

ATPL Workbook

Subject 40:

ATPL Flight Planning (Aeroplane) – Boeing 777-300ER

- **This version of the workbook is for training purposes.**
- **An examination version will be provided at the examination centre at the time of your sitting.**

Revision – Candidate Training Copy(2019)

Contents

Introduction.....	3
Definitions	4
Use of Flight Planning Data	7
Fuel Policy	8
Normal Operation	8
Preflight (Taxi) Fuel	9
ETP Fuel Requirements	9
Diversion - All Engines Operating (AEO).....	11
Long Range Cruise Enroute Fuel and Time	11
APU Operation During Flight	14
Diversion - All Engines Inoperative (OEI).....	15
Long Range Cruise Diversion Time and Fuel – OEI	15
Holding - All Engines Operating (AEO).....	17
Holding - One Engine Inoperative (OEI).....	18
Flight Plans.....	19

Introduction

The flight planning data in this Data Booklet is based on the Boeing 777-300ER as operated by a typical international airline. Consequently, there will definitely be differences between this material and the flight and fuel planning policies and data requirements of the aircraft type that you are either presently operating or may operate in the future.

Therefore you must always refer to the appropriate Operations/Performance/Training Manual (whatever it is called) and/or Aircraft Flight Manual (AFM) for your aircraft type, in your operating environment.

The data in this booklet is NOT to be used in actual flight planning!

Definitions

The hierarchy of sources for the following definitions are:

1. CAR Part 1
2. Boeing Flight Crew Operations Manual for the 777-300ER
3. Jeppesen documentation

A-B Fuel	The fuel required, calculated from the start of the takeoff roll at the departure airfield through climb, cruise and descent to arrival at 1,500 feet over the destination airfield.
Approach and Landing Fuel	The fuel required for visual flight from 1,500 feet over the alternate airfield to the completion of the landing run.
Burn Off	Shall consist of the sum of A-B fuel, plus fuel for an instrument approach at destination, plus departure and arrival allowances if applicable.
Contingency Fuel (CAR Pt 1)	A fuel provision for any of the following: (1) en-route winds or temperatures being different from forecast; (2) any deviation from the flight planned routes, altitudes or flight levels or, (3) variations from optimum operating techniques.
Contingency Reserves	A percentage fuel allowance to provide a reserve for inflight contingencies including meteorological, navigation errors and operational restrictions.
Critical Equi-Time Point	This is the equi-time point for the most critical sector of the route to be flown when the particular emergency and distribution of available airfields along the route are taken into consideration. Critical fuel scenarios have been determined and loaded into the Dispatch Manager flight planning computer for various aircraft types and will default to the worst case, which is dependent on aircraft weight and diversion time. The two options are ETPD (2 Eng Depressurised) and ETP1D (1 Eng depressurised).
Critical Equi-Fuel Point	While the critical fuel scenarios on the Computer Flight Plan (CFP) labels the critical points "Equi-Time" points, the Dispatch Manager flight planning computer actually calculates these points as "Equi-Fuel" points.

Departure and Arrival Allowances	The fuel required, when necessary, to cover circuitous routing during departure and/or arrival. Where a departure and/or arrival allowance has been included in the Computer Flight Plan (CFP), this allowance will be added into the first and/or last zone FUELRO figure. To show that the allowance has been included a D (for Departure) and/or an A (for Arrival) is printed adjacent to the applicable zone FUELRO figure. The amount of the allowance will be also shown in the fuel analysis block.
Diversion Decision Point (DDP)	This is a designated point on a route to which a flight may operate with reduced specific aircraft contingency. Each DDP is associated with an enroute re-fuelling airfield. A DDP plan is used solely for payload enhancement by allowing a portion of the A-B contingency fuel to be exchanged for the equivalent weight of payload, but only under specific conditions.
Diversion Fuel (B-C Fuel)	The fuel required for diversion from the minimum altitude on final approach to the destination airfield through the missed approach procedure to 1,500 feet, climb, cruise and descent to arrival at 1,500 feet over the alternate airfield.
ECL P/N	Electronic Checklist Part Number. The Boeing 777 has a dual database feature which provides the flight crew with the capability of activating either of two different Electronic Checklist (ECL) databases, each having a different database part number and revision identification.
Final Reserve Fuel	The fuel required to fly for 30 minutes at holding speed at 1,500 feet above the destination or destination alternate aerodrome airfield (excluding any additional fuel for holding in a racetrack pattern). This reserve is the minimum quantity of fuel required to provide a margin to secure the safe completion of the flight under normal conditions of operation in the event of any unplanned manoeuvring in the vicinity of the destination or destination alternate aerodrome. In ordinary circumstances this fuel remains on board until completion of the landing.
Fixed Fuel Reserve	Has exactly the same meaning as "Final Reserve Fuel".
Instrument Approach and Missed Approach Fuel	The fuel required as part of the ETP critical fuel scenario for single engine flight from 1,500 feet over the airfield to completion of the missed approach.
Instrument Approach Fuel	The fuel required for flight from 1,500 feet over the destination airfield through the planned instrument approach to the minimum altitude on final approach at the destination airfield.
Performance Deterioration Allowance (CAR Pt 1)	The difference between the aeroplane manufacturer's published fuel consumption figures and the actual fuel consumption applicable to a specific aeroplane.

Performance Deterioration Allowance	A specific percentage fuel allowance to provide for the deterioration of that aircraft performance from standard book figures. This allowance shall be applied to ALL facets of the fuel calculation and shall be included in the individual fuel figures and not as a separate percentage.
Point of No Return (PNR)	The point in the flight of an aircraft beyond which the remaining fuel will be insufficient for a return to the departure airfield.
Point of No Return Factor	The PNR Factor is the amount of fuel required to fly 1nm beyond the ETPD at altitude, plus the fuel required to fly 1nm back to the ETPD at 10,000 feet. The PNR Factor for the B777-300ER is 37kg/nm.
Point of Safe Return (PSR)	The point in the flight of an aircraft beyond which the remaining fuel will be insufficient for a safe return to the departure airfield with appropriate reserve fuel.
PNR Decision Point (PNR DP)	This is a designated point on a particular route to which a flight may plan to proceed when the weather at the destination and the close alternate airfield is below alternate minima or the alternate airfields are not available for other reasons.
Revised (Inflight) PSR	An inflight point of safe return may be calculated using fuel in excess of ETPD requirements, by using a number referred to as the Point of No Return (PNR) Factor.

Use of Flight Planning Data

Unless otherwise stated, the specification aircraft referred to in the examination questions is the Boeing 777-300ER, and the following weights apply:

Maximum ramp weight	352,441kg
Maximum takeoff weight	351,534kg
Maximum landing weight	251,290kg
Maximum zero fuel weight	237,682kg
Maximum taxi weight	352,441kg
Prepared for service weight	174,600kg
Basic weight	170,000kg
Maximum fuel load	145,500kg
Taxi fuel	510kg

- Notes:
- 1) Takeoff weight is the same as the Brake Release Weight (BRW).
 - 2) Prepared for service weight is the same as operating empty weight.
 - 3) Basic weight is the same as empty weight.
 - 4) For all HKG, LAX and LHR departures standard taxi fuel will be 720kg.

Fuel Policy

Normal Operation

Flight from A to B when an alternate (c) is required.

The aircraft must not takeoff with less than the sum of the following fuel components:

- 1) **Trip fuel A to B**, fuel required from the start of the take-off roll to 1,500 feet overhead the destination aerodrome.
- 2) **Contingency fuel, 2%** of the trip fuel A to B.
- 3) **Full instrument approach and landing fuel**, from 1,500 feet overhead destination to minimum altitude on approach, **1080kg** (12 min approach configuration).
- 4) **Diversion fuel B to C**, from minimum altitude on final approach to 1,500 feet overhead the alternate aerodrome.
- 5) **Circuit and landing fuel**, from 1,500 feet overhead the alternate aerodrome to the completion of the landing run, **540kg**.
- 6) Alternate reserve fuel, **30 min holding at 1,500 feet** overhead the alternate aerodrome.
- 7) Performance Deterioration Allowance (**PDA**), a specified percentage fuel to provide for the deterioration of that aircraft performance from standard book figures. To be applied to ALL components.
- 8) Any **extra fuel to cover enroute ETP** requirements, as listed below.

Flight from A to B when an alternate (c) is NOT required.

The aircraft must not takeoff with less than the sum of the following fuel components:

- 1) **Trip fuel A to B**, fuel required from the start of the take-off roll to 1,500 feet overhead the destination aerodrome.
- 2) **Contingency fuel, 2%** of the trip fuel A to B.
- 3) **Full instrument approach and landing fuel**, from 1,500 feet overhead destination to minimum altitude on approach, **1080kg** (12 min approach configuration).
- 4) Destination reserve fuel, **30 min holding at 1,500 feet** overhead the destination aerodrome.
- 5) Extra holding fuel to ensure that a minimum of **60 minutes holding fuel at 1,500 feet** is available on arrival at the destination.
- 6) Performance Deterioration Allowance (**PDA**), a specified percentage fuel to provide for the deterioration of that aircraft performance from standard book figures. To be applied to ALL components.
- 7) Any **extra fuel to cover enroute ETP** requirements, as listed below.

Preflight (Taxi) Fuel

A preflight fuel allowance must be added to the Total Fuel Required for the flight to obtain Ramp Fuel. This allowance is normally 510kg, and consists of the following:

APU operation	120kg
Start Up (2 minutes)	60kg
Taxi (10 minutes)	<u>330kg</u>
	510kg

The total preflight fuel is often referred to simply as taxi fuel. Unless otherwise specified, assume that taxi fuel includes start up and APU operation. Any time a long (in excess of 10 minutes) taxi is expected, additional taxi fuel should be calculated at a rate of 33kg per minute. For all LAX and LHR departures standard taxi fuel will be 720kg.

While strictly the PDA for the aircraft should be added to the preflight/taxi fuel, since it is a fairly conservative estimate of the planning fuel required to cover the use of the APU, the start-up and the taxi, in practice the PDA is not considered.

ETP Fuel Requirements

The aircraft must have at least the sum of the most critical of the following fuel components when reaching the Critical Equi-Time Point:

For a **One Engine Inoperative (OEI) pressurised** diversion (ETP1):

- 1) Fuel to the diversion aerodrome, OEI, **pressurised**, from the ETP;
- 2) 5% wind component adjustment *;
- 3) Diversion reserve fuel, 15 minutes holding at 1,500 feet;
- 4) APU fuel (at 240kg/hr);
- 5) Instrument approach and landing fuel, 1,080kg and,
- 6) Performance Deterioration Allowance (PDA).

For an **All Engines Operating (AEO) depressurised** diversion (ETPD):

- 1) Fuel to the diversion aerodrome, AEO, **depressurised**, from the ETP;
- 2) 5% wind component adjustment *;
- 3) Diversion reserve fuel, 15 minutes holding at 1,500 feet;
- 4) Instrument approach and landing fuel, 1,080kg;
- 5) Icing fuel. Fuel to allow operation of engine and wing anti-ice systems for 100% of expected exposure time; and,
- 6) Performance Deterioration Allowance (PDA).

For an **One Engine Inoperative (OEI) depressurised** diversion (ETP1D):

- 1) Fuel to the diversion aerodrome, OEI, **depressurised**, from the ETP;
- 2) 5% wind component adjustment *;
- 3) Diversion reserve fuel, 15 minutes holding at 1,500 feet;
- 4) APU fuel (at 240kg/hr);
- 5) Instrument approach and landing fuel, 1,080kg;
- 6) Icing fuel. Fuel to allow operation of engine and wing anti-ice systems for 100% of expected exposure time; and,
- 7) Performance Deterioration Allowance (PDA).

* The 5% Wind Component Adjustment means an increase of 5% for headwind components and a 5% decrease for tailwind components when calculating the applicable fuel.

Diversion - All Engines Operating (AEO)

Long Range Cruise Enroute Fuel and Time

Long Range Cruise Enroute Fuel and Time tables are provided to determine remaining time and fuel required to destination. The data is based on Long Range Cruise and .84/310/250 descent.

Tables are presented for low altitudes for shorter trip distances and high altitudes for longer trip distances.

To determine remaining fuel and time required, first enter the Ground to Air Miles Conversion table to convert ground distance and enroute wind to an equivalent still air distance for use with the Reference Fuel and Time tables. Next, enter the Reference Fuel and Time table with air distance from the Ground to Air Miles Conversion table and the desired altitude and read Reference Fuel and Time Required. Lastly, enter the Fuel Required Adjustment table with the Reference Fuel and the actual weight at checkpoint to obtain fuel required to destination.

Low Altitude

Long Range Cruise Ground to Air Miles Conversion

AIR DISTANCE (NM)					GROUND DISTANCE (NM)	AIR DISTANCE (NM)				
HEADWIND COMPONENT (KTS)						TAILWIND COMPONENT (KTS)				
100	80	60	40	20		20	40	60	80	100
282	261	242	226	213	200	191	182	174	167	160
561	520	484	452	425	400	382	366	351	337	325
840	779	725	678	637	600	574	550	528	508	489
1120	1039	966	904	849	800	766	734	705	678	653
1401	1299	1208	1130	1062	1000	957	918	881	848	817
1683	1560	1451	1357	1274	1200	1149	1101	1057	1017	980
1966	1822	1694	1583	1487	1400	1340	1285	1234	1187	1144
2250	2085	1937	1811	1700	1600	1532	1469	1410	1356	1307
2535	2348	2181	2038	1913	1800	1723	1652	1586	1525	1470
2820	2611	2425	2265	2126	2000	1915	1835	1762	1695	1633

Reference Fuel and Time Required at Check Point

AIR DIST (NM)	PRESSURE ALTITUDE (1000 ft)									
	10		14		20		24		28	
	FUEL (TONNE)	TIME (HR:MIN)	FUEL (TONNE)	TIME (HR:MIN)	FUEL (TONNE)	TIME (HR:MIN)	FUEL (TONNE)	TIME (HR:MIN)	FUEL (TONNE)	TIME (HR:MIN)
200	4.0	0:38	3.5	0:37	2.9	0:35	2.5	0:34	2.3	0:34
400	8.2	1:12	7.5	1:08	6.5	1:04	5.9	1:02	5.5	1:00
600	12.4	1:46	11.4	1:40	10.1	1:33	9.3	1:30	8.7	1:26
800	16.5	2:20	15.4	2:12	13.6	2:02	12.6	1:58	11.9	1:52
1000	20.7	2:55	19.3	2:45	17.2	2:31	15.9	2:26	15.0	2:19
1200	24.7	3:30	23.1	3:17	20.7	3:00	19.2	2:54	18.1	2:45
1400	28.8	4:05	27.0	3:50	24.2	3:30	22.5	3:22	21.2	3:12
1600	32.8	4:41	30.8	4:24	27.6	4:00	25.7	3:50	24.3	3:39
1800	36.8	5:16	34.5	4:57	31.1	4:30	28.9	4:19	27.3	4:06
2000	40.8	5:52	38.3	5:31	34.5	5:00	32.1	4:48	30.3	4:34

Fuel Required Adjustment (TONNE)

REFERENCE	WEIGHT AT CHECK POINT (TONNE)
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FUEL REQUIRED (TONNE)	170	190	210	230	250	270	290	310	330	350
5	-0.6	-0.5	-0.3	-0.2	0.0	0.2	0.4	0.6	0.8	1.0
10	-1.3	-1.0	-0.7	-0.3	0.0	0.4	0.9	1.3	1.8	2.2
15	-2.0	-1.5	-1.0	-0.5	0.0	0.7	1.4	2.1	2.8	3.4
20	-2.7	-2.1	-1.4	-0.7	0.0	1.0	1.9	2.9	3.8	4.7
25	-3.4	-2.6	-1.8	-0.9	0.0	1.2	2.4	3.6	4.8	5.9
30	-4.1	-3.1	-2.1	-1.1	0.0	1.5	3.0	4.4	5.8	7.2
35	-4.8	-3.7	-2.5	-1.2	0.0	1.8	3.5	5.2	6.9	8.5
40	-5.5	-4.2	-2.8	-1.4	0.0	2.1	4.1	6.0	7.9	9.7
45	-6.2	-4.7	-3.2	-1.6	0.0	2.3	4.6	6.8	9.0	11.0

High Altitude

Ground to Air Miles Conversion

AIR DISTANCE (NM)					GROUND DISTANCE (NM)	AIR DISTANCE (NM)				
HEADWIND COMPONENT (KTS)						TAILWIND COMPONENT (KTS)				
100	80	60	40	20		20	40	60	80	100
1032	976	925	879	838	800	767	736	708	682	657
1543	1460	1385	1317	1256	1200	1151	1106	1063	1024	989
2056	1946	1846	1756	1675	1600	1535	1475	1419	1367	1320
2571	2433	2308	2195	2094	2000	1920	1845	1775	1710	1651
3088	2922	2771	2635	2513	2400	2304	2214	2131	2053	1982
3606	3412	3235	3076	2932	2800	2688	2583	2486	2396	2313
4126	3904	3699	3517	3352	3200	3072	2953	2842	2739	2645
4649	4396	4165	3959	3772	3600	3456	3322	3197	3082	2976
5172	4890	4631	4400	4192	4000	3840	3691	3552	3424	3307
5697	5384	5098	4843	4612	4400	4224	4060	3908	3767	3637
6223	5880	5565	5285	5033	4800	4608	4429	4263	4109	3967
6751	6376	6034	5729	5453	5200	4992	4798	4617	4450	4297
7281	6874	6503	6172	5874	5600	5375	5166	4971	4791	4626
7812	7373	6973	6616	6295	6000	5759	5534	5324	5131	4954
8345	7874	7444	7061	6716	6400	6142	5901	5678	5471	5282
8880	8376	7915	7506	7138	6800	6525	6269	6030	5811	5610
9418	8880	8388	7952	7560	7200	6908	6636	6383	6150	5936
9959	9385	8863	8399	7982	7600	7291	7002	6735	6488	6262
10502	9893	9338	8846	8405	8000	7674	7369	7086	6826	6587

Reference Fuel and Time required at Check Point

AIR DIST (NM)	PRESSURE ALTITUDE (1000 ft)									
	29		31		33		35		37	
	FUEL (TONNE)	TIME (HR:MIN)	FUEL (TONNE)	TIME (HR:MIN)	FUEL (TONNE)	TIME (HR:MIN)	FUEL (TONNE)	TIME (HR:MIN)	FUEL (TONNE)	TIME (HR:MIN)
800	11.8	1:50	11.4	1:48	11.0	1:47	10.7	1:47	10.7	1:48
1200	17.8	2:43	17.3	2:40	16.8	2:37	16.4	2:37	16.2	2:38
1600	23.9	3:36	23.2	3:31	22.6	3:28	22.0	3:27	21.7	3:27
2000	29.9	4:30	29.1	4:22	28.4	4:18	27.6	4:17	27.2	4:17
2400	35.7	5:24	34.8	5:15	33.9	5:09	33.0	5:07	32.5	5:07
2800	41.5	6:19	40.5	6:08	39.5	6:00	38.4	5:57	37.8	5:57
3200	47.2	7:15	46.0	7:02	44.9	6:52	43.8	6:48	43.0	6:47
3600	52.8	8:11	51.5	7:56	50.2	7:45	49.0	7:39	48.1	7:37
4000	58.4	9:07	56.9	8:51	55.6	8:37	54.2	8:30	53.2	8:27
4400	63.7	10:05	62.2	9:47	60.7	9:32	59.2	9:22	58.0	9:18
4800	69.1	11:02	67.4	10:43	65.8	10:26	64.2	10:15	62.9	10:09
5200	74.3	12:00	72.5	11:40	70.8	11:21	69.1	11:08	67.7	11:00
5600	79.5	12:59	77.5	12:37	75.7	12:17	73.9	12:01	72.4	11:52
6000	84.7	13:58	82.5	13:35	80.6	13:13	78.7	12:55	77.1	12:44
6400	89.7	14:59	87.4	14:34	85.3	14:10	83.3	13:51	81.6	13:37
6800	94.6	15:59	92.2	15:33	90.0	15:07	87.9	14:46	86.1	14:30
7200	99.5	17:01	97.0	16:32	94.7	16:06	92.4	15:42	90.5	15:24
7600	104.3	18:04	101.6	17:33	99.2	17:04	96.8	16:40	94.8	16:19
8000	109.2	19:07	106.3	18:33	103.7	18:03	101.2	17:37	99.1	17:14

Fuel Required Adjustment (TONNE)

REFERENCE FUEL REQUIRED (TONNE)	WEIGHT AT CHECK POINT (TONNE)									
	170	190	210	230	250	270	290	310	330	350
10	-1.8	-1.3	-0.8	-0.4	0.0	0.7	2.4	4.9	8.4	12.7
20	-3.6	-2.8	-1.9	-0.9	0.0	1.4	4.0	7.7	12.5	18.5
30	-5.5	-4.3	-2.9	-1.5	0.0	2.1	5.5	10.2	16.3	23.7
40	-7.3	-5.7	-3.9	-2.0	0.0	2.7	6.9	12.5	19.7	28.3
50	-9.1	-7.1	-4.9	-2.5	0.0	3.3	8.2	14.6	22.7	32.3
60	-10.9	-8.5	-5.8	-2.9	0.0	3.9	9.4	16.5	25.3	35.7
70	-12.6	-9.8	-6.7	-3.4	0.0	4.4	10.5	18.2	27.5	38.6
80	-14.3	-11.0	-7.5	-3.8	0.0	4.9	11.4	19.6	29.4	40.8
90	-15.9	-12.2	-8.3	-4.2	0.0	5.4	12.3	20.8	30.9	42.5
100	-17.6	-13.3	-9.0	-4.6	0.0	5.8	13.1	21.8	32.0	43.6
110	-19.2	-14.4	-9.7	-5.0	0.0	6.3	13.8	22.6	32.7	44.1
120	-20.8	-15.4	-10.4	-5.3	0.0	6.7	14.4	23.2	33.1	44.0

APU Operation During Flight

For APU operation during flight, increase fuel flow according to the following table. These increments include the APU fuel flow and the effect of increased drag from the APU door.

PRESSURE ALTITUDE (1000 FT)	APU FUEL FLOW PENALTY (kg/hr)				
	GROSS WEIGHT (TONNE)				
	300	260	220	180	140
43				160	140
39			180	160	145
35		200	190	170	140
31	230	220	195	165	140
25	230	220	195	175	155
20	235	230	205	185	165
15	235	235	215	200	185
10	240	240	230	220	200
5	270	270	255	240	220

Diversion - All Engines Inoperative (OEI)

Long Range Cruise Diversion Time and Fuel – OEI

Tables are provided for crews to determine the fuel and time required to proceed to an alternate airfield with one engine inoperative. The data is based on single engine Long Range Cruise speed and .84/310/250 descent.

Enter with Air Distance as determined from the Ground to Air Miles Conversion table and read Fuel and Time required at the cruise pressure altitude. Adjust the fuel obtained for deviation from the reference weight at checkpoint as required by entering the off reference fuel corrections table with the fuel required for the reference weight and the actual weight at checkpoint.

Read fuel and time required for the actual weight.

ENGINE INOP

MAX CONTINUOUS THRUST

Ground to Air Miles Conversion

AIR DISTANCE (NM) INCLUDES 5% WIND ADJUSTMENT					GROUND DISTANCE (NM)	AIR DISTANCE (NM) INCLUDES 5% WIND ADJUSTMENT				
HEADWIND COMPONENT (KTS)						TAILWIND COMPONENT (KTS)				
100	80	60	40	20		20	40	60	80	100
292	268	247	229	214	200	190	182	174	167	161
581	533	492	457	426	400	382	366	350	336	323
871	801	738	686	640	600	573	548	525	505	487
1163	1068	985	914	854	800	765	732	702	675	649
1455	1337	1232	1144	1067	1000	956	915	878	843	811
1748	1605	1480	1373	1282	1200	1147	1098	1053	1011	974
2043	1876	1728	1603	1496	1400	1338	1281	1228	1180	1135
2338	2145	1976	1833	1710	1600	1530	1464	1403	1348	1298
2635	2417	2226	2063	1924	1800	1721	1646	1578	1516	1459
2933	2689	2475	2294	2139	2000	1911	1829	1753	1684	1621

Reference Fuel and Time Required at Check Point

AIR DIST (NM)	PRESSURE ALTITUDE (1000 ft)									
	10		14		18		22		26	
	FUEL (TONNE)	TIME (HR:MIN)	FUEL (TONNE)	TIME (HR:MIN)	FUEL (TONNE)	TIME (HR:MIN)	FUEL (TONNE)	TIME (HR:MIN)	FUEL (TONNE)	TIME (HR:MIN)
200	4.0	0:39	3.5	0:38	3.2	0:36	2.8	0:36	2.6	0:35
400	8.4	1:15	7.6	1:11	7.1	1:08	6.7	1:06	6.4	1:03
600	12.7	1:50	11.7	1:45	11.1	1:40	10.4	1:36	10.2	1:32
800	16.9	2:26	15.7	2:19	14.9	2:11	14.2	2:06	13.9	2:02
1000	21.1	3:02	19.7	2:53	18.8	2:44	17.9	2:37	17.6	2:31
1200	25.3	3:38	23.7	3:27	22.6	3:16	21.5	3:07	21.2	3:00
1400	29.4	4:15	27.6	4:02	26.3	3:49	25.1	3:38	24.7	3:30
1600	33.5	4:52	31.4	4:37	30.1	4:21	28.7	4:09	28.2	4:00
1800	37.6	5:29	35.2	5:12	33.8	4:55	32.3	4:40	31.6	4:29
2000	41.6	6:07	39.0	5:47	37.4	5:28	35.8	5:11	35.0	5:00

ENGINE INOP

MAX CONTINUOUS THRUST

Fuel Required Adjustment (TONNE)

REFERENCE FUEL REQUIRED (TONNE)	WEIGHT AT CHECK POINT (TONNE)									
	170	190	210	230	250	270	290	310	330	350
5	-0.8	-0.6	-0.4	-0.2	0.0	0.3	0.7	1.2	1.7	2.3
10	-1.8	-1.3	-0.9	-0.4	0.0	0.8	1.6	2.6	3.7	4.9
15	-2.7	-2.0	-1.3	-0.7	0.0	1.2	2.5	4.0	5.6	7.4
20	-3.7	-2.7	-1.8	-0.9	0.0	1.6	3.3	5.3	7.5	9.8
25	-4.6	-3.4	-2.3	-1.1	0.0	2.0	4.2	6.6	9.3	12.2
30	-5.6	-4.2	-2.7	-1.4	0.0	2.3	4.9	7.8	11.0	14.4
35	-6.5	-4.9	-3.2	-1.6	0.0	2.7	5.7	9.0	12.6	16.6
40	-7.5	-5.6	-3.7	-1.8	0.0	3.1	6.4	10.2	14.2	18.6
45	-8.5	-6.3	-4.2	-2.1	0.0	3.4	7.1	11.3	15.8	20.6

Includes APU fuel burn.

Holding - All Engines Operating (AEO)

The tables below gives the target %N1, indicated airspeed (KIAS) and fuel flow per engine (FF/ENG) information for holding with flaps up, based on the FMC optimum holding speed schedule. This is the higher of the maximum endurance speed and the maneuvering speed for the selected flap setting. Small variations in airspeed will not appreciably affect the overall endurance time.

Enter the tables with weight and pressure altitude to read %N1, KIAS and fuel flow per engine.

- Notes: 1. This table includes 5% additional fuel for holding in a racetrack pattern. Divide fuel flow by 1.05 for holding in other than a racetrack pattern.
2. Unless otherwise stated, extra holding is carried out at FL200.

All-Engine Holding

WEIGHT (TONNE)		PRESSURE ALTITUDE (1,000 FT)									
		1,500	5,000	10,000	15,000	20,000	25,000	30,000	35,000	40,000	43,000
360	%N1	62.4	65.4	69.5	74.3	78.9	83.5	88.5			
	KIAS	272	273	275	298	313	317	312			
	FF/ENG	4740	4690	4650	4800	4960	5140	5380			
340	%N1	60.9	63.8	67.9	72.3	77.3	82.1	86.6			
	KIAS	264	266	267	282	303	307	312			
	FF/ENG	4480	4440	4380	4450	4660	4800	4980			
320	%N1	59.4	62.1	66.3	70.4	75.7	80.3	85.0			
	KIAS	257	257	259	265	294	297	302			
	FF/ENG	4220	4180	4120	4130	4360	4460	4600			
300	%N1	57.8	60.4	64.6	68.6	73.8	78.5	83.2			
	KIAS	249	249	251	252	277	287	291			
	FF/ENG	3960	3920	3870	3850	4020	4130	4270			
280	%N1	56.2	58.7	62.8	66.8	71.6	76.6	81.3			
	KIAS	240	241	242	243	258	277	280			
	FF/ENG	3710	3670	3610	3590	3670	3830	3950			
260	%N1	54.4	56.9	60.8	64.9	69.3	74.6	79.3	84.1		
	KIAS	232	232	233	234	240	266	269	274		
	FF/ENG	3470	3420	3360	3330	3340	3540	3620	3750		
240	%N1	52.7	55.1	58.8	62.9	67.2	72.3	77.1	82.0		
	KIAS	226	226	226	226	226	248	258	262		
	FF/ENG	3250	3180	3110	3070	3070	3200	3310	3410		
220	%N1	50.9	53.2	56.8	60.7	64.9	69.6	74.7	79.6		
	KIAS	220	220	220	220	220	226	246	249		
	FF/ENG	3040	2960	2870	2830	2820	2850	3000	3090		
200	%N1	48.8	51.3	54.8	58.4	62.7	67.0	72.3	77.2	83.5	
	KIAS	213	213	213	213	213	213	233	237	241	
	FF/ENG	2830	2750	2650	2610	2580	2580	2690	2770	2930	
180	%N1	46.6	49.2	52.6	56.1	60.2	64.5	69.1	74.3	80.8	
	KIAS	206	206	206	206	206	206	208	224	227	
	FF/ENG	2640	2550	2450	2410	2360	2390	2350	2470	2590	
160	%N1	44.3	46.7	50.4	53.8	57.5	62.0	66.1	71.3	77.7	81.8
	KIAS	199	199	199	199	199	199	199	210	213	215
	FF/ENG	2500	2420	2320	2260	2210	2170	2160	2180	2270	2340

Holding - One Engine Inoperative (OEI)

The One Engine Inoperative (single engine) holding data is provided in a similar format to the All Engines Operative holding data and is based on the same assumptions.

One Engine Inoperative (OEI) Holding

WEIGHT (1000 KG)		PRESSURE ALTITUDE (FT)						
		1500	5000	10000	15000	20000	25000	30000
360	%N1	81.1	84.5	89.2	94.5			
	KIAS	272	273	275	298			
	FF/ENG	9270	9350	9640	10310			
340	%N1	79.3	82.6	87.4	92.2			
	KIAS	264	266	267	282			
	FF/ENG	8720	8760	8990	9410			
320	%N1	77.6	80.6	85.4	90.1	98.4		
	KIAS	257	257	259	265	294		
	FF/ENG	8170	8190	8350	8590	9780		
300	%N1	75.6	78.6	83.4	88.1	94.5		
	KIAS	249	249	251	252	277		
	FF/ENG	7640	7640	7740	7890	8730		
280	%N1	73.7	76.6	81.1	86.0	91.3		
	KIAS	240	241	242	243	258		
	FF/ENG	7120	7090	7150	7250	7830		
260	%N1	71.6	74.5	78.8	83.7	88.8	97.3	
	KIAS	232	232	233	234	240	266	
	FF/ENG	6600	6570	6570	6640	7030	7980	
240	%N1	69.3	72.3	76.5	81.3	86.3	92.6	
	KIAS	226	226	226	226	226	248	
	FF/ENG	6090	6060	6040	6080	6360	6920	
220	%N1	67.0	69.9	74.1	78.6	83.8	88.8	99.1
	KIAS	220	220	220	220	220	226	246
	FF/ENG	5600	5570	5530	5540	5750	6060	7020
200	%N1	64.7	67.4	71.6	76.0	80.9	85.8	93.5
	KIAS	213	213	213	213	213	213	233
	FF/ENG	5130	5090	5030	5040	5180	5360	5950
180	%N1	62.2	64.8	68.9	73.2	77.9	83.0	88.0
	KIAS	206	206	206	206	206	206	208
	FF/ENG	4670	4620	4560	4560	4640	4780	5000
160	%N1	59.5	62.1	65.9	70.3	74.7	79.8	84.5
	KIAS	199	199	199	199	199	199	199
	FF/ENG	4230	4170	4110	4100	4150	4230	4360

This table includes 5% additional fuel for holding in a racetrack pattern.

Flight Plans

XX

COMPUTER FLIGHT PLAN

B777-300 ER

XX

PLANNED TO 180 MIN EDTO

CO ROUTE – AKLLAXT01

FMS NAV DATA ACTIVE DEC13JAN10/XX

B772 ACTIVE ECL P/N 3162-ANZ-422-32
 B773 ACTIVE ECL P/N 3160-ANZ-432-13

ROUTE DESCRIPTION

NZAA DCT AA AGEDU INTIB TERAN 20W70 15W67 10W64 05W61 00N57 05N53 10N49 15N45
 20N40 25N33 30N25 WEDES B581 FICKY C1177 SXC LAX DCT KLAX

ROUTE PROFILE

310 TERAN 330 05W61 350 20N40 370

NZ 6 / 26	NZAA-KLAX	ETD 26DECXX	- 0615Z							
		STA	- 1830Z							RADIO LOG
CAPTAIN BLYTH M				BLOX FUEL	.					RADIO FREQ
DESP MARCO POLO				A/FL TAXI FUEL	.					P
ZKOKI CR050 TRK.T	FW/V TMP	MNO	FL	DIST	ZEET	FUELRM				S
PDA 02.2 TRK.M	AW/V	GS	SH	ZATA	ZETA	FUELRQ				STN / UTC

RVSM ALTIMETER CHECK CAPT: STBY: F / O:

WP NZAA			CL050DR1					
S37 00.5								
E174 47.5		AIREP / Z			S/H	.....		95.7
WP AA		.... / ..... Z						
S37 00.5	079.1	31001	CLB	CLB	1	0		
E174 47.4	059.1		133	49	.....	.....		95.5
TOC	041.6	23023	CLB	CLB	127	19		
	021.6		408	55	.....	.....		89.3
WP AGEDU	NZZO	.... / ..... Z						
S34 28.7	041.6	21030M40	832	F310	73	8		
E177 29.5	021.6		533	55	.....	.....		88.1
WP INTEB		.... / ..... Z						
S25 53.6	033.8	31021M37	831	F310	319	38		
W175 00.0	015.4		508	21	.....	.....		82.4
WP TERAN		.... / ..... Z						
S25 53.6	042.5	31021M37	831	F310	328	40		
W175 00.0	025.9		497	30	.....	.....		76.4
WP 20W70		.... / ..... Z						
S20 00.0	039.2	23022M42	832	F330	448	52		
W170 00.0	024.1		514	16	.....	.....		68.8
WP 15W67		.... / ..... Z						
S15 00.0	030.4	22033M39	833	F330	345	39		
W167 00.0	017.5		527	16	.....	.....		63.2

WP 10W64		.... / ..... Z						
S10 00.0	030.9	25030M38	832	F330	347	40		
W164 00.0	019.1		521	14	.....	.....		57.6
WP 05W61	KZAK	.... / ..... Z						
S05 00.0	031.1	26025M37	832	F330	348	41		
W161 00.0	020.8		515	10	.....	.....		51.9
WP 00N57		.... / ..... Z						
N00 00.0	038.9	28020M42	833	F350	383	45		
W157 00.0	029.5		502	10	.....	.....		45.7
WP 05N53		.... / ..... Z						
N05 00.0	038.8	32022M42	833	F350	383	47		
W153 00.0	029.9		489	12	.....	.....		39.5
WP 10N49		.... / ..... Z						
N10 00.0	038.4	34025M43	833	F350	382	48		
W149 00.0	029.7		478	10	.....	.....		33.3
WP 15N45		.... / ..... Z						
N15 00.0	037.8	35029M45	832	F350	380	48		
W145 00.0	028.8		473	10	.....	.....		27.3
WP 20N40		.... / ..... Z						
N20 00.0	043.1	30036M46	831	F350	414	50		
W140 00.0	033.4		497	10	.....	.....		21.1
WP 25N33		.... / ..... Z						
N25 00.0	051.2	27056M54	833	F370	490	57		
W133 00.0	040.4		523	10	.....	.....		14.5
WP 30N25		.... / ..... Z						
N30 00.0	053.2	26086M57	833	F370	521	56		
W125 00.0	041.0		557	10	.....	.....		8.1
WP WEDES		.... / ..... Z						
N30 40.1	067.2	26111M57	833	F370	105	11		
W123 07.5	053.9		584	10	.....	.....		6.9
WP FICKY	KZLA	.... / ..... Z						
N31 33.5	058.7	26119M57	833	F370	104	10		
W121 23.5	045.0		585	10	.....	.....		5.8
WP ROSIN		.... / ..... Z						
N31 56.5	067.9	26125M57	833	F370	62	6		
W120 16.1	054.0		598	10	.....	.....		5.1
TOD	047.0	26130	832	F370	3	1		
	033.0		579	45	.....	.....		5.0
WP MALIT		.... / ..... Z						
N32 28.5	047.0	26125	DSC	DSC	44	6		
W119 35.5	033.0		446	45	.....	.....		4.9
WP GOATZ		.... / ..... Z						
N33 11.1	047.4	27078	DSC	DSC	63	9		
W118 40.2	033.0		399	106	.....	.....		4.6

WP SXC	.... / ..... Z							
N33 22.5	047.8	27052	DSC	DSC	17	3		
W118 25.2	033.0		381	129	.....	.....		4.6
WP LAX	.... / ..... Z							
N33 56.0	359.1	28027	DSC	DSC	33	6		
W118 25.9	344.1		341	129	.....	.....		4.4
WP KLAX	.... / ..... Z							
N33 56.5	061.0	28001	DSC	DSC	1			
W118 24.5	046.0		347	129	.....	.....		4.0 A

STA 1830Z

AV COMP P022 TOT DIST / TIME 5723 / 1120 6581 SM / 10599 KM ESAD - 5469

DESCENT SPOT WIND DATA

ALT	WIND	ALT	WIND	ALT	WIND	ALT	WIND
	DIR SPD		DIR SPD		DIR SPD		DIR SPD
29000	260 / 109	21000	266 / 081	13000	268 / 053	7000	273 / 028

ZF WT	214500	A-B TIME/FUEL	1120	91286
NET FUEL	103851	CONTGCY FUEL 2 / 2		1826
B R WT	318351	DEP ALLOWANCE		0
BURNOFF	92799	ETP B/U	0039	4264
LAND WT	225552	ARRIVAL ALLNC		409
		INST APP KLAX	12	1104
MIN RES	2889	XTR HOLD KLAX	0021	2073
		TANKER FUEL		0
COST INDEX	050	DIV TO	0000	0
CRZ ALT	310	XTR HOLD		0
CRZ WIN	211 / 38	FIXED FUEL RES	0030	2889
T/C OAT	-40	TTL FUEL ENDURANCE	1302	103851

TIME / FUEL SUMMARIES FOR ZFW CHANGE

	ZFW	A - B	TIME / FUEL	BURNOFF	TTL FUEL
PLUS 1000KG OR					
LIMITING ZFW	215500		1120 91670	93183	104258
FL310 TERAN 330 05W61 350 20N40 370					
MINUS 1000KG	213500		1120 90914	92427	103457
FL310 TERAN 330 05W61 350 20N40 370					

CONTINGENCY SUMMARIES

	ZFW	A - B	TIME / FUEL	BURNOFF	TTL FUEL
LOWER LEVEL CR050	214500		1120 93345	94858	105629
CONTGCY FUEL 2 / 2					
FL290 TERAN 310 05W61 330 20N40 350					
HIGH SPEED CR200	214500		1111 93253	94766	105404
CONTGCY FUEL 2 / 2					
FL310 TERAN 330 05W61 350 20N40 370					
LOWER SPEED CR000	214500		1125 91171	92684	103766
CONTGCY FUEL 2 / 2					
FL310 TERAN 330 05W61 350 20N40 370					

CRITICAL FUEL SUMMARIES

S/H NZAA –

EDTO

ENTRY AKL S31 19.31 E179 56.20 EET 00.54 ETA
 EXIT LAX N29 52.70 W125 12.75 EET 10.27 ETA

ETP1D AKL-APW AT TERAN - 63 EET 01.37 ETA FUEL REQD 36252
 W/C AKL M007 EET 2.16 W/C APW P006 EET 2.15 DIVN FUEL 17748
 ETA AKL 1008Z ETA APW 1007Z FUEL IN EXCESS OF ETP RQMNT 67599
 ETP CRZ FF INCR BY 1 % FOR 99 % OF EET FROM ETP DUE ICING CONDNS
 ETP POSN S26 41.8 W175 46.1

ETP1D APW-HNL AT 05N53 - 327 EET 05.30 ETA FUEL REQD 79438
 W/C APW P004 EET 3.30 W/C HNL M007 EET 3.30 DIVN FUEL 27487
 ETA APW 1515Z ETA HNL 1515Z FUEL IN EXCESS OF ETP RQMNT 24413
 ETP CRZ FF INCR BY 1 % FOR 99 % OF EET FROM ETP DUE ICING CONDNS
 ETP POSN N00 44.0 W156 24.9

ETP1D ITO-LAX AT 25N33 - 204 EET 09.09 ETA FUEL REQD 103851
 W/C ITO M005 EET 3.06 W/C LAX P013 EET 3.09 DIVN FUEL 23822
 ETA ITO 1830Z ETA LAX 1833Z FUEL IN EXCESS OF ETP RQMNT 0
 ETP CRZ FF INCR BY % FOR % OF EET FROM ETP DUE ICING CONDNS
 ETP POSN N22 57.5 W135 58.4

ALTERNATE SUMMARIES

KLAX-KONT 97NM FL130 W/C P034 TIME 0.20 FUEL 3036 MIN RES 5925
 LKAX DCT SLI V8 PDZ DCT KONT
 KLAX-KFAT 186NM FL200 W/C M021 TIME 0.39 FUEL 5047 MIN RES 7936
 LKAX DCT EHF TTE DCT KFAT
 KLAX-KLAS 236NM FL210 W/C P044 TIME 0.39 FUEL 5130 MIN RES 8019
 LKAX DCT DAG DCT KLAS

WIND TEMP AND COMP SUMMARY

WX PROG DAY/HOUR XX/18

POINT	FL140		FL220		LOWER LEVEL		PLANNED FL		HIGHER LEVEL			
	WIND	TMP	WIND	COMP	FL	WIND	COMP	FL	WIND	COMP		
NZAA	27015M01		23024		29	23030		31	22033		33	23035
AA	27015M01		23024P019		29	23030P025		31	22033P027		33	23035P028
AGEDU	29017M02		24023P021		29	21032P031		31	21035P034		33	21037P036
INTIB	27010M02		27015P009		29	31023M003		31	32026M007		33	33028M011
TERAN	15002P00		28010P005		29	28015P007		31	28016P007		33	28017P008

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FICKY	29052M09		28064P048		35	26123P113		37	26123P110		39	26119P106
ROSIN	28054M09		28068P059		35	26127P124		37	26127P123		39	26123P119
MALIT	28056M09		27071P045		35	26132P104		37	26132P100		39	26127P095
GOATZ	27057M11		27077P054		35	26137P109		37	26130P100		39	26120P090
SXC	27057M11		27078P057		35	26138P111		37	26130P101		39	26119P090
LAX	27057M13		27083M005		35	26137M004		37	26125M007		39	26110M007
KLAX	27057M13		27083		35	26136		37	26125		39	26110