

# ETOPS FLIGHT PLANNING

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# Index

1. Introduction
  - General aircraft data
2. NOTAMs
  - Departure & Arrival
  - ETOPS Alternate Airports
3. Meteorological conditions
  - Departure Airport
  - En-route alternate Airports
  - Arrival Airport
  - SIGMETS
4. Performances
  - Weight & Fuel
5. Routing
  - ETOPS Scenery
  - ETP Explanation
  - ETOPS Extra Scenery Information
  - En-Route Alternates
  - ICAO Flight Plan
6. Bibliography



# 1. Introduction

The goal of this project is to plan and dispatch an ETOPS flight across the North Atlantic from Barcelona (LEBL) to John F. Kennedy International airport (KJFK).

The following conditions are given in the SoW:

- ❖ Flight schedule: 0800z to 1645z on 20 October
- ❖ Aircraft used: B787-800
- ❖ Single-engine distance in 60 min is 352 NM and 810 NM for 120 min + 15%
- ❖ Landing minima: ILS CAT IIIB and RNP 0.3
- ❖ Flight performed at M 0.85 and FL380
- ❖ Flightplan AIRAC and NAT taken from the 6th October 2021



# General Aircraft Data

- ❖ DOW: 114406 kgs
- ❖ MTOW: 227930
- ❖ MLW: 172365
- ❖ MZFM: 161025
- ❖ PAX: 10F/250Y (Pax weight 99 Kgs)
- ❖ Cargo: 8500 Kgs
- ❖ Taxi Out fuel: 525 Kgs
- ❖ Total Payload= $525 \text{ Kg} + 8500 \text{ Kg} + 260 * 99 \text{ Kg} = 34765 \text{ Kgs}$



## 2. NOTAMs

Departure : BARCELONA (LEBL)

- ❖ Runway 07R/25L is closed during the 20th October from 07:50 until 09:00

Therefore we will have to use another runway because our time of departure is 08:00

Arrival : NEW YORK (KJFK)

- ❖ Navigation ILS in Runway 31R is out of service from the 1st April until the 17th November 2019



# ETOPS Alternates

Two ETOPS alternates can't be used due to different circumstances:

## BGSF (Kangerlussuaq)

- ❖ Aerodrome not to be used as a diversion airport from the 1st October until the 31 October

## LEST (Santiago de Compostela)

- ❖ Runway 17/35 closed due to maintenance works from 18th October until the 22nd October

Three ETOPS Alternates are used: EINN, LPLA



# 3. Meteorological conditions

# Departure Airport (LEBL)

SA 200530 S 33013KT 9999 FEW035 17/10 Q1015 NOSIG

FT 200500 D 2006/2106 05007KT 9999 FEW025 TX24/0312Z TN17/0306Z  
PROB30 TEMPO 2006/2008 07010G20KT BECMG 2009/2012 18008KT BECMG  
2019/2022 35006KT.

Visibility and Meteorological conditions inside aircraft and operator's performance policy margins



# En-route Alternates:

## LPLA

- SA 200700 S 00000KT 9999 FEW018 BKN025 18/16 Q1021
- FT 200502 S 2006/2106 VRB05KT OVC010 FEW015 SCT BECMG 2013/2015 22008KT TEMPO 2003/2006 23015G25KT

## EINN

- No METAR/TAF provided in the SoW

## CYYT


- SP 200848 RRM W 33020KT 15SM OVC018 04/02 A2954  
RMK SC8 SLP009
- FT 200755 AMD D 2007/2106 32012G22KT 6SM SCT012 OVC025 TEMPO 2007/2012 5SM -SHRA BR BKN012 OVC025 FM201200 30015G25KT P6SM SCT015 BKN030 TEMPO 2012/2015 P6SM -SHRA OVC015 FM201500 30015G25KT P6SM BKN030 TEMPO 2015/2019 P6SM -SHRA FM201900 30015G25KT 5SM -SHRA BR BKN015 OVC030 PROB30 2019/2022 2SM -SHRA BR BKN012 OVC015 FM202200 30015G25KT P6SM SCT030 FM210500 28015G25KT P6SM -SHRA BKN025 BKN050 RMK NXT FCST BY 031200Z

## KBWI

- SA 200654 RRG D 07009KT 10SM BKN075 OVC110 27/20 A2991 RMK AO2 SLP127 T02670200
- FT 200902 AMD S 2009/2012 07009KT P6SM OVC015 TEMPO 2009/2010 BKN080 FM201200 06008KT 1SM OVC001 FM201900 06006KT P6SM OVC010 FM210000 10006KT 6SM BR OVC008

## KBOS

- SA 200754 RRF D 04016KT 10SM SCT034 OVC041 12/04 A3014 RMK AO2 SLP204 T01170039
- FT 200801 AMD D 2008/2112 04013G21KT P6SM SCT035 BKN045 FM201100 04011KT P6SM SCT045 FM201600 08010KT P6SM BKN045 FM210000 14008KT P6SM VCSH OVC035 FM210300 15007KT P6SM -RA OVC025 FM211000 31007KT 5SM -SHRA BR OVC010



## Some final thoughts regarding CYYT TAFF:

FT 200755 AMD D 2007/2106  
32012G22KT 6SM SCT012 OVC025 TEMPO  
2007/2012 5SM -SHRA BR BKN012  
OVC025 FM201200 30015G25KT P6SM  
SCT015 BKN030 TEMPO 2012/2015 P6SM  
-SHRA OVC015 FM201500 30015G25KT  
P6SM BKN030 TEMPO 2015/2019 P6SM -  
SHRA FM201900 30015G25KT 5SM -SHRA  
BR BKN015 OVC030 PROB30 2019/2022  
2SM -SHRA BR BKN012 OVC015  
FM202200 30015G25KT P6SM SCT030  
FM210500 28015G25KT P6SM -SHRA  
BKN025 BKN050 RMK NXT FCST BY  
031200Z

- Visibility lowers to 6ST and temporally to 5SM, cloud ceiling is low and might affect the airport minima (no info is available in the SoW).
- Taff indicates that a storm is coming with gusty winds, however it is out of our demanded period.



## Some final thoughts regarding KBWI TAFF:

FT 200902 AMD S 2009/2012  
07009KT P6SM OVC015 TEMPO  
2009/2010 BKN080 FM201200  
06008KT 1SM OVC001 FM201900  
06006KT P6SM OVC010 FM210000  
10006KT 6SM BR OVC008

- Visibility lowers to 6ST.
- From 12:00 to 19:00 only 1SM of visibility.

## Some thoughts regarding KBOS TAFF:

FT 200801 AMD D 2008/2112  
04013G21KT P6SM SCT035 BKN045  
FM201100 04011KT P6SM SCT045  
FM201600 08010KT P6SM BKN045  
FM210000 14008KT P6SM VCSH  
OVC035 FM210300 15007KT P6SM -RA  
OVC025 FM211000 31007KT 5SM -  
SHRA BR OVC010

- Taff indicates that a weak storm is coming on the 21Th, however it is out of our demanded period.
- Also visibility lowers to 6SM

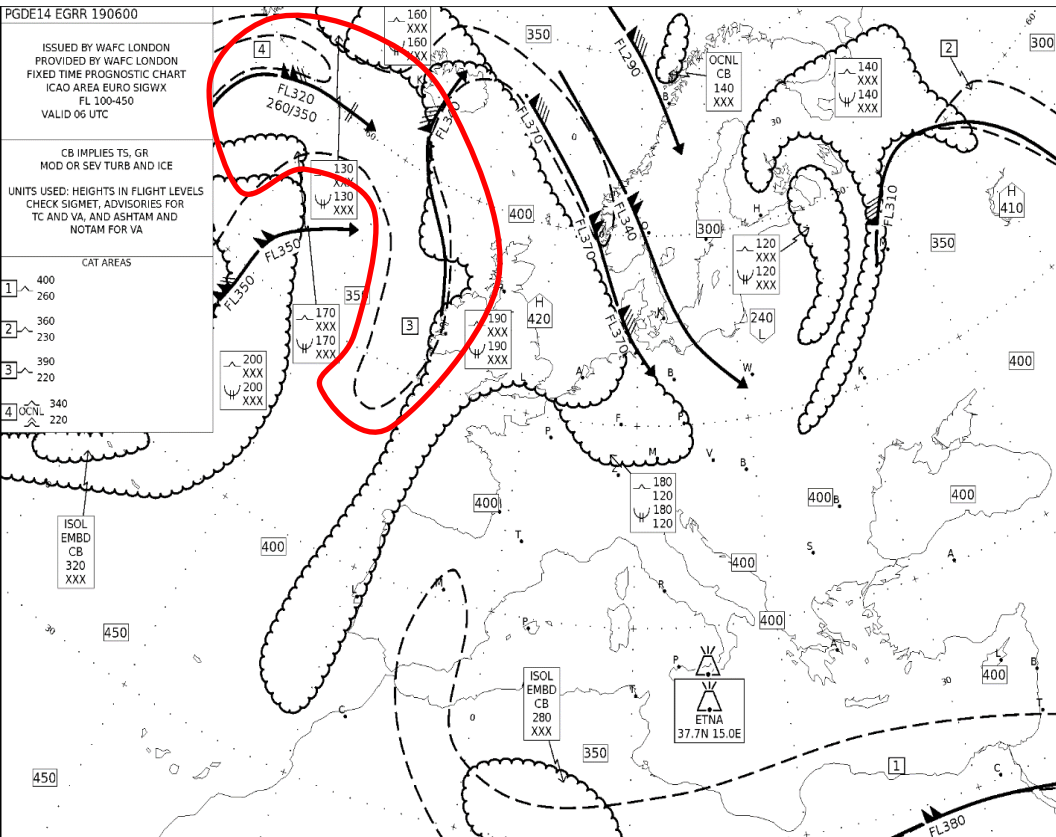
# Arrival Airport (KJFK)

SA 200530 S 33013KT 9999 FEW035 17/10 Q1015 NOSIG

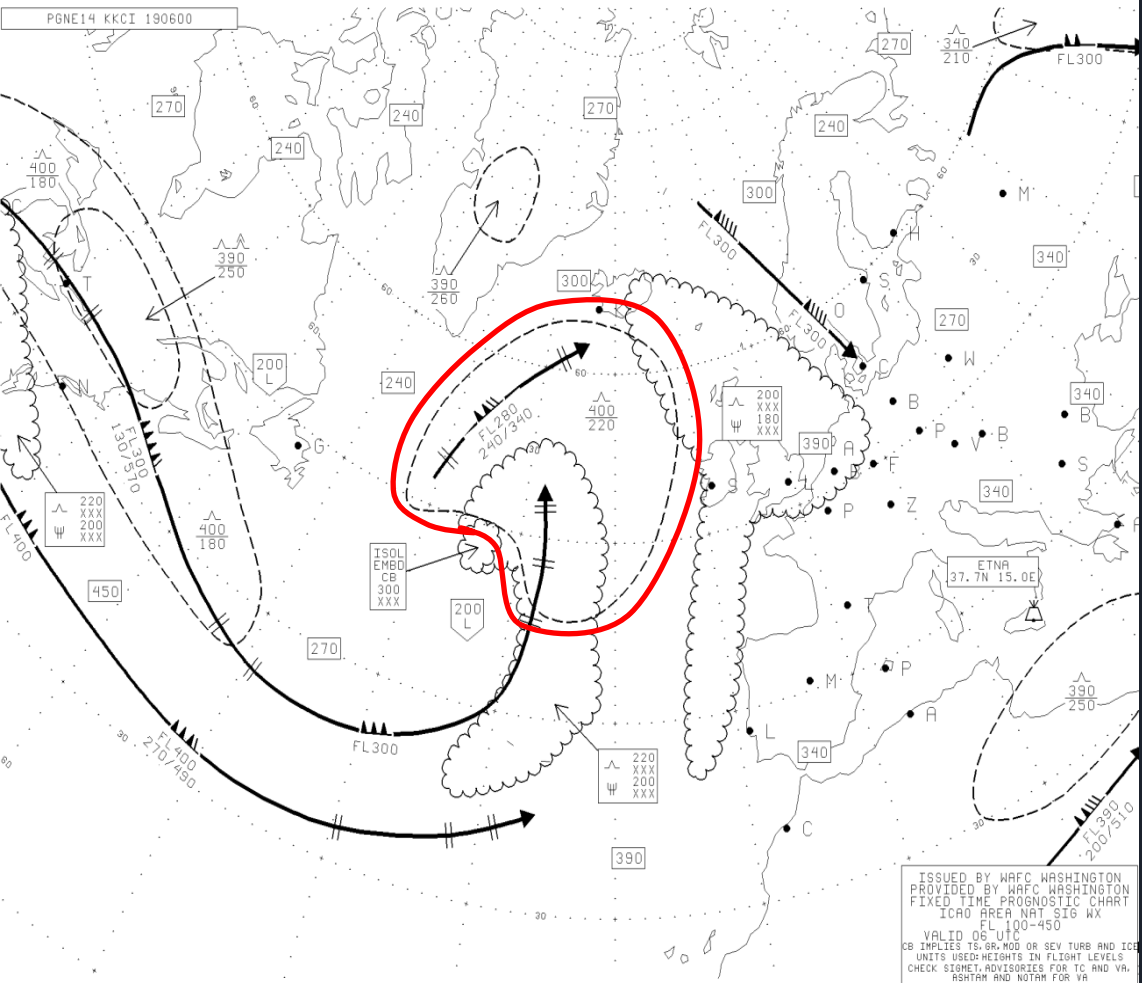
FT 200500 D 2006/2106 05007KT 9999 FEW025 TX24/0312Z TN17/0306Z  
PROB30 TEMPO 2006/2008 07010G20KT BECMG 2009/2012 18008KT BECMG  
2019/2022 35006KT.

Visibility and Meteorological conditions inside aircraft and operator's performance policy margins

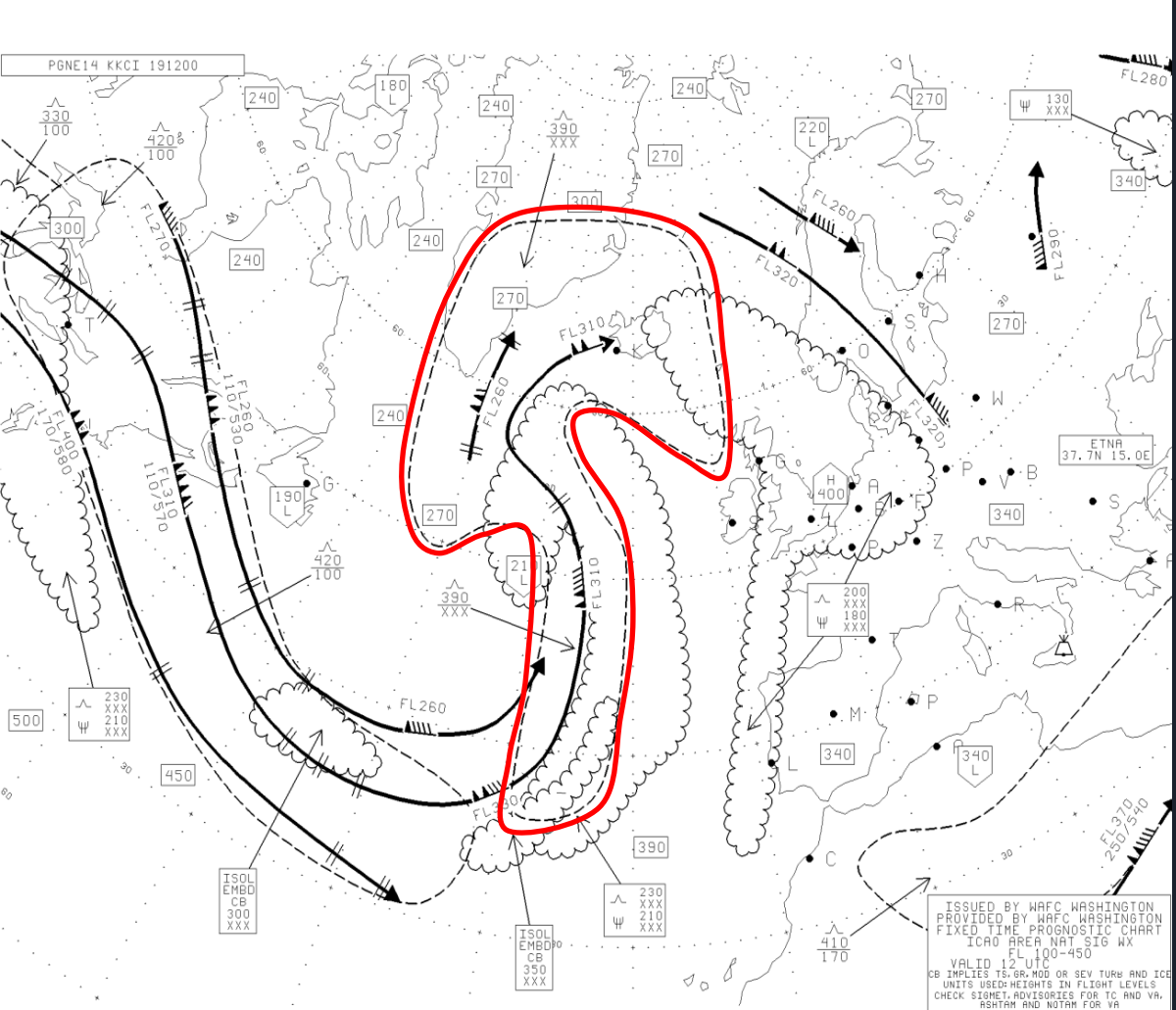
# SIGMETS:



- Flying into a moderate Clear Air Turbulence (CAT) zone



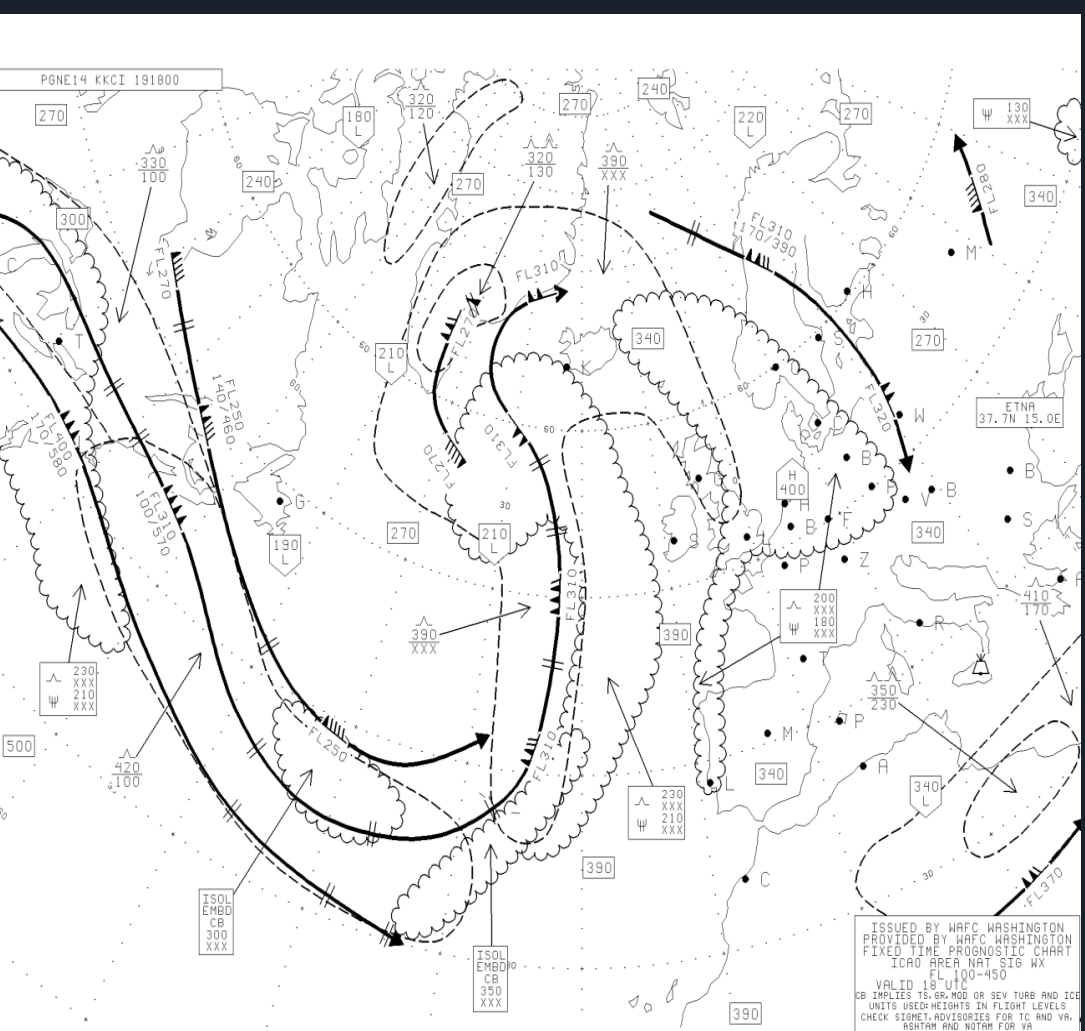
- Moderate turbulent area



- Moderate turbulent areas



PGNE14 KKCI 191800



• NOSIG





# 4. Performance

# Weight & Fuel

Item	Quantity:	Weight [kg]
PAX	260	25.740,00
Cargo		8.500,00
Payload		34.240,00
DOW		114.406,00
<b>Zero fuel weight</b>		<b>148.646,00</b>
<b>Take off weight</b>		<b>195.856,25</b>
<b>MTOW</b>		<b>227.930,00</b>
<b>MZFW</b>		<b>161.025,29</b>

- ❖ ETOPS critical fuel scenario: fuel req. = 13,5T,
- ❖ FOB= 25,6T → **No extra fuel needed for ETOPS**
- ❖ **Landing weight:** Considered to be ZFW as instructed by the lecturers.

Item	Fuel [Kg]
taxi fuel	525,00
LDN weight factor +2	2.000,00
Trip fuel	33.650,00
Alternate Fuel	4.000,00
Holding fuel	1.930,00
total fuel	42.105,00
contingency (5%)	2.105,25
extra fuel	3.000,00
<b>block fuel</b>	<b>47.210,25</b>

- ❖ **Additional 3T: discrepancy between manual and LIDO4D computation**



# Weight & Fuel

- PAXs: 250 economy + 10 business= 260, 99 Kg/PAX
- Cargo= 8500kg
- DOW=114406 kg
- Route ground distance = 3425 Nm
- Air distance (20Knts headwind) = 3573 Nm
- FL380, Trip fuel = 33,65 T; (7h 50mins)
- Holding at FL100 clean surfaces = 3860Kg/h
- Alternate fuel 4000 kg
- Taxi fuel 525kg
- Landing weight fuel factor +2



# 5. Routing



# Routing

- LEBL/25R MOPAS2P MOPAS DCT ORTEZ DCT PEXOD DCT RIXIX DCT XIDAN UN480 REGHI DCT LASNO DCT EVBAK DCT ATSUR DCT SOMAX NATD NICSO DCT YQY DCT ALLEX DCT ENE KJFK

# Equipment

- H-SDE1E2E3FGHIJ2J3J4J5M1RWXY/LB1D1



# ETOPS Scenery

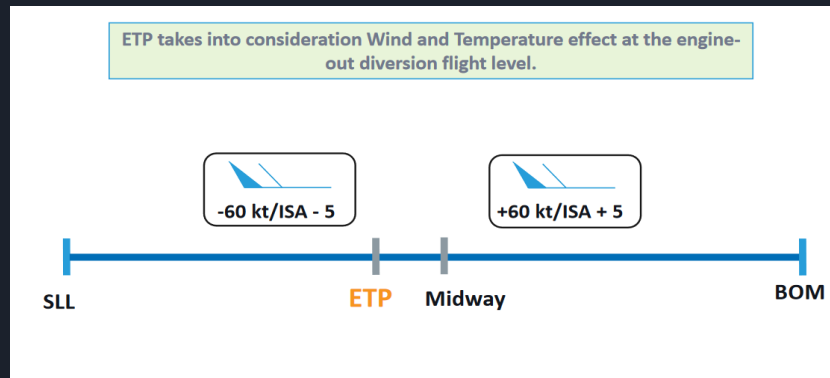
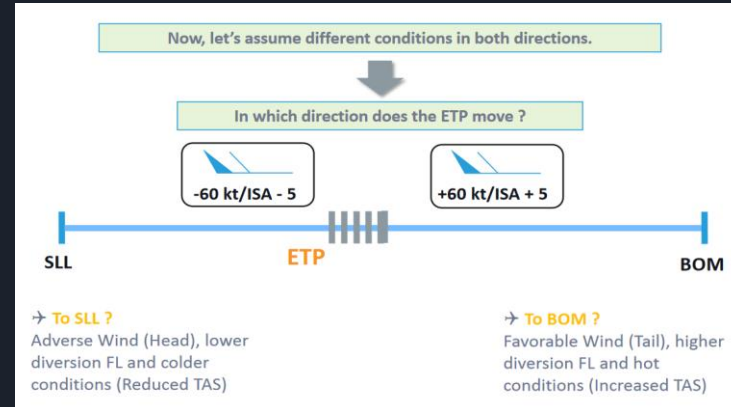
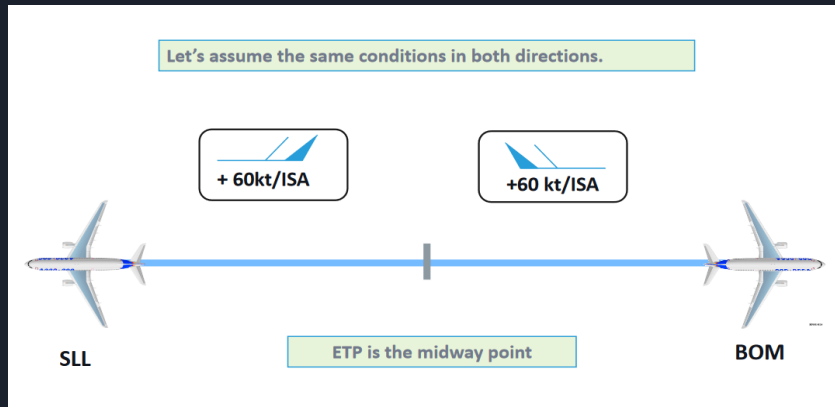
- Flight using NAT D.
- Oceanic Clearance:
  - SOMAX 51N020W 52N030W 51N040W 48N050W NICSO FL380 .84
- ETOPS 120 mins (disregard extra margin for more safety)
- Critical fuel scenario at ETP1:

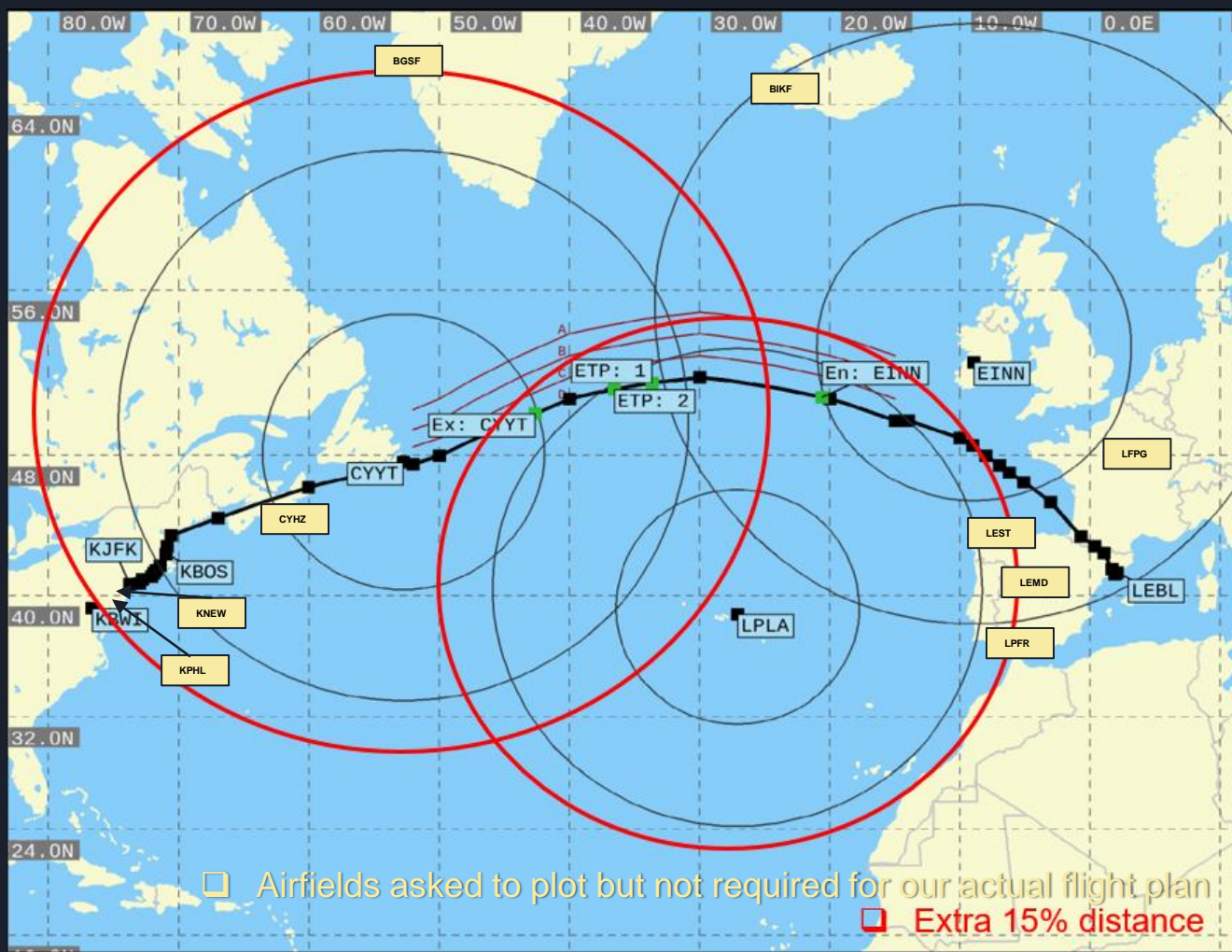
Aircraft weight @ETP1:173417 Kg  $\approx$  ISA +10 or lower chart: **FL210** for 1X condition.

Air distance (ISA -40°C) = **907 Nm**



# ETP explanation





Flight: AA0066

Dep / Dest: BCN / JFK

# Some final thoughts about Previous ETOPS map:

- three 120min ETOPS airports should be needed.
- However:
  - SoW tells to use 120 min+15%
  - Only two airports allowed
  - Applying the extra 15% allows us to use only two airfields. 😊
  - Circles take into account the wind condition in our DOF



# ETOPS Extra Scenarios Information

ETOPS	SAP	ELTME TIME (AAP)	DIST ISA	MORA W/C	ICE	CFUEL	FOB	COND
ENTRY	EINN	0238 0111	443	047	0.3	6.9	30.8	DC
N5105.3	W02037.2	(EINN)	P08	P053				
ETP1	EINN/LPLA	0342 0230	907/826	047/050	0.6	13.5	25.6	DC
N5144.3	W03338.7		P05/P06	P032/M001				
ETP2	LPLA/CYYT	0356 0210	859/670	028/024	0.4	10.5	24.5	1X
N5126.8	W03633.3		P08/P00	P013/M045				
EXIT	CYYT	0427 0127	430	024	0.3	7.9	22.0	DC
N5019.7	W04237.9	(CYYT)	P04	M026				



# ENROUTE ALTERNATES (WEATHER SUITABILITY PERIOD)

- EINN 11:10 15:33 WX MIN: 600-3219 FCST WX: 800-2993 (60 min)
- LPLA 13:27 15:30 WX MIN: 600-3219 FCST WX: 1400-6003 (ETOPS)
- CYYT 13:27 15:27 WX MIN: 600-3219 FCST WX: 3000-9999 (ETOPS)



# ICAO Flight Plan:

FF LECBZQZX LFFFZQZX EGGXZQZX CZQXZQZX CZQMZQZX KZBWZQZX KZNYZQZX  
062030 CYULSBFP  
(FPL-AAL66-IS  
-B788/H-SDE1E2E3FGHIJ2J3J4J5M1RWXY/LB1D1  
-LEBL0800  
-N0484F380 MOPAS2P MOPAS DCT ORTEZ DCT PEXOD DCT RIXIX DCT XIDAN  
UN480 REGHI/M084F380 DCT LASNO DCT EVBAK DCT ATSUR DCT SOMAX NATD  
NICSO/N0478F380 DCT YQY DCT ALLEX DCT ENE PARCH3  
-KJFK0747 KBWI  
-PBN/A1B1C1D1L1O1S2 DOF/211006 REG/N768AA EET/LFFF0021 EGGX0127  
51N020W0235 CZQX0325 51N040W0413 48N050W0510 CZQM0556 KZBW0649  
KZNY0746 OPR/AAL PER/D RALT/EINN LPLA CYYT RMK/TCAS)

Fig. 7233-100

**International Flight Plan**

U.S. Department of Transportation  
Federal Aviation Administration

PRIORITY ADDRESS(S) **LECBZQZX LFFFZQZX EGGXZQZX CZQXZQZX CZQMZQZX KZBWZQZX KZNYZQZ**

**<=FF**

FILING TIME ORIGINATOR **<=**

0, 6 2, 0, 3, 0 **C Y U L I S B J F P**

SPECIFIC IDENTIFICATION OF ADDRESSEE(S) AND/OR ORIGINATOR

3 MESSAGE TYPE **<=(FPL** 7 AIRCRAFT IDENTIFICATION **A A L 6 0 1** 8 FLIGHT RULES **I** TYPE OF FLIGHT **S** **<=**

9 NUMBER **0 1** TYPE OF AIRCRAFT **B 7 8 8** WAKE TURBULENCE CAT. **H** 10 EQUIPMENT **<=**

13 DEPARTURE AERODROME **L E B L** TIME **0 8 0 0** **<=**

15 CRUISING SPEED **N 0 4 8 4** LEVEL **F L 3 8 0** ROUTE **MOPAS2P MOPAS DCT ORTEZ DCT PENOD DCT REXIX DCT XIDAN UN480**

REGIO DCT LASNO DCT EVBRAK DCT ATSUR DCT SOMAX NATD NICS0/N0478F380 DCT YQY DCT ALLEX DCT ENE  
PARCH3

16 DESTINATION AERODROME **K J F K** TOTAL EET **0 7 4 7** ALTN AERODROME **K B W 1** 2ND ALTN AERODROME **K B O S** **<=**

18 OTHER INFORMATION  
PBN/A1B1C1D1L1O1S2 D0F/211006 RFG/N768AA ERT/LFFF0021 EGGX0127  
S1N020W0235 CZQX0325 S1N040W0413 48N050W0510 CZQM0556 KZBW0649  
KZNY0746 OPR/AAL PER/D RALT/EENN LPLA CYYT RMK/TCAS

SUPPLEMENTARY INFORMATION (NOT TO BE TRANSMITTED IN FPL MESSAGES)

19 ENDURANCE **E/** HR **0 9** MIN **3 9** PERSONS ON BOARD **P/** **2 7 5** EMERGENCY RADIO UHF **R/** UHF **U** VHF **V** ELT **E**

SURVIVAL EQUIPMENT POLAR  DESERT  MARITIME  JUNGLE  JACKETS LIGHT  FLUORES  UHF  VHF

DINGHIES NUMBER **D/** CAPACITY **3 5** COVER **0 0 8** COLOR **C** **ORANGE** **<=**

AIRCRAFT COLOR AND MARKINGS **A/** **GREY**

REMARKS **X/**

PILOT-IN-COMMAND **C/** **EDUARDO ALGAR** **)<=**

FILED BY **EDUARDO ALGAR** ACCEPTED BY **EDUARDO ALGAR** ADDITIONAL INFORMATION

Departure

LEBL: 25R  MOPAS2P

Arrival

KJFK: 04L  PARCH3



# 6. Bibliography





# Bibliography

- Global Navigation for Pilots 2nd Edition PhD Dale de Remer, Donald w. Mclean, ASA, ISBN 978-1-56027-312-7.
- EDTO documentation from:
  - <https://www.icao.int/WACAF/Pages/EDTO.aspx>
- Boeing 787 ACAP:
  - <https://www.boeing.com/resources/boeingdotcom/commercial/airports/acaps/787.pdf>
- LIDO4D software