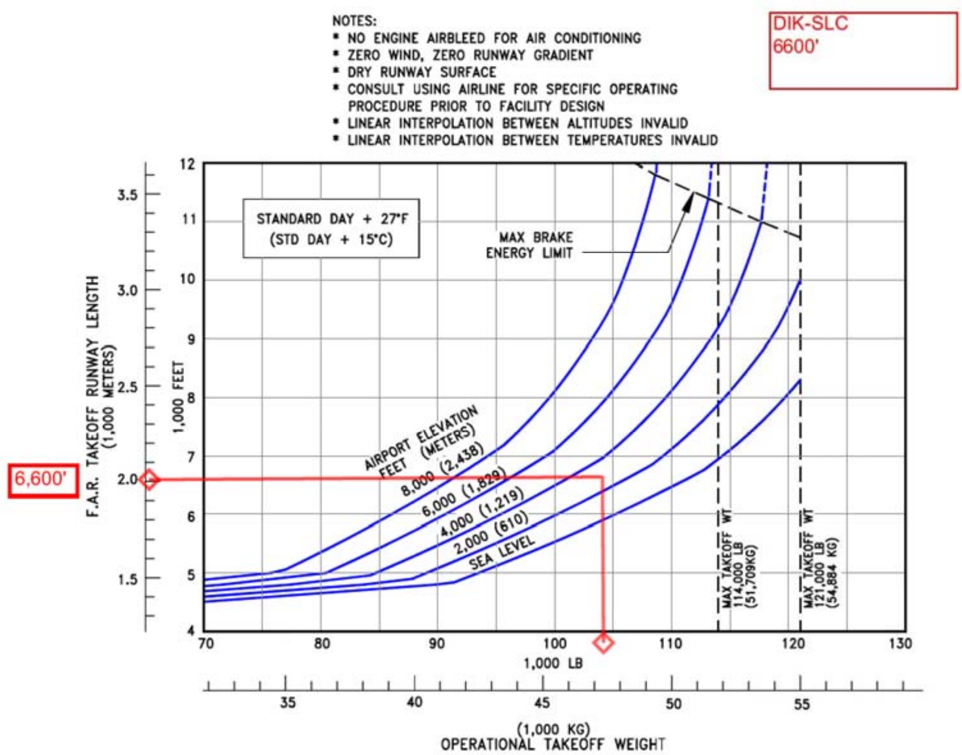
3.2. PAYLOAD/RANGE FOR LONG-RANGE CRUISE
MODEL 717-200



D6-58330

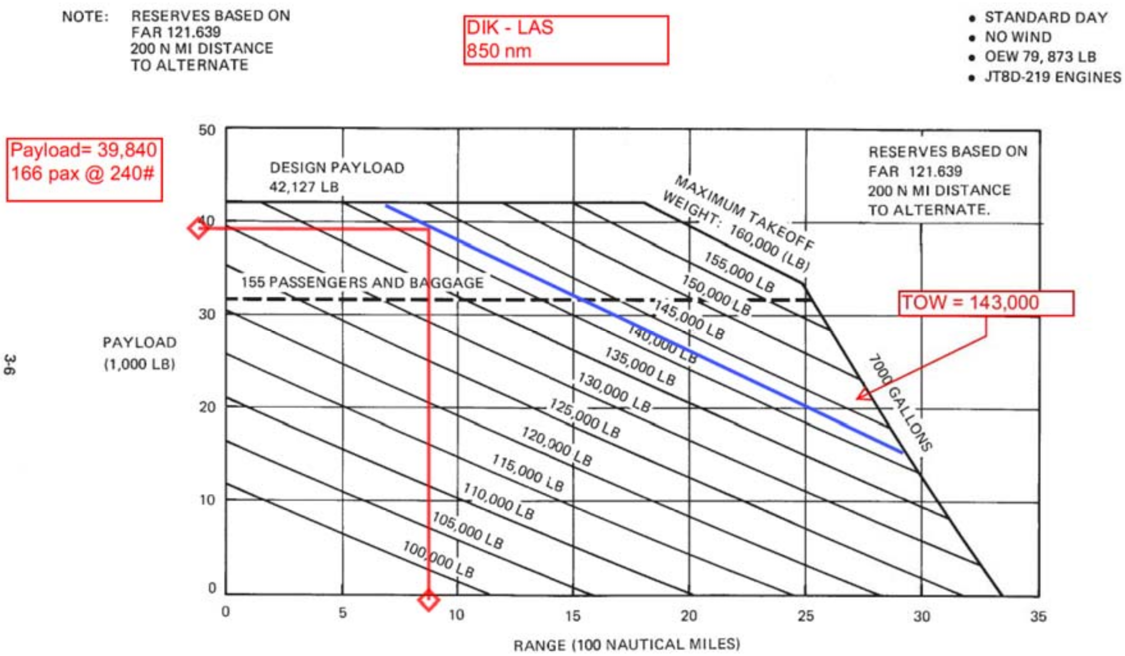
AUGUST 2001 23

3.3.2 F.A.R. TAKEOFF RUNWAY LENGTH REQUIREMENTS - STANDARD DAY + 27°F (STD +15° C) - DRY RUNWAY
MODEL 717-200 (BR715 ENGINES AT 18,500 LB THRUST)

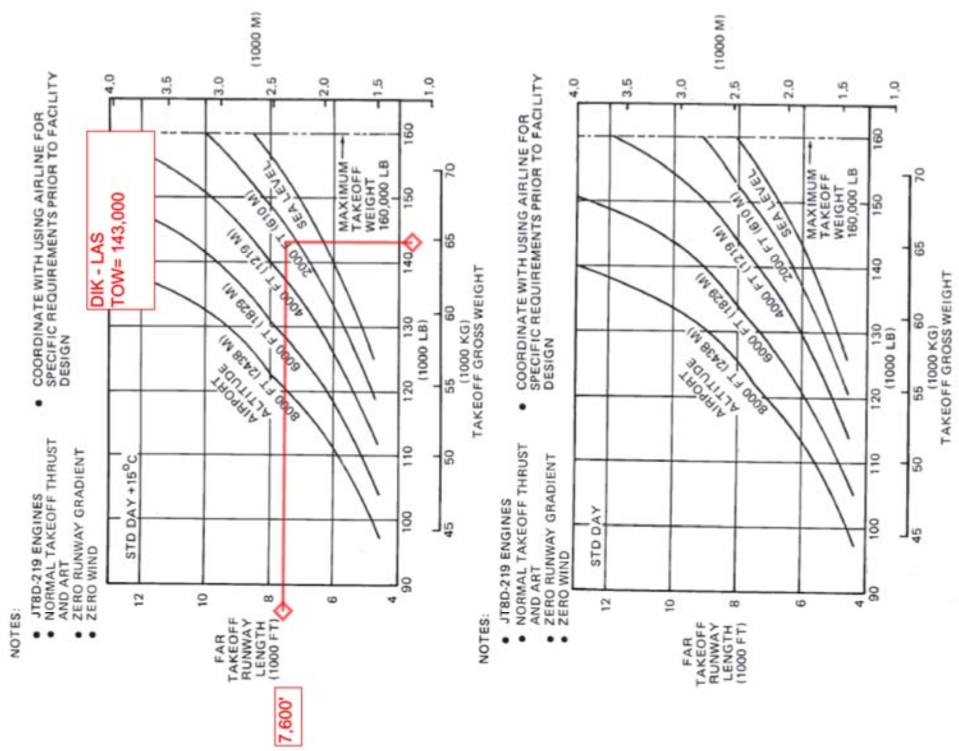


D6-58330

AUGUST 2001 25

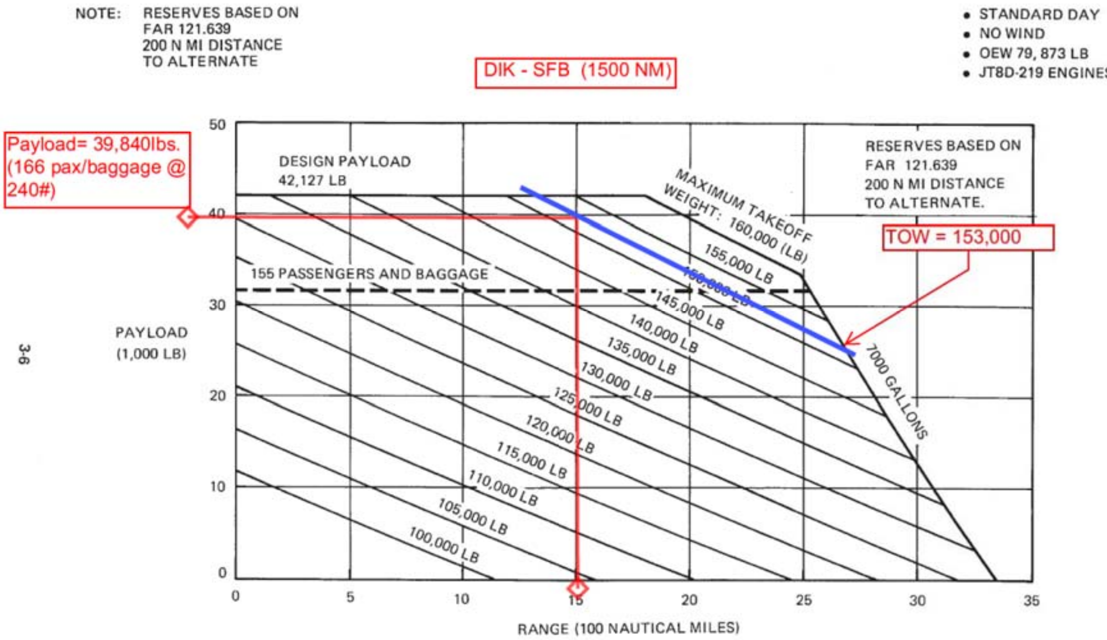


3.2 PAYLOAD-RANGE
PAYLOAD-RANGE FOR TYPICAL LONG-RANGE CRUISE AT 31,000 FT/35,000 FT STEP
MODEL MD-83

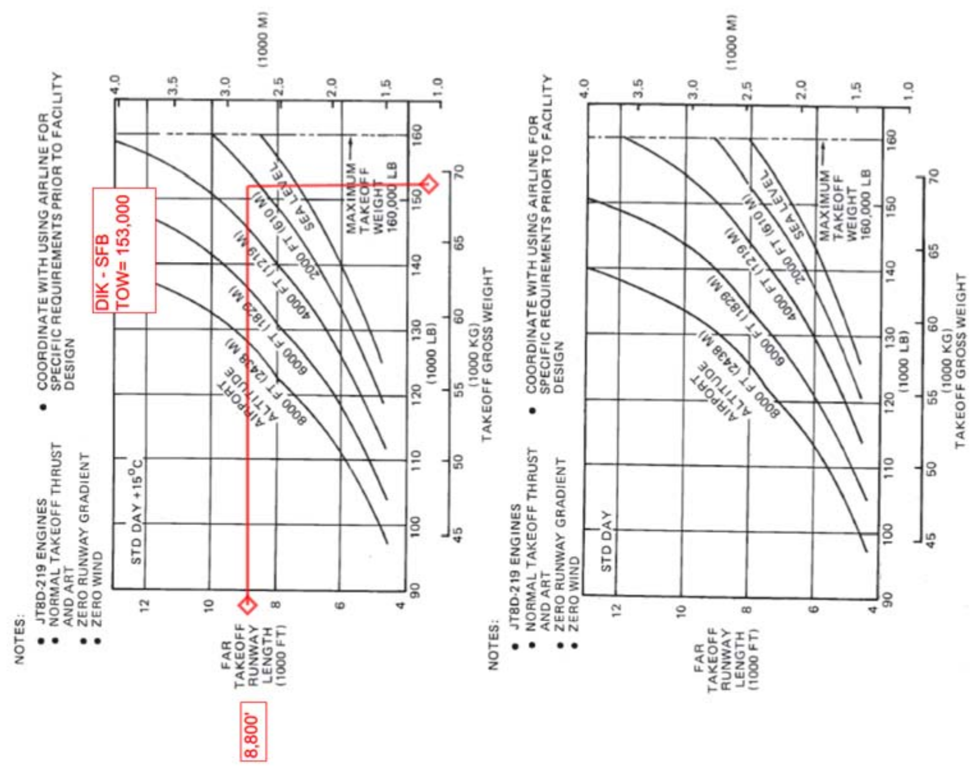


3.3 FAR TAKEOFF RUNWAY LENGTH REQUIREMENTS
MODEL MD-83

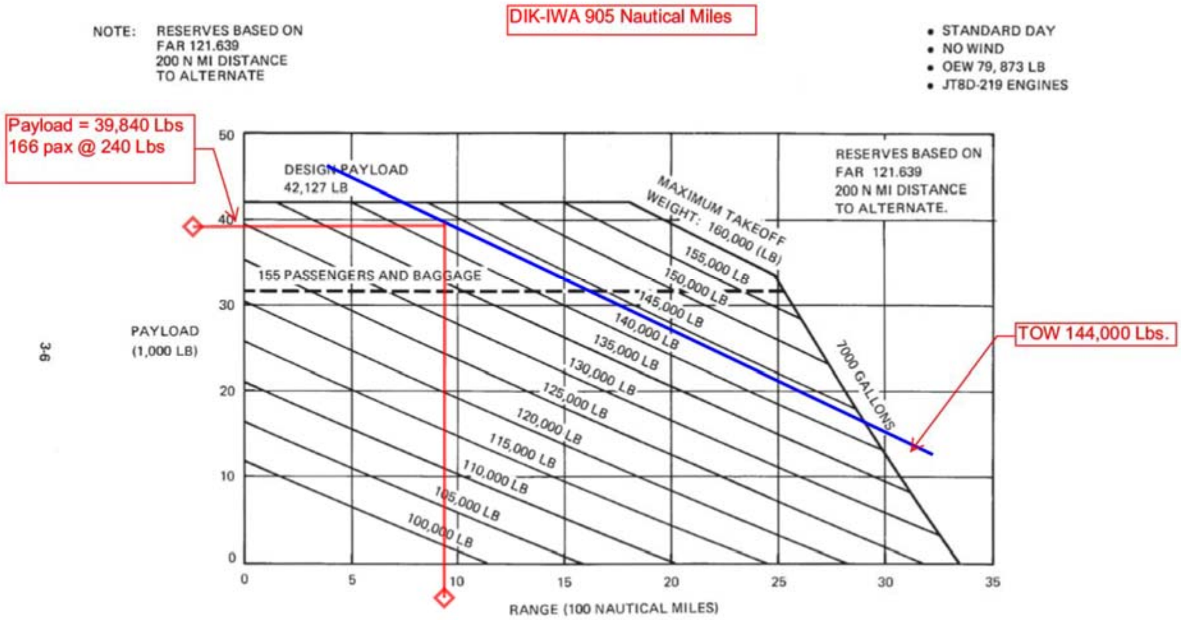
3-13



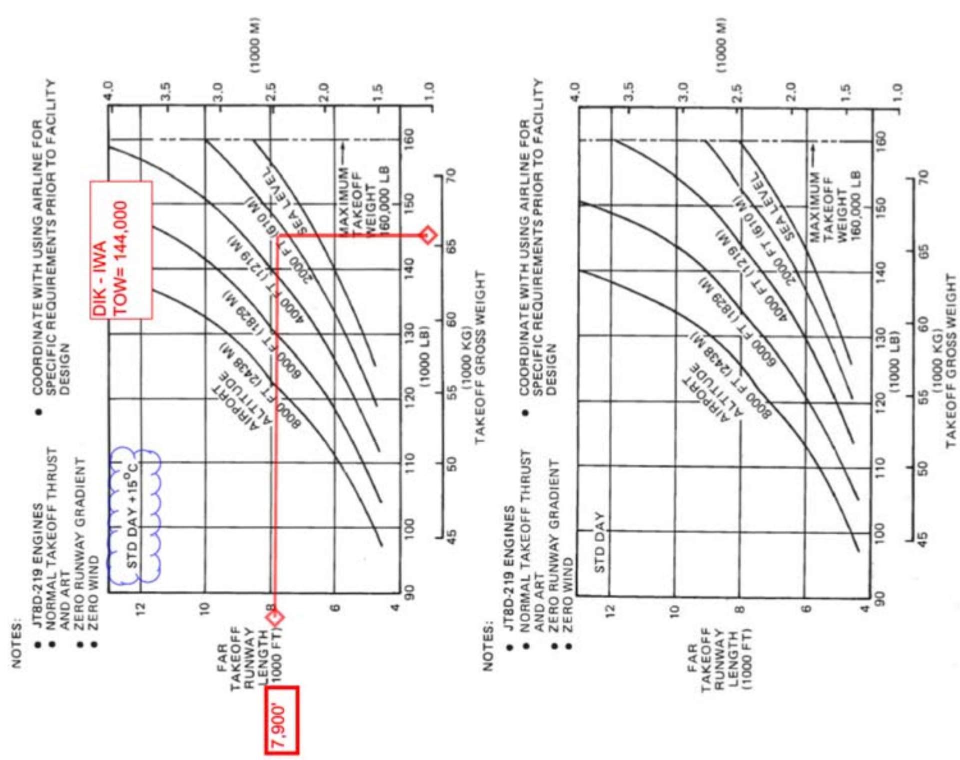
3.2 PAYLOAD-RANGE
PAYLOAD-RANGE FOR TYPICAL LONG-RANGE CRUISE AT 31,000 FT/35,000 FT STEP
MODEL MD-83



3.3 FAR TAKEOFF RUNWAY LENGTH REQUIREMENTS
MODEL MD-83



3.2 PAYLOAD-RANGE
PAYLOAD-RANGE FOR TYPICAL LONG-RANGE CRUISE AT 31,000 FT/35,000 FT STEP
MODEL MD-83



3.3 FAR TAKEOFF RUNWAY LENGTH REQUIREMENTS
MODEL MD-83

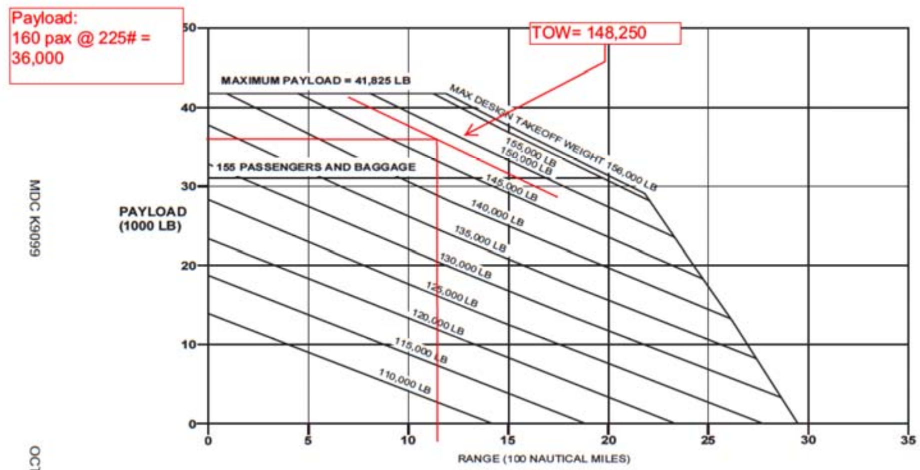
3-2 MDC K9099 OCTOBER 2002

DL: DIK - ATL
1150 nm

NOTE: RESERVES BASED ON FAR 121.639 200 N MI DISTANCE TO ALTERNATE

NOT TO BE USED FOR FLIGHT PLANNING PURPOSES

STANDARD DAY
NO WIND
OEW 88,175 LB
V2500-D5 ENGINES



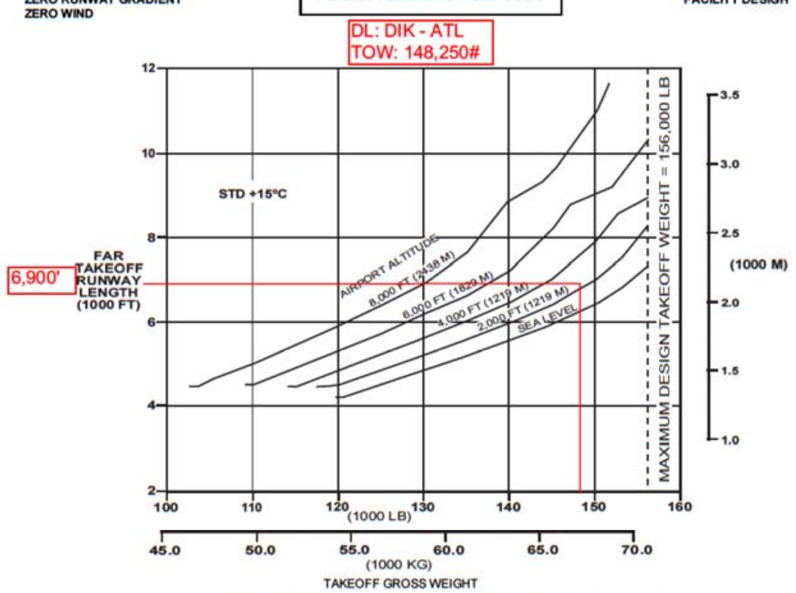
3.2 PAYLOAD-RANGE
3.2.1 PAYLOAD--RANGE FOR TYPICAL LONG-RANGE CRUISE AT 31,000/35,000 FT STEP
MODEL MD-90-30/-30ER

OCTOBER 2002 MDC K9099 3-5

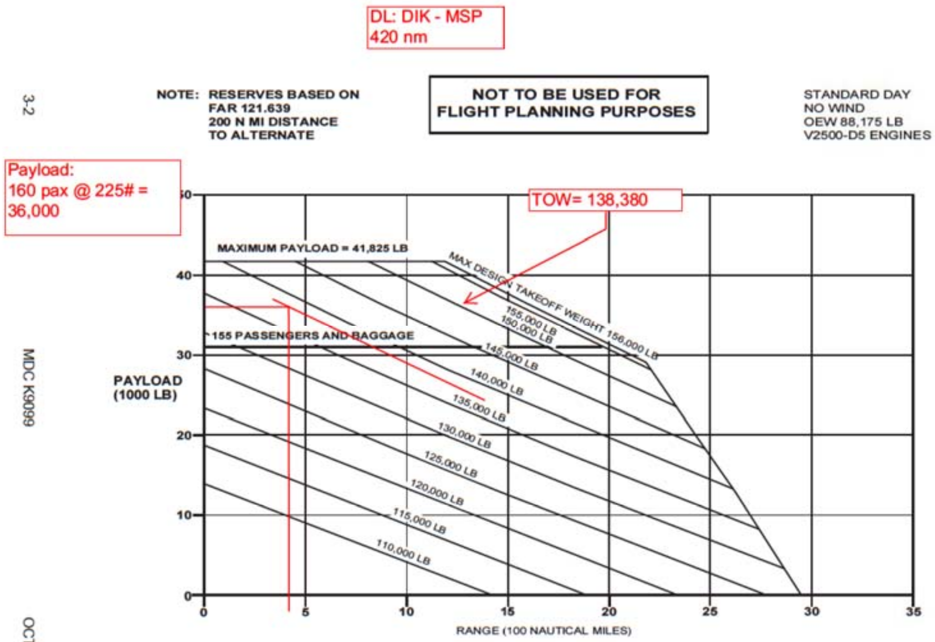
NOTE: V2500--D5 ENGINES
NORMAL TAKEOFF THRUST AND ART
ZERO RUNWAY GRADIENT
ZERO WIND

NOT TO BE USED FOR FLIGHT PLANNING PURPOSES

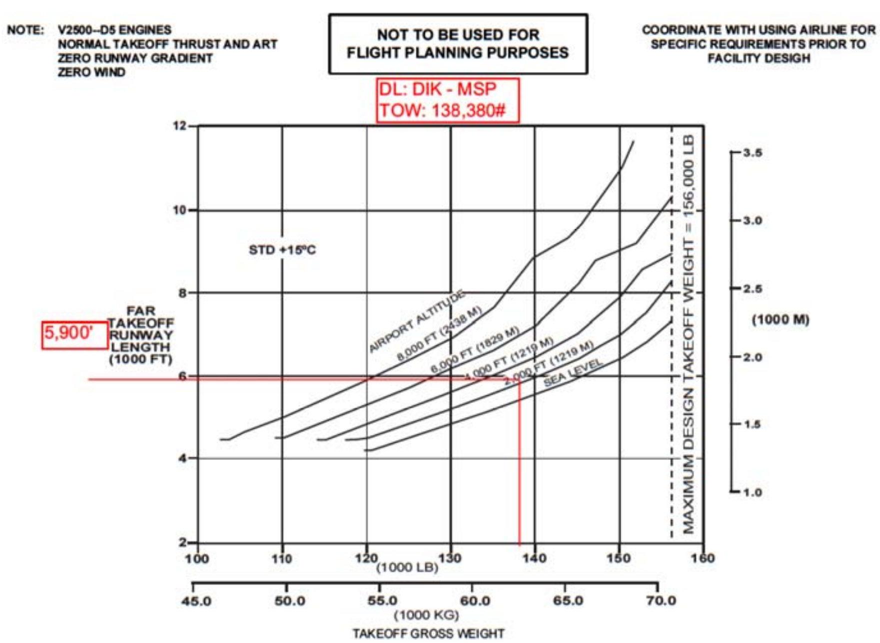
COORDINATE WITH USING AIRLINE FOR SPECIFIC REQUIREMENTS PRIOR TO FACILITY DESIGH



3.3 FAR TAKEOFF RUNWAY LENGTH REQUIREMENTS
3.3.2 STANDARD DAY + 15ºC
MODEL MD-90-30/-30ER



3.2 PAYLOAD-RANGE
3.2.1 PAYLOAD--RANGE FOR TYPICAL LONG-RANGE CRUISE AT 31,000/35,000 FT STEP
MODEL MD-90-30/-30ER



3.3 FAR TAKEOFF RUNWAY LENGTH REQUIREMENTS
3.3.2 STANDARD DAY + 15ºC
MODEL MD-90-30/-30ER

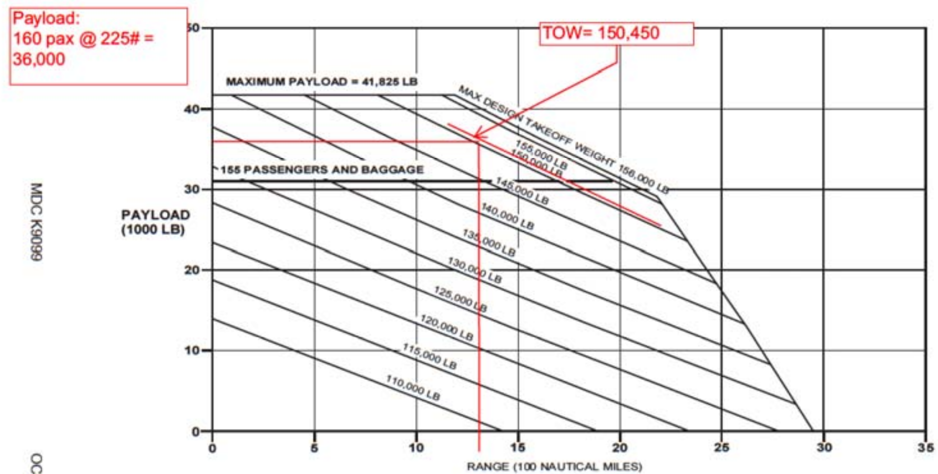
DL: DIK - JFK
1310 nm

3-2 MDC K9099 OCTOBER 2002

NOTE: RESERVES BASED ON FAR 121.639 200 N MI DISTANCE TO ALTERNATE

NOT TO BE USED FOR FLIGHT PLANNING PURPOSES

STANDARD DAY
NO WIND
OEW 88,175 LB
V2500-D5 ENGINES



3.2 PAYLOAD-RANGE
3.2.1 PAYLOAD–RANGE FOR TYPICAL LONG-RANGE CRUISE AT 31,000/35,000 FT STEP
MODEL MD-90-30/-30ER

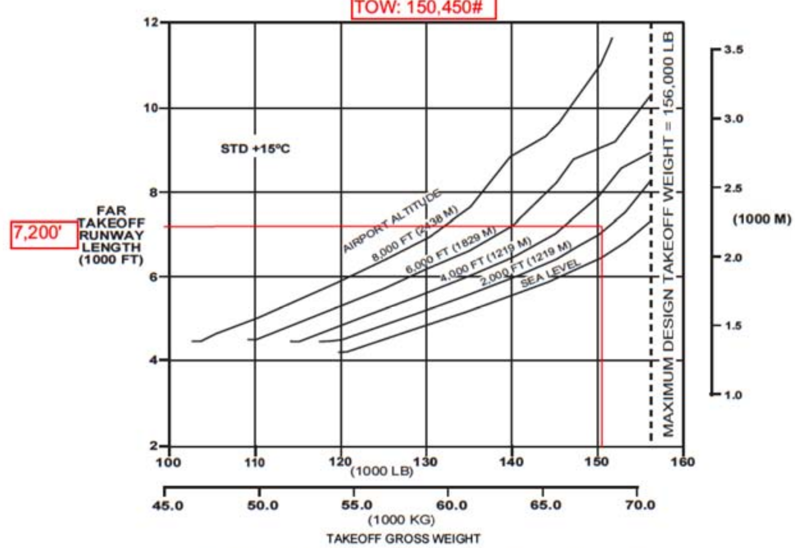
OCTOBER 2002 MDC K9099 3-5

NOTE: V2500–D5 ENGINES NORMAL TAKEOFF THRUST AND ART ZERO RUNWAY GRADIENT ZERO WIND

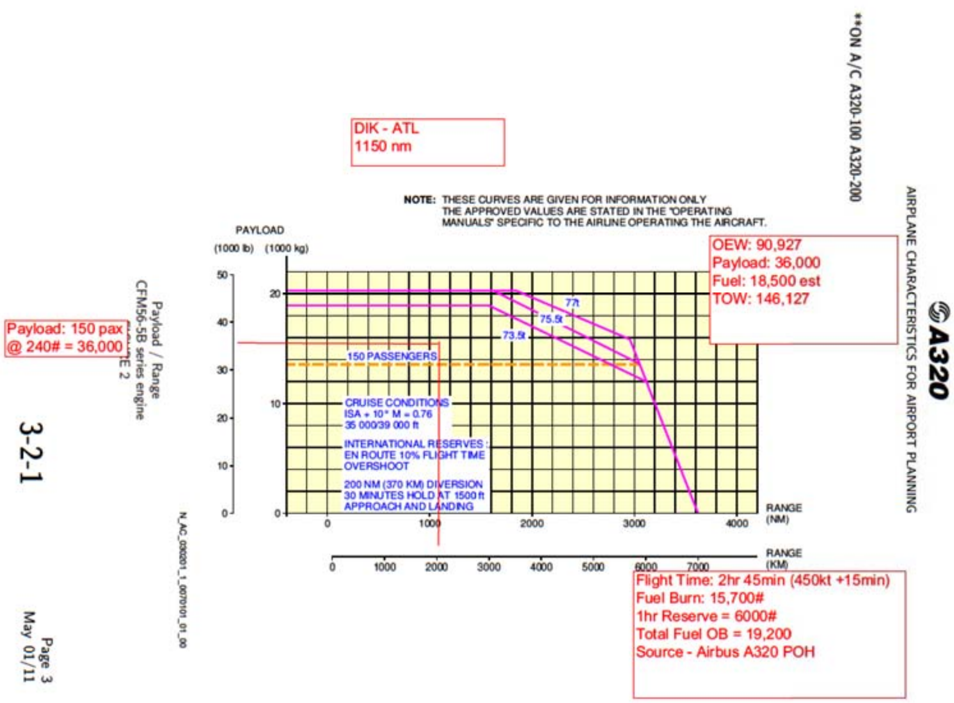
NOT TO BE USED FOR FLIGHT PLANNING PURPOSES

COORDINATE WITH USING AIRLINE FOR SPECIFIC REQUIREMENTS PRIOR TO FACILITY DESIGH

DL: DIK - JFK
TOW: 150,450#



3.3 FAR TAKEOFF RUNWAY LENGTH REQUIREMENTS
3.3.2 STANDARD DAY + 15ºC
MODEL MD-90-30/-30ER

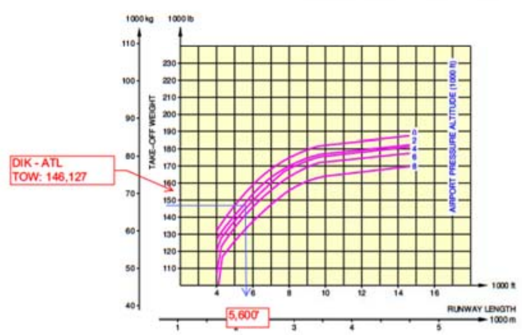


A320

AIRPLANE CHARACTERISTICS FOR AIRPORT PLANNING

**ON A/C A320-100 A320-200

NOTE: THESE CURVES ARE GIVEN FOR INFORMATION ONLY
THE APPROVED VALUES ARE STATED IN THE "OPERATING MANUALS" SPECIFIC TO THE AIRLINE OPERATING THE AIRCRAFT.



N_AC_030302_1_0050101_01_00

FAR / JAR Take-off Weight Limitation
ISA +15°C (+59°F) Conditions – CFM56 series engine
FIGURE 1

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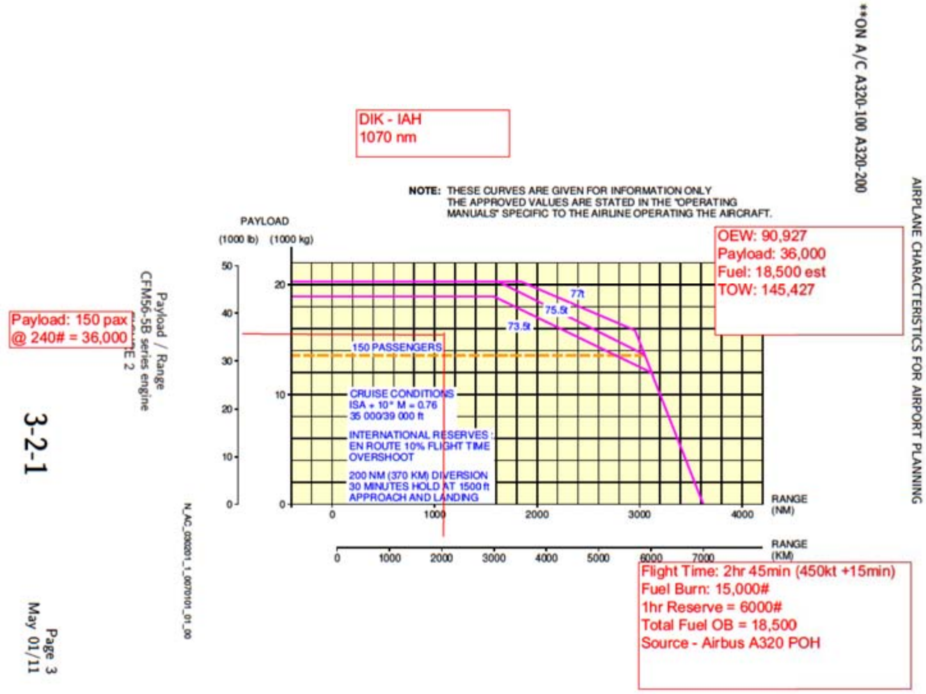
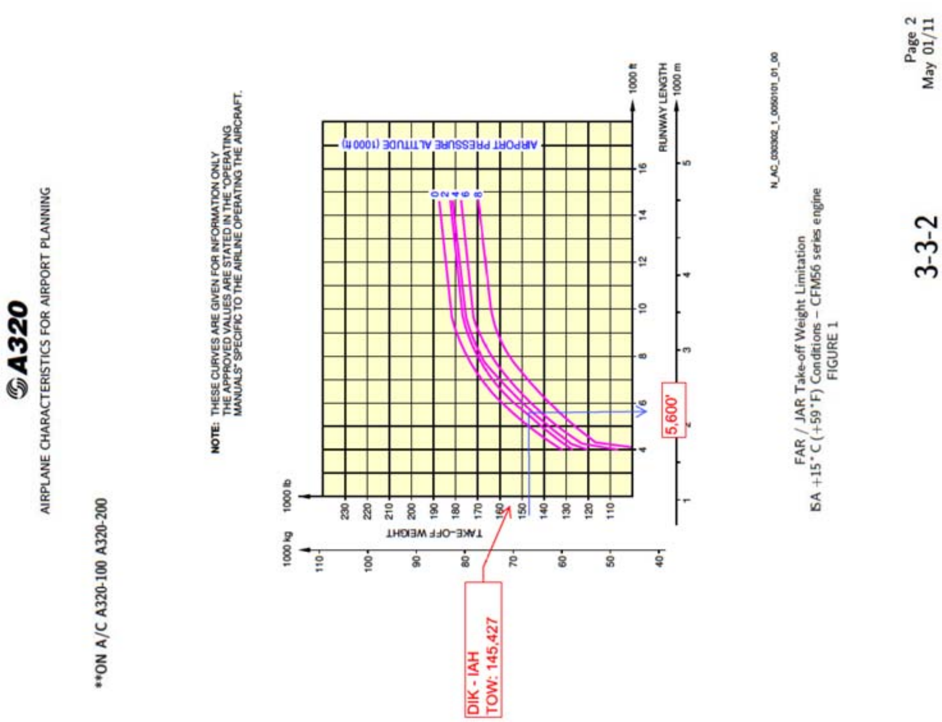
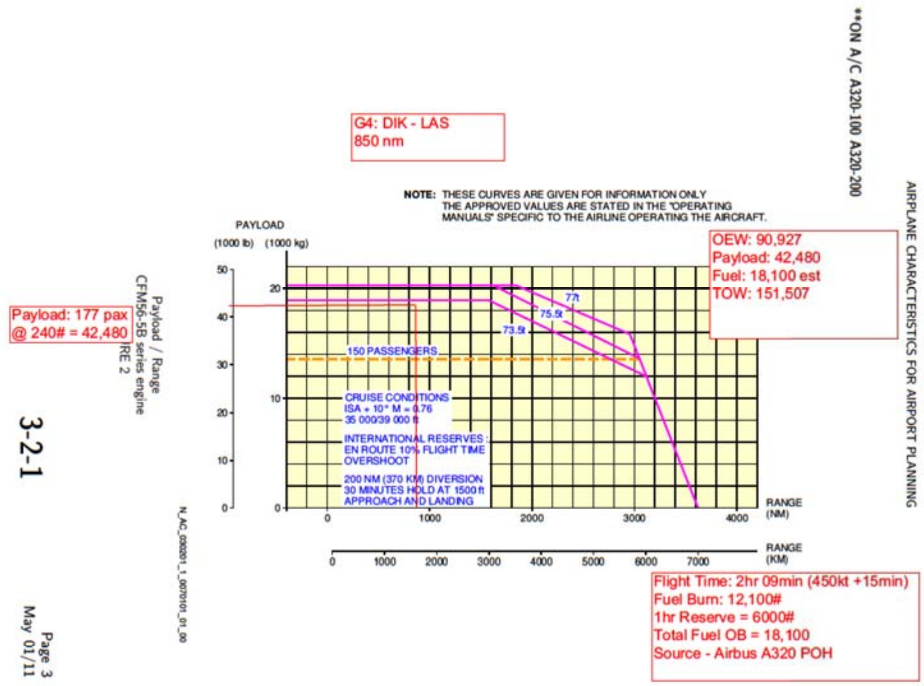
May 01/11


**ON A/C A320-100 A320-200
A320
AIRPLANE CHARACTERISTICS FOR AIRPORT PLANNING
DIK - IAH
1070 nm
NOTE: THESE CURVES ARE GIVEN FOR INFORMATION ONLY
THE APPROVED VALUES ARE STATED IN THE "OPERATING MANUALS" SPECIFIC TO THE AIRLINE OPERATING THE AIRCRAFT.
OEW: 90,927
Payload: 36,000
Fuel: 18,500 est
TOW: 145,427
PAYLOAD
150 PASSENGERS
CRUISE CONDITIONS
ISA + 10° M = 0.76
35 000/39 000 ft
INTERNATIONAL RESERVES :
EN ROUTE 10% FLIGHT TIME
OVERSHOOT
200 NM (370 KM) DIVERSION
30 MINUTES HOLD AT 1500 ft
APPROACH AND LANDING
RANGE (NM)
RANGE (KM)
Flight Time: 2hr 45min (450kt +15min)
Fuel Burn: 15,000#
1hr Reserve = 6000#
Total Fuel OB = 18,500
Source - Airbus A320 POH
Payload: 150 pax
@ 240# = 36,000
Payload / Range
CFM56-5B series engine
3-2-1
Page 3
May 01/11


A320
AIRPLANE CHARACTERISTICS FOR AIRPORT PLANNING
**ON A/C A320-100 A320-200
NOTE: THESE CURVES ARE GIVEN FOR INFORMATION ONLY
THE APPROVED VALUES ARE STATED IN THE "OPERATING MANUALS" SPECIFIC TO THE AIRLINE OPERATING THE AIRCRAFT.
AIRPORT PRESSURE ALTITUDE (1000 ft)
TAKE-OFF WEIGHT
RUNWAY LENGTH
5,600'
DIK - IAH
TOW: 145,427
FAR / JAR Take-off Weight Limitation
ISA +15°C (+59°F) Conditions – CFM56 series engine
FIGURE 1
3-3-2
Page 2
May 01/11


**ON A/C A320-100 A320-200
A320
AIRPLANE CHARACTERISTICS FOR AIRPORT PLANNING
G4: DIK - LAS
850 nm
NOTE: THESE CURVES ARE GIVEN FOR INFORMATION ONLY
THE APPROVED VALUES ARE STATED IN THE "OPERATING
MANUALS" SPECIFIC TO THE AIRLINE OPERATING THE AIRCRAFT.
PAYLOAD
(1000 lb) (1000 kg)
OEW: 90,927
Payload: 42,480
Fuel: 18,100 est
TOW: 151,507
77t
75.5t
73.5t
150 PASSENGERS
CRUISE CONDITIONS
ISA + 10° M = 0.76
35 000/39 000 ft
INTERNATIONAL RESERVES :
EN ROUTE 10% FLIGHT TIME
OVERSHOOT
200 NM (370 KM) DIVERSION
30 MINUTES HOLD AT 1500 ft
APPROACH AND LANDING
RANGE (NM)
RANGE (KM)
Flight Time: 2hr 09min (450kt +15min)
Fuel Burn: 12,100#
1hr Reserve = 6000#
Total Fuel OB = 18,100
Source - Airbus A320 POH
Payload: 177 pax
@ 240# = 42,480
Payload / Range
CFM56-5B series engine
3-2-1
Page 3
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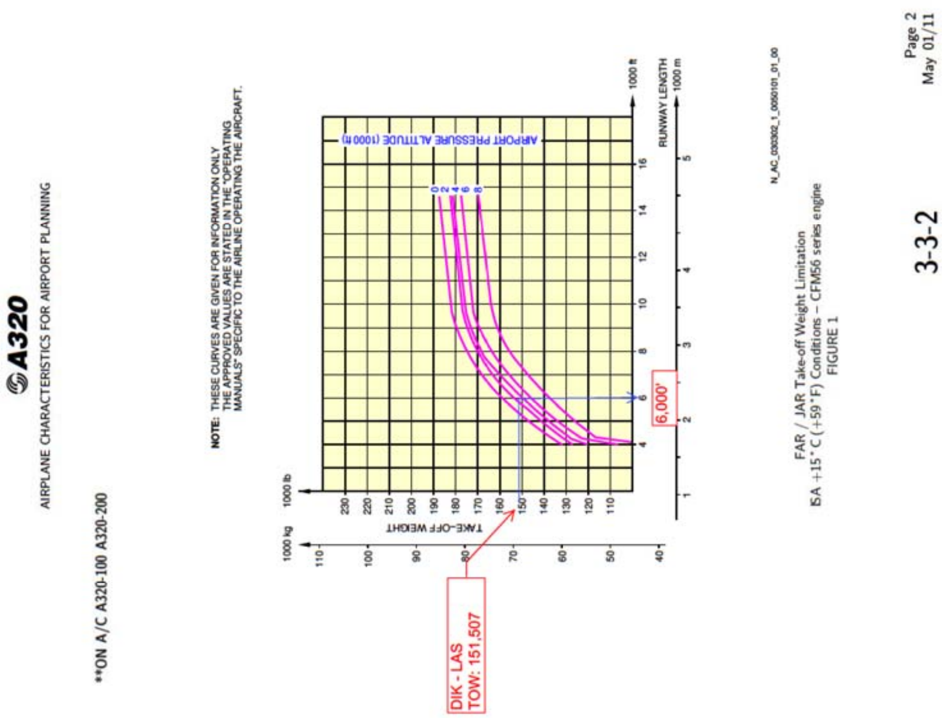
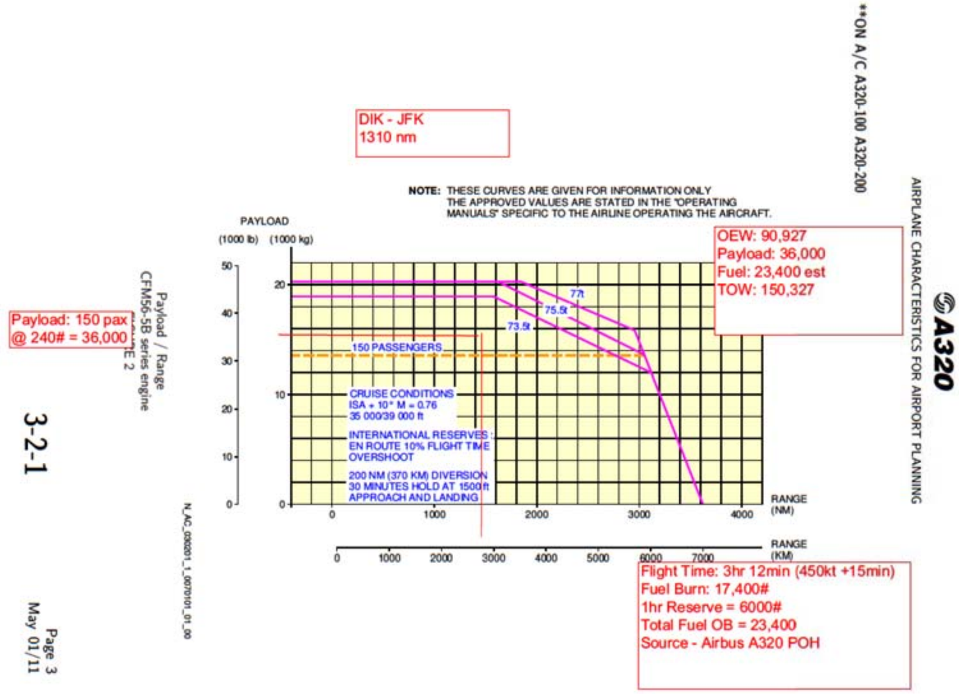
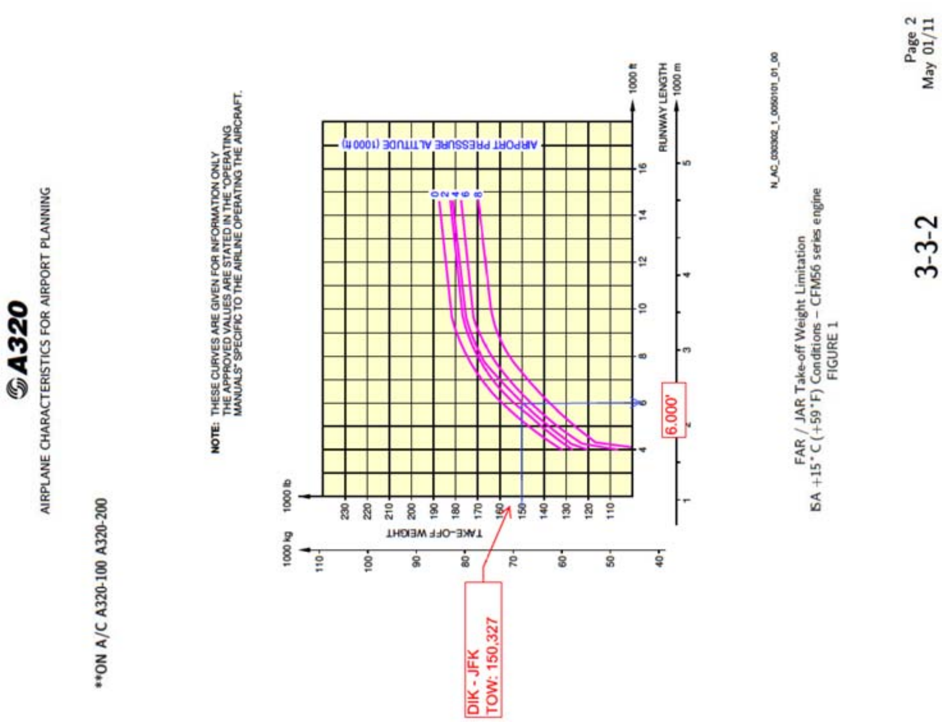
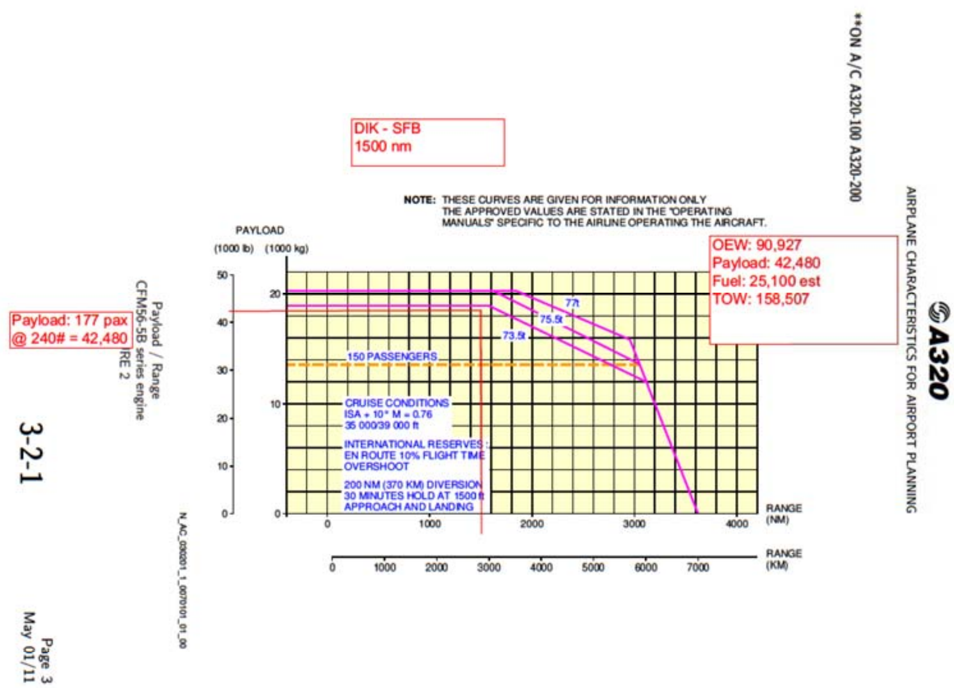

A320
AIRPLANE CHARACTERISTICS FOR AIRPORT PLANNING
**ON A/C A320-100 A320-200
NOTE: THESE CURVES ARE GIVEN FOR INFORMATION ONLY
THE APPROVED VALUES ARE STATED IN THE "OPERATING
MANUALS" SPECIFIC TO THE AIRLINE OPERATING THE AIRCRAFT.
AIRPORT PRESSURE ALTITUDE (1000 ft)
TAKE-OFF WEIGHT
RUNWAY LENGTH
6,000'
DIK - LAS
TOW: 151,507
FAR / JAR Take-off Weight Limitation
ISA +15°C (+59°F) Conditions – CFM56 series engine
FIGURE 1
3-3-2
Page 2
May 01/11

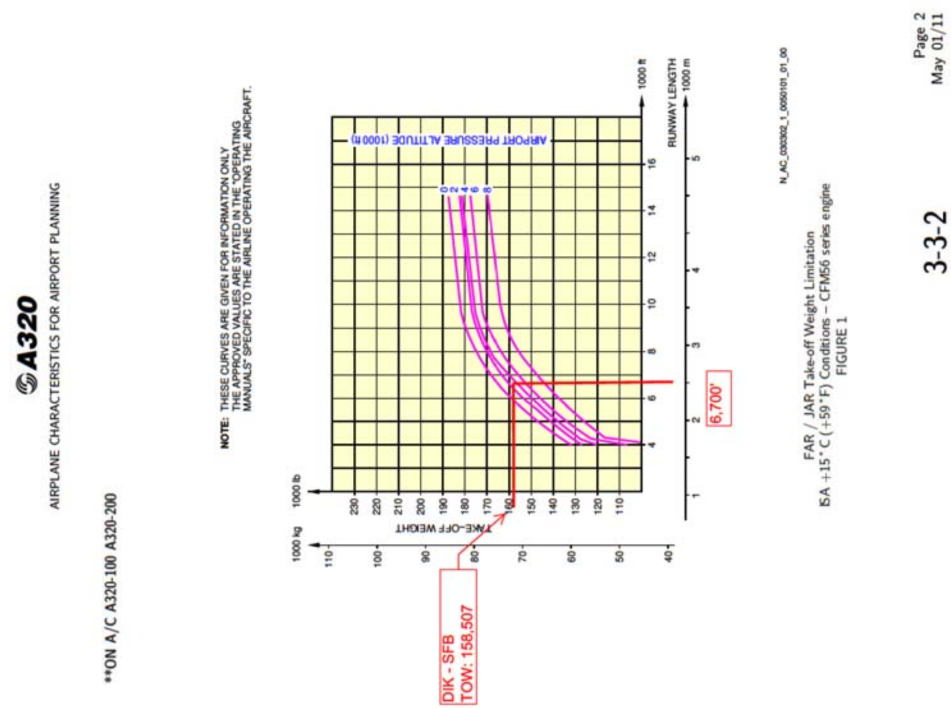


A320
AIRPLANE CHARACTERISTICS FOR AIRPORT PLANNING
**ON A/C A320-100 A320-200
DIK - JFK
1310 nm
NOTE: THESE CURVES ARE GIVEN FOR INFORMATION ONLY
THE APPROVED VALUES ARE STATED IN THE "OPERATING MANUALS" SPECIFIC TO THE AIRLINE OPERATING THE AIRCRAFT.
PAYLOAD
(1000 lb) (1000 kg)
OEW: 90,927
Payload: 36,000
Fuel: 23,400 est
TOW: 150,327
77t
75.5t
73.5t
150 PASSENGERS
CRUISE CONDITIONS
ISA + 10° M = 0.76
35 000/39 000 ft
INTERNATIONAL RESERVES :
EN ROUTE 10% FLIGHT TIME
OVERSHOOT
200 NM (370 KM) DIVERSION
30 MINUTES HOLD AT 1500 ft
APPROACH AND LANDING
RANGE (NM)
RANGE (KM)
Flight Time: 3hr 12min (450kt +15min)
Fuel Burn: 17,400#
1hr Reserve = 6000#
Total Fuel OB = 23,400
Source - Airbus A320 POH
Payload: 150 pax
@ 240# = 36,000
Payload / Range
CFM56-5B series engine
3-2-1
Page 3
May 01/11



A320
AIRPLANE CHARACTERISTICS FOR AIRPORT PLANNING
**ON A/C A320-100 A320-200
NOTE: THESE CURVES ARE GIVEN FOR INFORMATION ONLY
THE APPROVED VALUES ARE STATED IN THE "OPERATING MANUALS" SPECIFIC TO THE AIRLINE OPERATING THE AIRCRAFT.
AIRPORT PRESSURE ALTITUDE (1000 ft)
TAKE-OFF WEIGHT
RUNWAY LENGTH
6,000'
DIK - JFK
TOW: 150,327
FAR / JAR Take-off Weight Limitation
ISA +15°C (+59°F) Conditions – CFM56 series engine
FIGURE 1
3-3-2
Page 2
May 01/11


**ON A/C A320-100 A320-200
A320
AIRPLANE CHARACTERISTICS FOR AIRPORT PLANNING
DIK - SFB
1500 nm
NOTE: THESE CURVES ARE GIVEN FOR INFORMATION ONLY
THE APPROVED VALUES ARE STATED IN THE "OPERATING MANUALS" SPECIFIC TO THE AIRLINE OPERATING THE AIRCRAFT.
OEW: 90,927
Payload: 42,480
Fuel: 25,100 est
TOW: 158,507
PAYLOAD
150 PASSENGERS
CRUISE CONDITIONS
RANGE (NM)
RANGE (KM)
Payload: 177 pax
@ 240# = 42,480
Payload / Range
CFM56-5B series engine
3-2-1
Page 3
May 01/11


A320
AIRPLANE CHARACTERISTICS FOR AIRPORT PLANNING
**ON A/C A320-100 A320-200
NOTE: THESE CURVES ARE GIVEN FOR INFORMATION ONLY
THE APPROVED VALUES ARE STATED IN THE "OPERATING MANUALS" SPECIFIC TO THE AIRLINE OPERATING THE AIRCRAFT.
AIRPORT PRESSURE ALTITUDE (1000 ft)
RUNWAY LENGTH
TAKE-OFF WEIGHT
6,700'
DIK - SFB
TOW: 158,507
FAR / JAR Take-off Weight Limitation
ISA +15°C (+59°F) Conditions – CFM56 series engine
FIGURE 1
3-3-2
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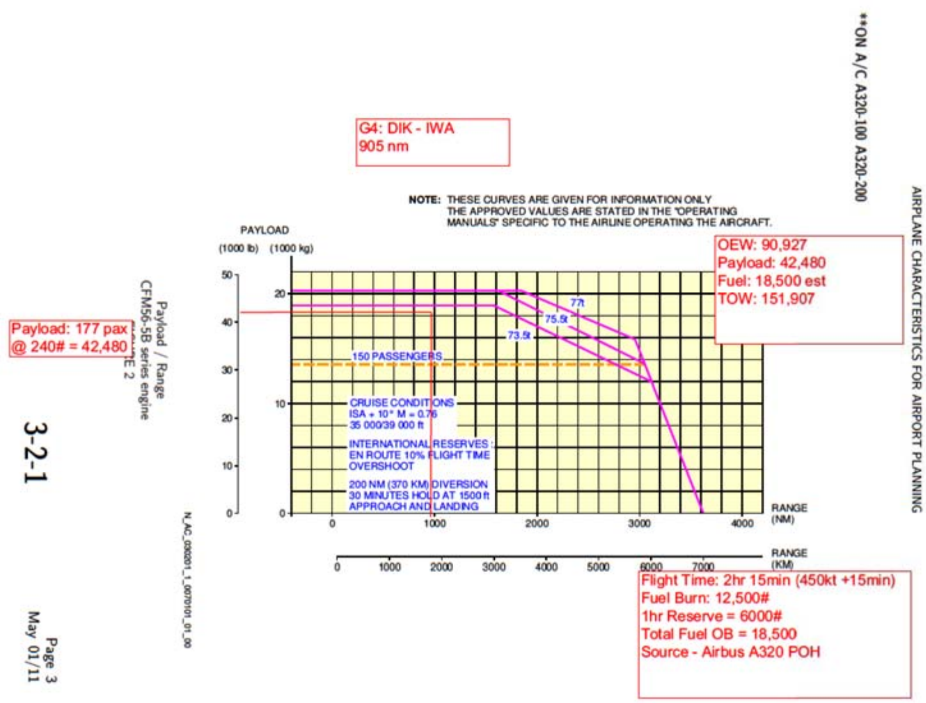
**ON A/C A320-100 A320-200
A320
AIRPLANE CHARACTERISTICS FOR AIRPORT PLANNING
G4: DIK - IWA
905 nm
NOTE: THESE CURVES ARE GIVEN FOR INFORMATION ONLY THE APPROVED VALUES ARE STATED IN THE "OPERATING MANUALS" SPECIFIC TO THE AIRLINE OPERATING THE AIRCRAFT.
OEW: 90,927
Payload: 42,480
Fuel: 18,500 est
TOW: 151,907
Payload: 177 pax @ 240# = 42,480
150 PASSENGERS
CRUISE CONDITIONS ISA + 10° M = 0.76 35 000/39 000 ft
INTERNATIONAL RESERVES : EN ROUTE 10% FLIGHT TIME OVERSHOOT
200 NM (370 KM) DIVERSION 30 MINUTES HOLD AT 1500 ft APPROACH AND LANDING
RANGE (NM)
RANGE (KM)
Flight Time: 2hr 15min (450kt +15min)
Fuel Burn: 12,500#
1hr Reserve = 6000#
Total Fuel OB = 18,500
Source - Airbus A320 POH
Payload / Range
CFM56-5B series engine
3-2-1
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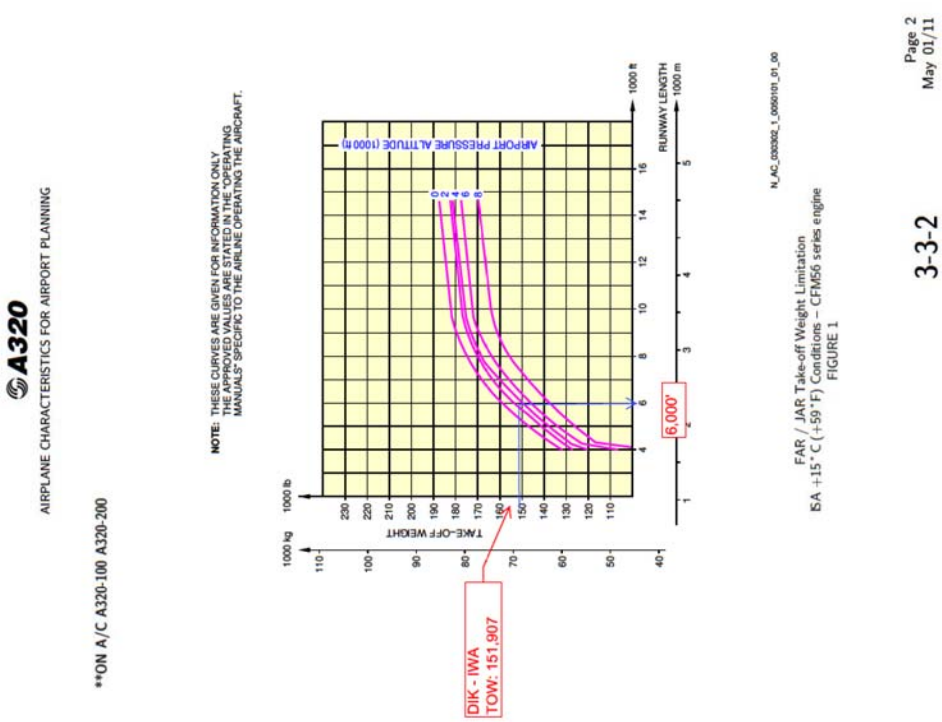
A320
AIRPLANE CHARACTERISTICS FOR AIRPORT PLANNING
**ON A/C A320-100 A320-200
NOTE: THESE CURVES ARE GIVEN FOR INFORMATION ONLY THE APPROVED VALUES ARE STATED IN THE "OPERATING MANUALS" SPECIFIC TO THE AIRLINE OPERATING THE AIRCRAFT.
AIRPORT PRESSURE ALTITUDE (1000 ft)
TAKE-OFF WEIGHT
RUNWAY LENGTH
6,000'
DIK - IWA
TOW: 151,907
FAR / JAR Take-off Weight Limitation
ISA +15°C (+59°F) Conditions – CFM56 series engine
FIGURE 1
3-3-2
Page 2
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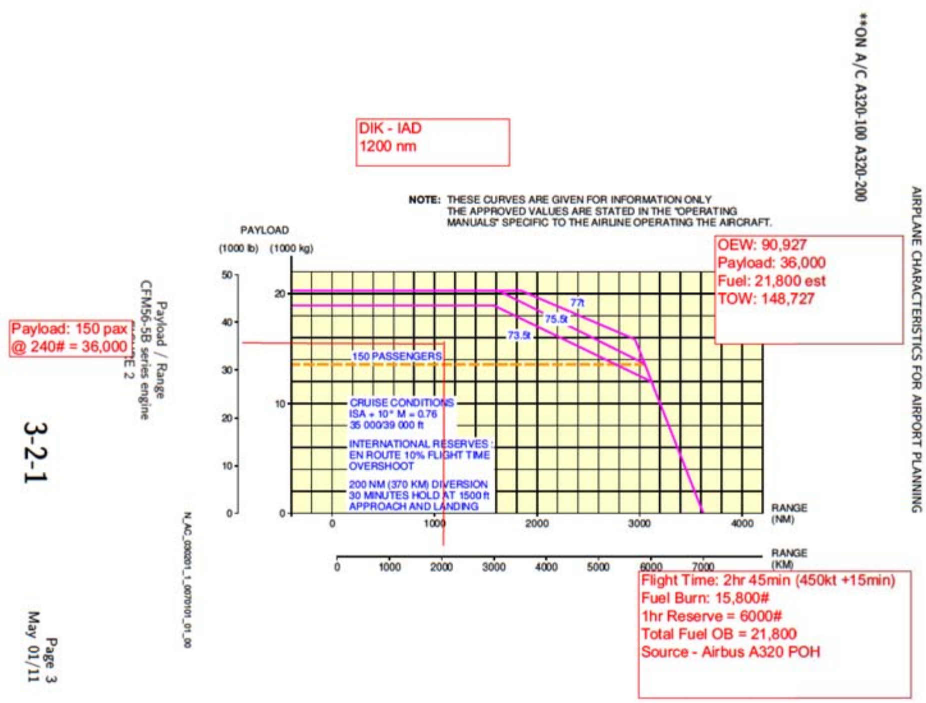
**ON A/C A320-100 A320-200
A320
AIRPLANE CHARACTERISTICS FOR AIRPORT PLANNING
DIK - IAD
1200 nm
NOTE: THESE CURVES ARE GIVEN FOR INFORMATION ONLY THE APPROVED VALUES ARE STATED IN THE "OPERATING MANUALS" SPECIFIC TO THE AIRLINE OPERATING THE AIRCRAFT.
OEW: 90,927
Payload: 36,000
Fuel: 21,800 est
TOW: 148,727
PAYLOAD
150 PASSENGERS
CRUISE CONDITIONS ISA + 10° M = 0.76 35 000/39 000 ft
INTERNATIONAL RESERVES: EN ROUTE 10% FLIGHT TIME OVERSHOOT
200 NM (370 KM) DIVERSION 30 MINUTES HOLD AT 1500 ft APPROACH AND LANDING
RANGE (NM)
RANGE (KM)
Flight Time: 2hr 45min (450kt +15min)
Fuel Burn: 15,800#
1hr Reserve = 6000#
Total Fuel OB = 21,800
Source - Airbus A320 POH
Payload: 150 pax
@ 240# = 36,000
Payload / Range
CFM56-5B series engine
3-2-1
Page 3
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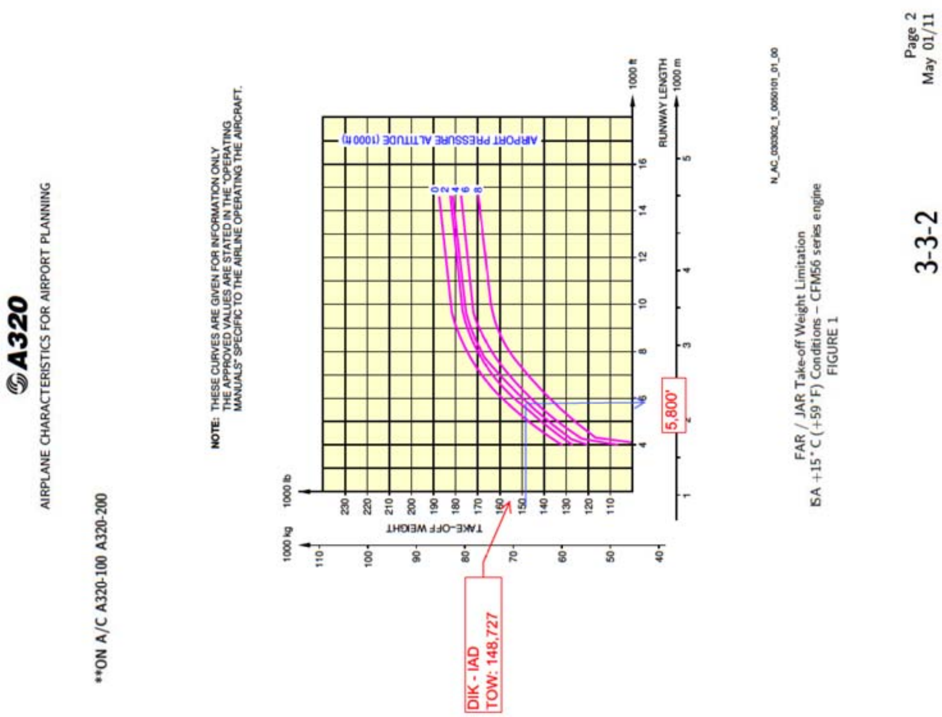
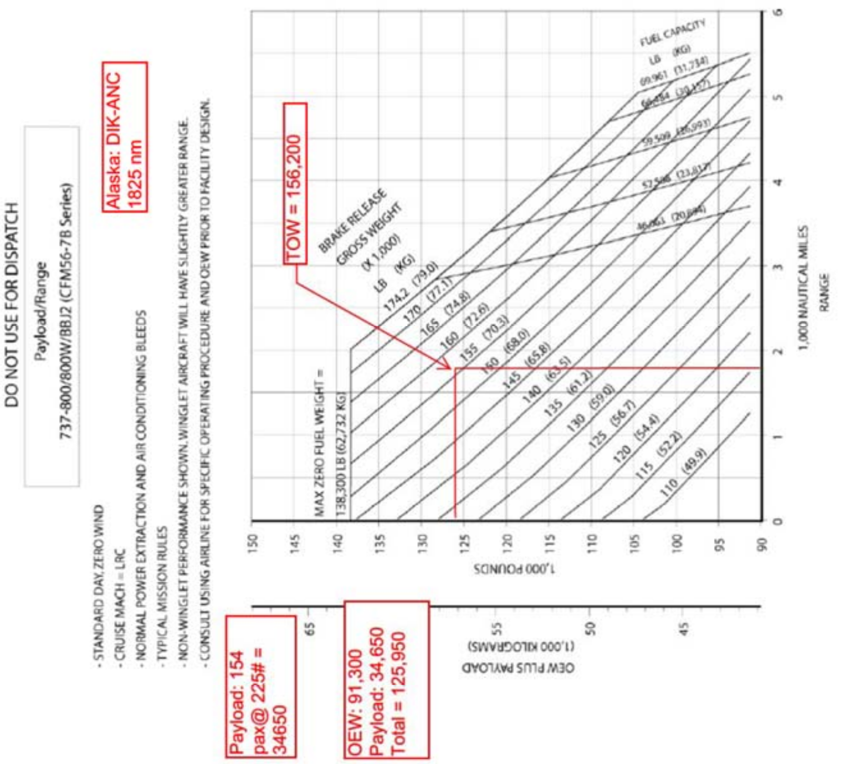
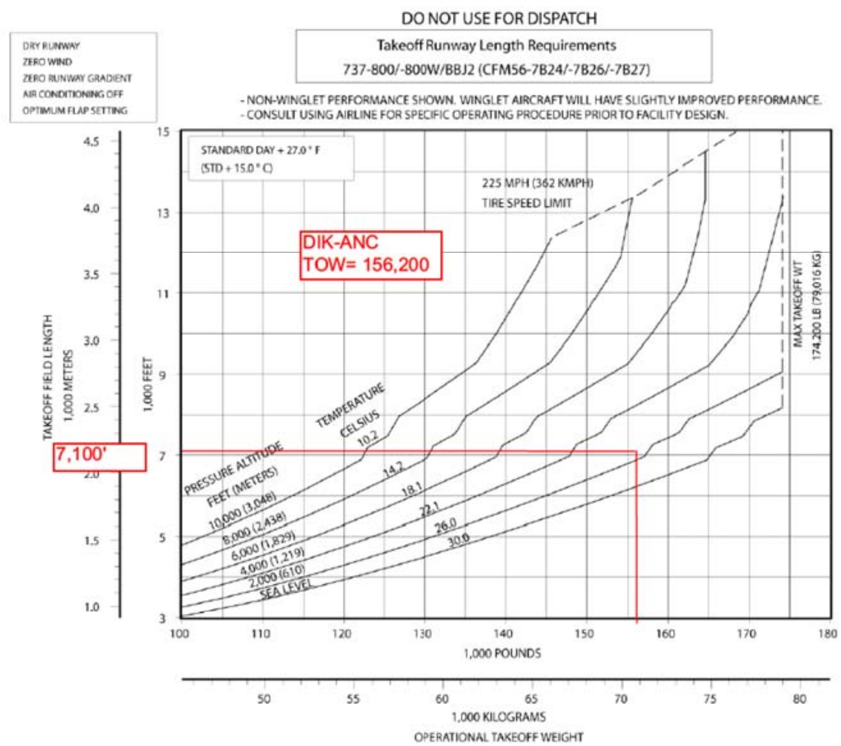

A320
AIRPLANE CHARACTERISTICS FOR AIRPORT PLANNING
**ON A/C A320-100 A320-200
NOTE: THESE CURVES ARE GIVEN FOR INFORMATION ONLY THE APPROVED VALUES ARE STATED IN THE "OPERATING MANUALS" SPECIFIC TO THE AIRLINE OPERATING THE AIRCRAFT.
AIRPORT PRESSURE ALTITUDE (1000 ft)
TAKE-OFF WEIGHT
RUNWAY LENGTH
5,800'
DIK - IAD
TOW: 148,727
FAR / JAR Take-off Weight Limitation
ISA +15°C (+59°F) Conditions – CFM56 series engine
FIGURE 1
3-3-2
Page 2
May 01/11



3.2.12 PAYLOAD/RANGE FOR LONG-RANGE CRUISE
MODEL 737-800

96 D6-58325-6 JULY 2010



3.3.48 F.A.R. TAKEOFF RUNWAY LENGTH REQUIREMENTS STANDARD DAY +27ºF (STD + 15ºC), DRY RUNWAY
MODEL 737-800/-800W/BBJ2 (CFM56-7B24/-7B26/-7B27 ENGINES AT 26,000 LB SLST)

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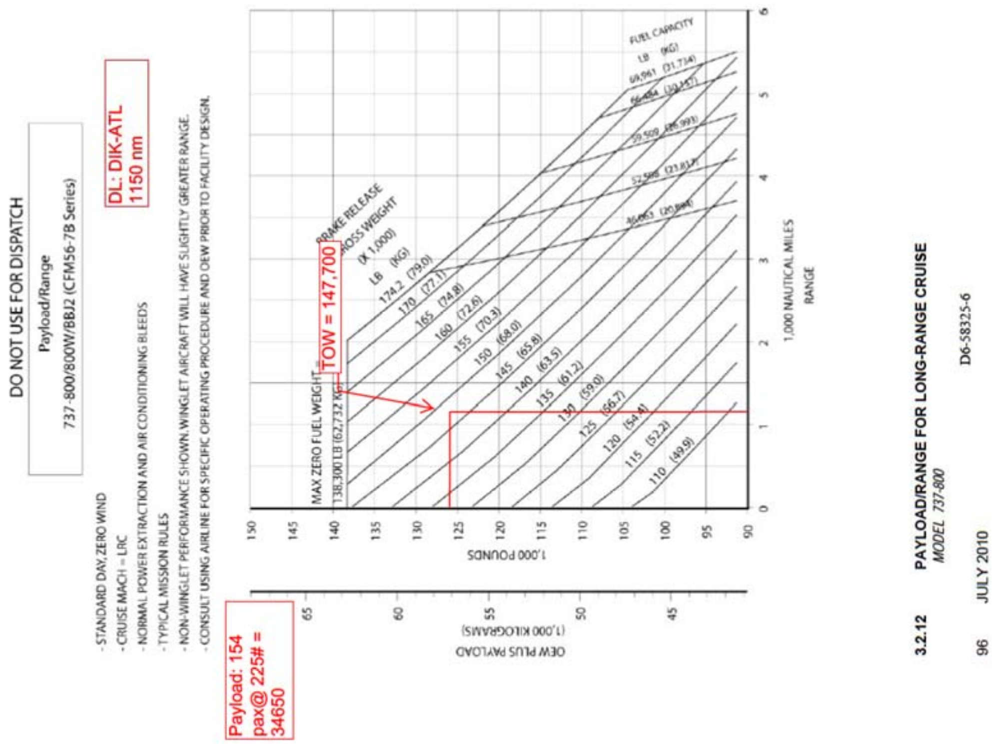
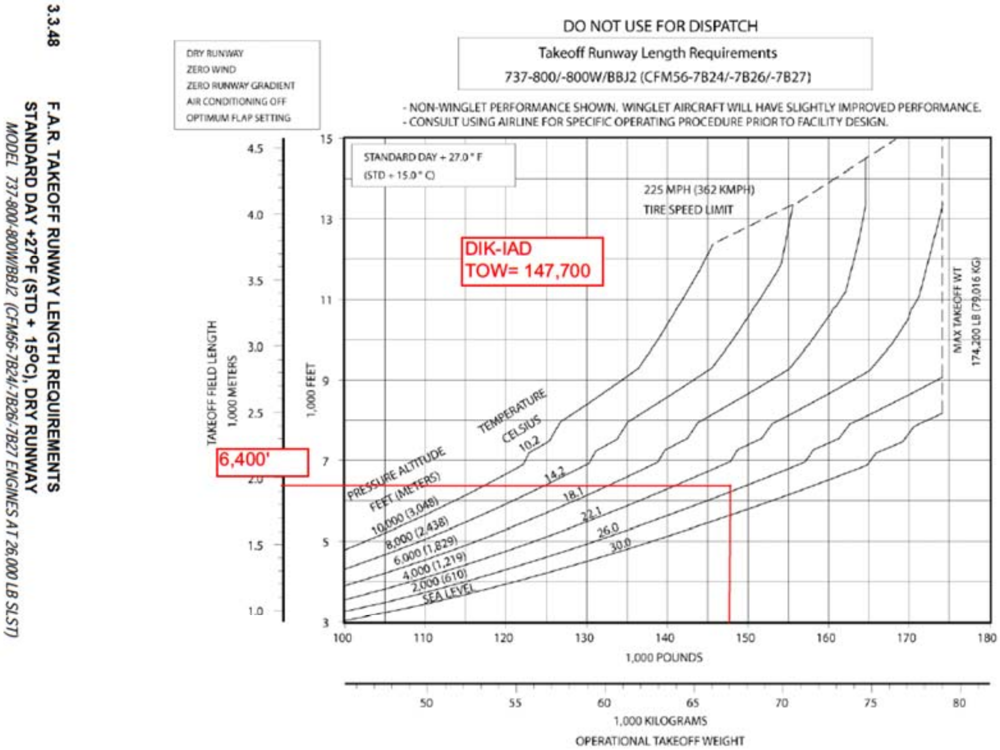

DO NOT USE FOR DISPATCH
Payload/Range
737-800/800W/BBJ2 (CFM56-7B Series)
DL: DIK-ATL
1150 nm
- STANDARD DAY, ZERO WIND
- CRUISE MACH = LRC
- NORMAL POWER EXTRACTION AND AIR CONDITIONING BLEEDS
- TYPICAL MISSION RULES
- NON-WINGLET PERFORMANCE SHOWN. WINGLET AIRCRAFT WILL HAVE SLIGHTLY GREATER RANGE.
- CONSULT USING AIRLINE FOR SPECIFIC OPERATING PROCEDURE AND OEW PRIOR TO FACILITY DESIGN.
TOW = 147,700
BRAKE RELEASE GROSS WEIGHT (X 1,000) LB (KG)
MAX ZERO FUEL WEIGHT = 138,300 LB (62,732 KG)
FUEL CAPACITY LB (KG)
1,000 NAUTICAL MILES
RANGE
1,000 POUNDS
(1,000 KILOGRAMS)
OEW PLUS PAYLOAD
Payload: 154 pax@ 225# = 34650
3.2.12 PAYLOAD/RANGE FOR LONG-RANGE CRUISE
MODEL 737-800
D6-58325-6
JULY 2010
96


3.3.48 F.A.R. TAKEOFF RUNWAY LENGTH REQUIREMENTS
STANDARD DAY +27ºF (STD + 15ºC), DRY RUNWAY
MODEL 737-800/-800W/BBJ2 (CFM56-7B24/-7B26/-7B27 ENGINES AT 26,000 LB SLST)
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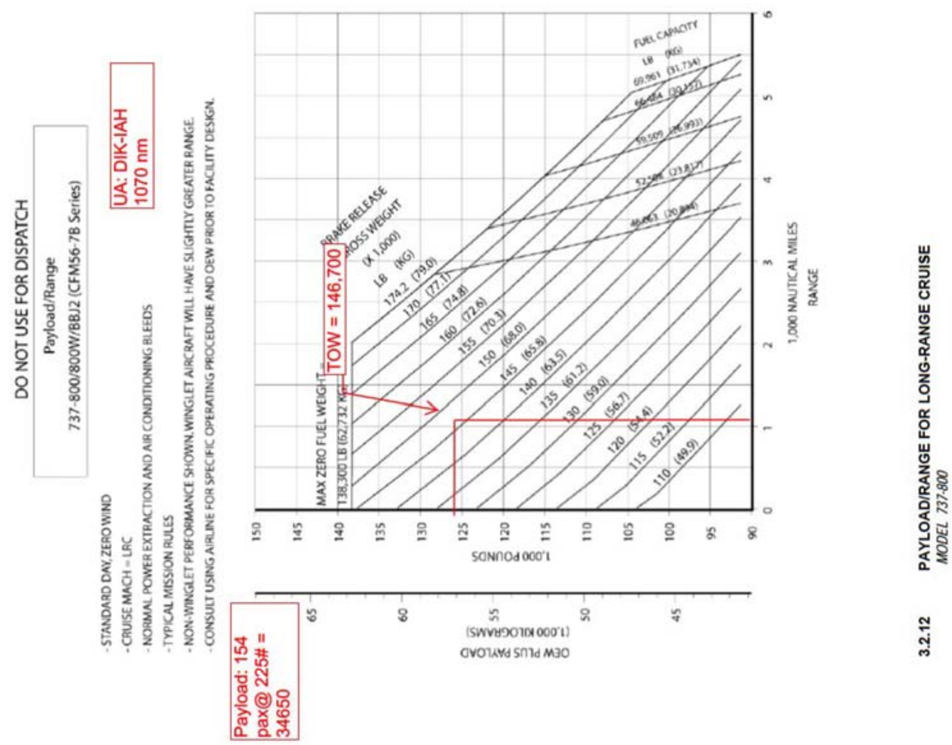
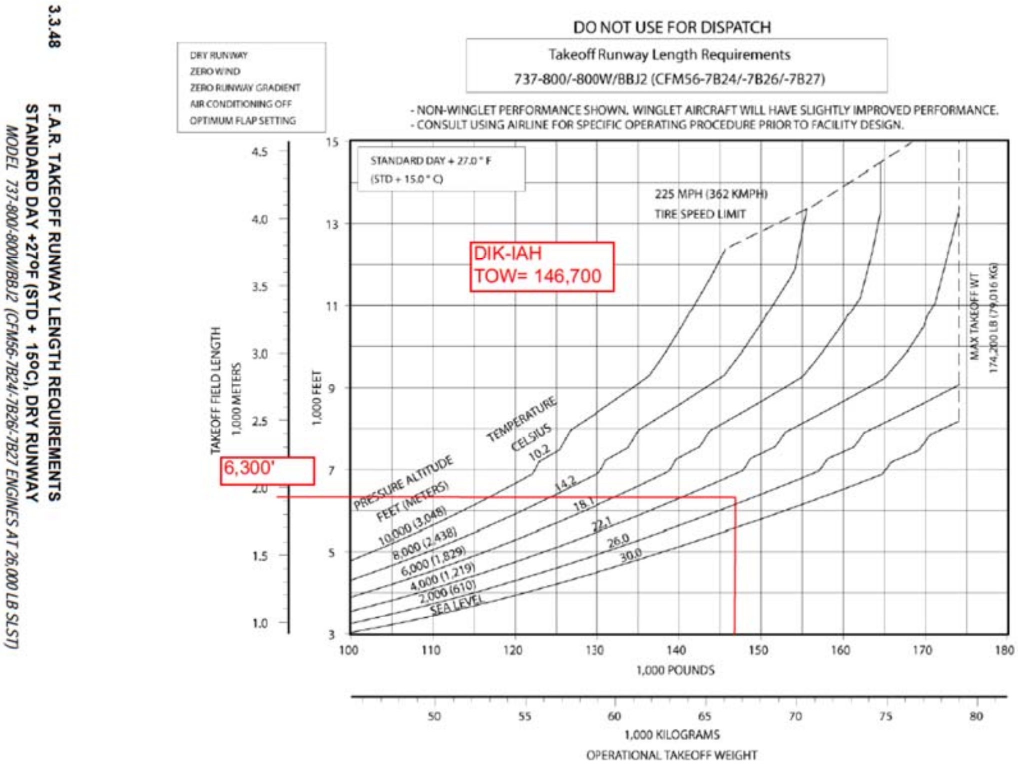
DO NOT USE FOR DISPATCH
Takeoff Runway Length Requirements
737-800/-800W/BBJ2 (CFM56-7B24/-7B26/-7B27)
DRY RUNWAY
ZERO WIND
ZERO RUNWAY GRADIENT
AIR CONDITIONING OFF
OPTIMUM FLAP SETTING
- NON-WINGLET PERFORMANCE SHOWN. WINGLET AIRCRAFT WILL HAVE SLIGHTLY IMPROVED PERFORMANCE.
- CONSULT USING AIRLINE FOR SPECIFIC OPERATING PROCEDURE PRIOR TO FACILITY DESIGN.
STANDARD DAY + 27.0 ° F
(STD + 15.0 ° C)
225 MPH (362 KMPH)
TIRE SPEED LIMIT
DIK-IAD
TOW= 147,700
MAX TAKEOFF WT
174,200 LB (79,016 KG)
TEMPERATURE
CELSIUS
PRESSURE ALTITUDE
FEET (METERS)
10,000 (3,048)
8,000 (2,438)
6,000 (1,829)
4,000 (1,219)
2,000 (610)
SEA LEVEL
6,400'
TAKEOFF FIELD LENGTH
1,000 METERS
1,000 FEET
1,000 POUNDS
1,000 KILOGRAMS
OPERATIONAL TAKEOFF WEIGHT


DO NOT USE FOR DISPATCH
Payload/Range
737-800/800W/BBJ2 (CFM56-7B Series)
UA: DIK-IAH
1070 nm
- STANDARD DAY, ZERO WIND
- CRUISE MACH = LRC
- NORMAL POWER EXTRACTION AND AIR CONDITIONING BLEEDS
- TYPICAL MISSION RULES
- NON-WINGLET PERFORMANCE SHOWN. WINGLET AIRCRAFT WILL HAVE SLIGHTLY GREATER RANGE.
- CONSULT USING AIRLINE FOR SPECIFIC OPERATING PROCEDURE AND OEW PRIOR TO FACILITY DESIGN.
TOW = 146,700
MAX ZERO FUEL WEIGHT = 138,300 LB (62,732 KG)
BRAKE RELEASE GROSS WEIGHT (X 1,000) LB (KG)
FUEL CAPACITY LB (KG)
1,000 NAUTICAL MILES RANGE
1,000 POUNDS
OEW PLUS PAYLOAD (1,000 KILOGRAMS)
Payload: 154 pax@ 225# = 34650
3.2.12 PAYLOAD/RANGE FOR LONG-RANGE CRUISE
MODEL 737-800
D6-58325-6
96 JULY 2010


DO NOT USE FOR DISPATCH
Takeoff Runway Length Requirements
737-800/-800W/BBJ2 (CFM56-7B24/-7B26/-7B27)
DRY RUNWAY
ZERO WIND
ZERO RUNWAY GRADIENT
AIR CONDITIONING OFF
OPTIMUM FLAP SETTING
- NON-WINGLET PERFORMANCE SHOWN. WINGLET AIRCRAFT WILL HAVE SLIGHTLY IMPROVED PERFORMANCE.
- CONSULT USING AIRLINE FOR SPECIFIC OPERATING PROCEDURE PRIOR TO FACILITY DESIGN.
STANDARD DAY + 27.0 °F (STD + 15.0 °C)
225 MPH (362 KMPH) TIRE SPEED LIMIT
DIK-IAH
TOW= 146,700
MAX TAKEOFF WT 174,200 LB (79,016 KG)
TEMPERATURE CELSIUS
PRESSURE ALTITUDE FEET (METERS)
10,000 (3,048)
8,000 (2,438)
6,000 (1,829)
4,000 (1,219)
2,000 (610)
SEA LEVEL
6,300'
TAKEOFF FIELD LENGTH 1,000 METERS
1,000 FEET
1,000 POUNDS
1,000 KILOGRAMS
OPERATIONAL TAKEOFF WEIGHT
3.3.48 F.A.R. TAKEOFF RUNWAY LENGTH REQUIREMENTS
STANDARD DAY +27ºF (STD + 15ºC), DRY RUNWAY
MODEL 737-800/-800W/BBJ2 (CFM56-7B24/-7B26/-7B27 ENGINES AT 26,000 LB SLST)
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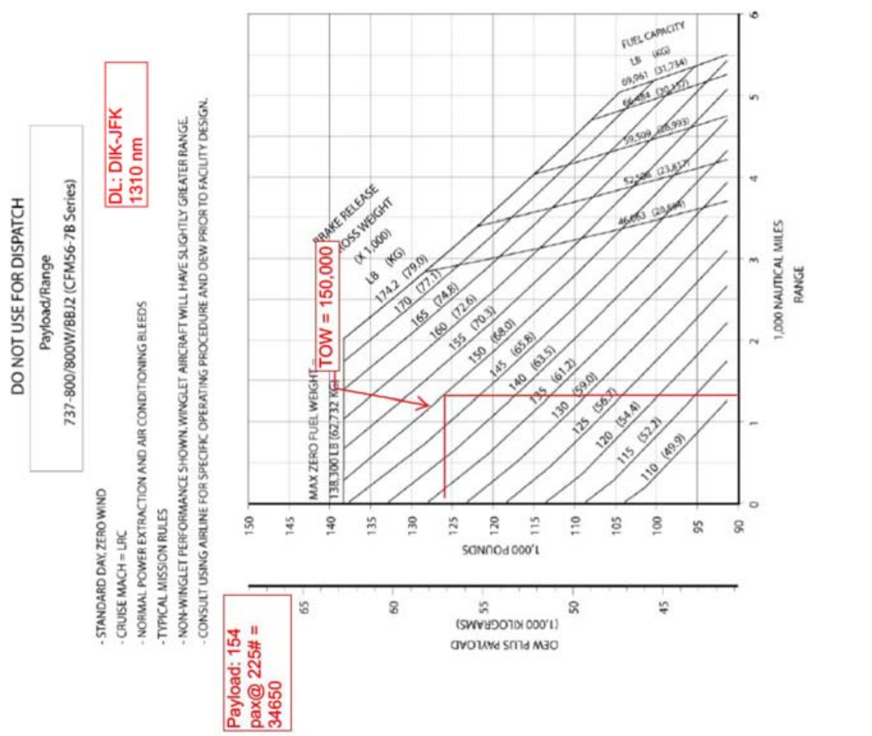
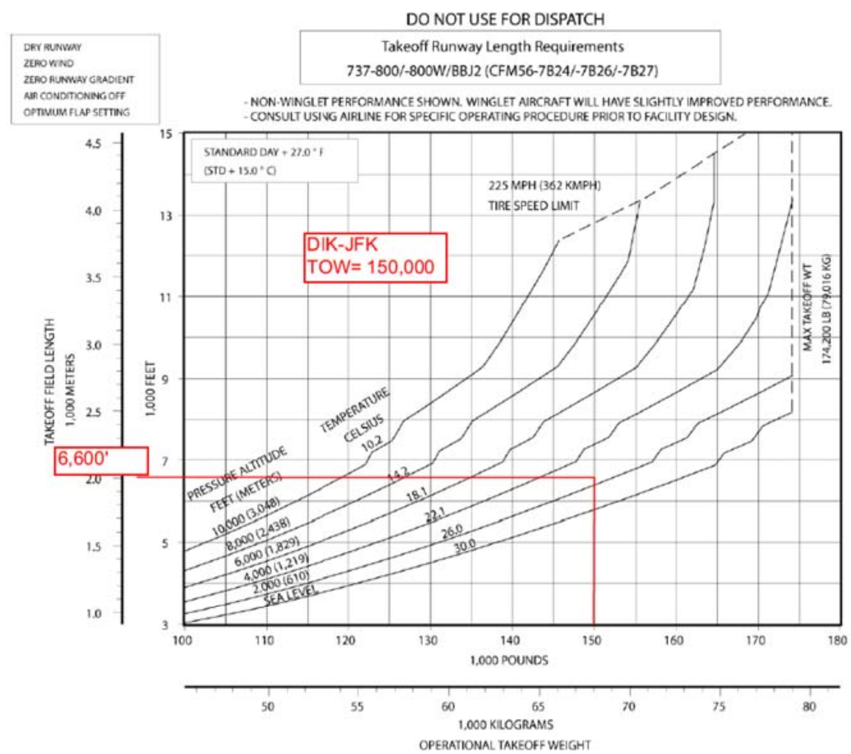


3.2.12 **PAYLOAD/RANGE FOR LONG-RANGE CRUISE**
MODEL 737-800

D6-58325-6

96 JULY 2010



3.3.48 **F.A.R. TAKEOFF RUNWAY LENGTH REQUIREMENTS**
STANDARD DAY +27°F (STD + 15°C), DRY RUNWAY
MODEL 737-800/-800W/BBJ2 (CFM56-7B24/-7B26/-7B27 ENGINES AT 26,000 LB SLST)

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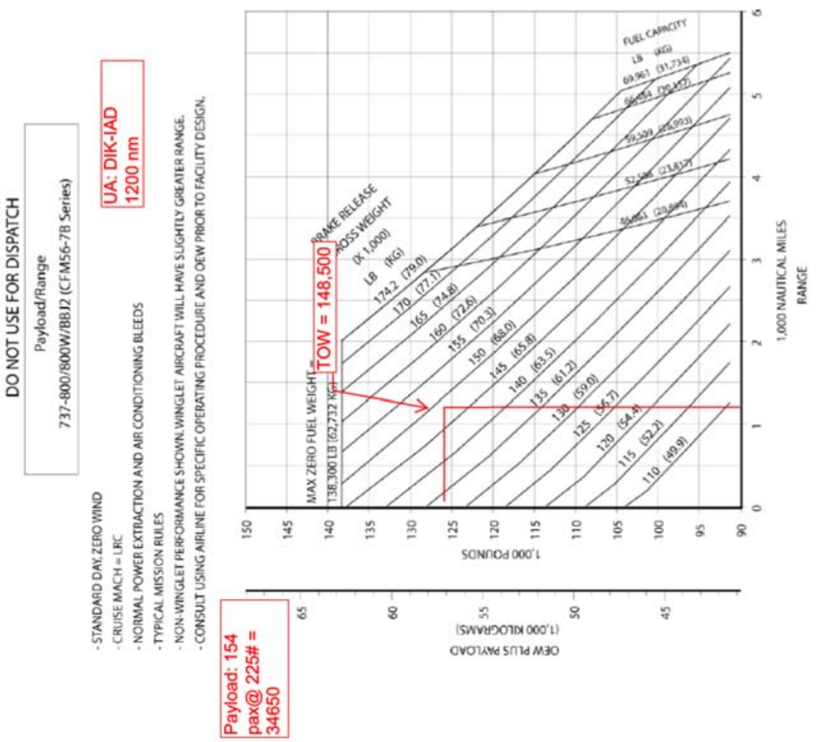

3.2.12 **PAYLOAD/RANGE FOR LONG-RANGE CRUISE**
MODEL 737-800

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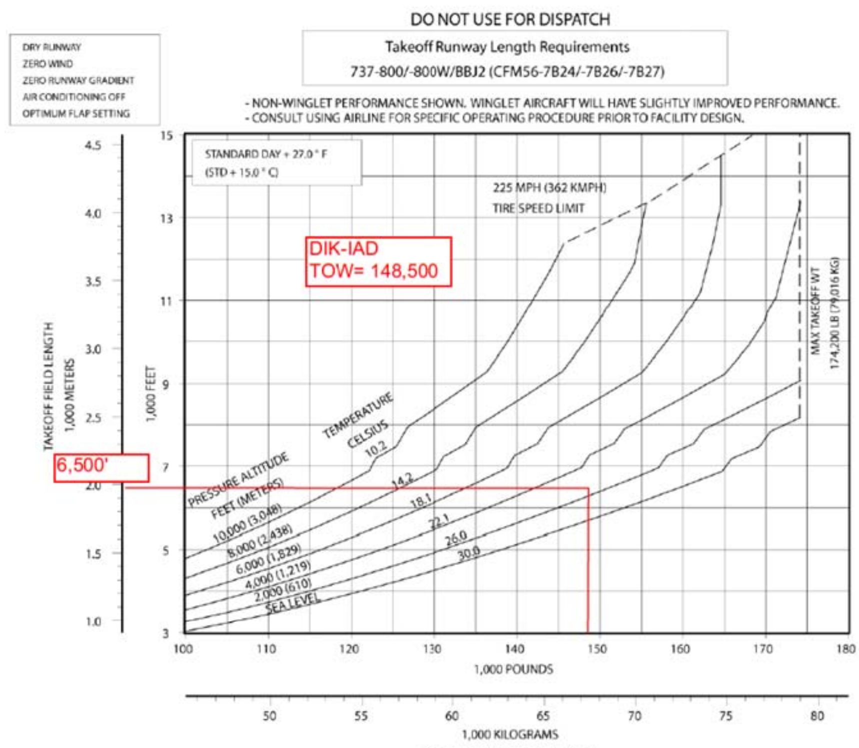
96 JULY 2010



3.3.48 **F.A.R. TAKEOFF RUNWAY LENGTH REQUIREMENTS**
STANDARD DAY +27°F (STD + 15°C), DRY RUNWAY
MODEL 737-800/-800W/BBJ2 (CFM56-7B24/-7B26/-7B27 ENGINES AT 26,000 LB SLST)

D6-58325-6

JULY 2010 151