Delta Virtual Airlines

Boeing 777-200ER
Aircraft Operations Manual

4th Edition
January 2014

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WELCOME

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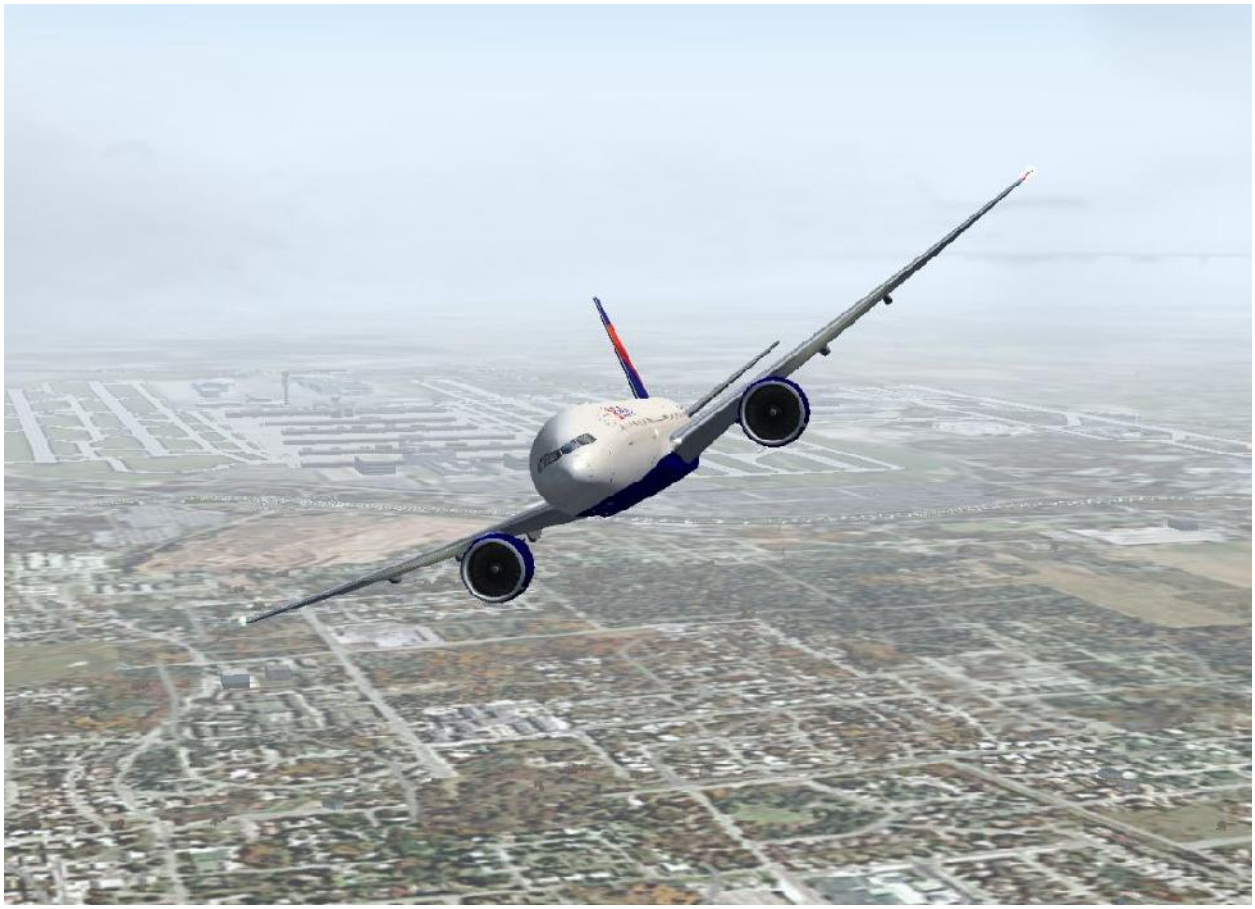
By reading this AOM you have already begun your journey to piloting the most advanced and largest 2-engine aircraft in Delta's fleet. The Boeing 777 represents a major advancement in size, technology and comfort. We welcome you to our fine program.

We are always seeking to improve the accuracy of this AOM. Should you have questions about the specifics of this airplane, this manual or aviation in general, you should create a help desk issue at our website, www.deltava.org

If you would like to receive virtual flight training that is modeled after real world training, go to the Pilot Center on our website, www.deltava.org where you can sign up for flight instruction in the DVA Virtual Flight Academy.

It is our hope that you will enjoy your time in the program.

B777 Chief Pilot



HISTORY AND OVERVIEW

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At the beginning of the “Jet Age” in the late 1950s and early 1960s, speed was the paramount consideration between jetliners. Early airliners such as the Boeing 720 could cruise up to Mach 0.90, and the Convair 990 reached speeds up to Mach 0.97. The oil crisis of 1973 accelerated a trend that began with the Boeing 747 – a trend towards larger, more economical airliners.

In the 1980s, airlines started to make extensive use of “big twin” aircraft such as the Boeing 757, 767 and Airbus 300 to deliver large passenger loads without the high operating costs of the aircraft they replaced, such as the 727, DC-10 and DC-8. Today, Delta’s trans-oceanic flights are dominated by the Boeing 767, 757 and 777.

In the late 1980s, Boeing received requests for a new, larger twin-engine airliner to replace older L-1011’s, DC-10’s and early model 747’s. Originally, they started out with a 767 derivative called the 767-X. After initial customer feedback, this derivative design was scrapped in favor of a completely new aircraft that became the 777. This aircraft would have the economics of a large, twin-engine aircraft combined with the range and seating capacity of a multi-engine airliner.

The airplane is larger than all other twinjet or tri-jet airplanes, yet smaller than the 747 and it brings the twin-engine economic advantage to medium- and long-range markets. The 777 currently is available in five models: 777-200, 777-200ER (extended range), 777-200LR (longer-range), 777-300 and the 777-300ER. The 777s seat from 301 to 368 passengers in a three-class configuration with a range of 5,210 nautical miles (9,649 km) in the 777-200 to 9,395 nautical miles (16,316 km) for the 777-200LR (longer range) model.

The 777 program was launched in October 1990 with an order from United Airlines. In June 1995, United flew its first 777 in revenue service. On June 26th, 1995, the Boeing board of directors authorized production of the 777-300. The first 777-300 was delivered to Cathay Pacific Airways in June 1998. The 777-300 is a high-capacity, stretched version of the newest twin-aisle jet. This newest member of the 777 family is "market-

driven" to meet airline demand for a jetliner sized to replace older twin-aisle airplanes. The 777-300 complements the existing range of available 777 models with another set

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of mission capabilities for the world's carriers and offers an attractive option for progressively lower costs per seat within the 777 family.

The Boeing 777 is the first jetliner to be 100 percent digitally designed using three-dimensional computer aided design. Throughout the design process, the airplane was "pre-assembled" on the computer, eliminating the need for a costly, full-scale mock-up. New design and testing initiatives helped ensure the highest possible levels of reliability on the very first 777, compared to what had been possible on previous jetliner introductions. Today's 777 operators enjoy a 99 percent reliability rate, which is unmatched in the industry.

Rollout of the first of the two models occurred in late 2002 with flight testing occurring the next year. Boeing originally anticipated a market demand for more than 500 of these two new 777 models, with about 45 percent of those airplanes going to Asian

operators. As of July 2013, approximately 1174 Boeing 777's had been delivered in -200, -300 and freighter models to over 50 operators with another 340 on order. The largest operator of Boeing 777's is United Airlines, followed by Emirates and Singapore

Airlines. Delta Airlines currently operates 18 aircraft, all are -200LR or -200ER versions. Air France operates 55 777's, 32 of which are the longer -300 version.

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On May 30th, 1995 the 777 became the first airplane in aviation history to earn U.S. Federal Aviation Administration (FAA) approval to fly 180-minute extended range twin-engine operations (ETOPS) on the day it entered service. On February 15th, 1996 the 777 was named the winner of the prestigious Robert J. Collier Trophy by the U.S. National Aeronautic Association, honoring the top aeronautical achievement of 1995. Boeing was since achieved a 330-ETOPS rating for the entire 777 family using GE engines.

POWER PLANT

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The Boeing 777 is available with a choice of three major turbofan engines from major global manufacturers. Delta uses Rolls-Royce engines on the 777-200ER and General Electric engines on the 777-200LR, and Air France uses engines manufactured by General Electric. A third option, not modeled or discussed in detail here, utilizes Pratt & Whitney PW4000 engines.

ROLLS-ROYCE TRENT 800

The Trent 800 entered service in April 1996. Built on the foundation of Trent 700 (which entered service in March 1995) experience, the Trent 800 was certified ahead of schedule at 90,000 pound-thrust, exceeding its original target of 84,000 lb.

The Trent 800 rapidly established a reputation for industry leading reliability and the capability of the original design has been demonstrated by continuing thrust growth. Today the Trent 800 is available from 75,000 to 95,000 lb. thrust with a common engine standard, the widest range of any engine in its class. Its three-shaft configuration and second-generation hollow titanium wide-chord fan technology also mean that a Trent-powered Boeing 777 weighs up to 8,000 lb. less than competitor-powered versions. Low weight and high thrust equates to optimum revenue earning capability. Today, the Trent 800 is the power plant of choice for the 777, with around 44% of the available market.

GENERAL ELECTRIC GE90

Following an extensive technical evaluation, GE Aircraft Engines was specified by Boeing to develop a 115,000 pound-thrust GE90 derivative engine for all longer-range 777-200LR and -300ER derivatives.

The advanced technologies that were introduced on the original engine in 1995 are incorporated into the GE90-115B engine. This derivative engine represents the successful culmination of the original strategy in the early 1990s to build a new centerline engine for the Boeing 777 aircraft family. Today, the GE90-115B is the world's most powerful jet engine sustaining a record 122,965 lbs of thrust during initial ground testing at GE's test facility near Peebles, Ohio.

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In early 2002, the engine began flight tests on GE's Boeing 747 flying test bed at Mojave, California. It received FAR33 certification (rated at 115,000 lbs of thrust) by the U.S. Federal Aviation Administration and the European Community's Joint Airworthiness Authorities in 2002.

Boeing 777's with GE90 engines have achieved ETOPS-330 ratings.

BOEING B777-200ER TECHNICAL SPECIFICATIONS

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Dimensions	Boeing 777-200ER
Length	209 Ft 1 In
Height	60 Ft 9 In
Wingspan	199 Ft 11 In
Wing Area	4,605 Sq Ft
Power plants	
Engine Type	2 ea Rolls Royce Trent 892
Maximum Thrust	93,400 Lbs/Engine
Weights	
Empty Weight	315,000 Lbs
Max Zero Fuel Weight	461,000 Lbs
Max Takeoff Weight (MTOW)	765,600 Lbs
Max Landing Weight	470,000 Lbs
Payloads	
Maximum Payload	136,000 Lbs
Total Cargo Volume	5,330 Cu Feet
Max Takeoff Length	11,000 Ft
Landing Runway Length – ISA, SL Flaps 30 deg.	See performance tables
Gross Weights	
Max Gross Weight	768,000 Lbs
80% Payload Zero Fuel Wt.	425,000 Lbs
Capacity	
Typical Passengers	225 Econ + 52 Bus. Elite
Total Seating Capacity	277
Cockpit Crew	2
Service Ceiling	42,000 Ft
Maximum Range	7,725 Nm
Range Fully Loaded	5,960 Nm
Cruising Speed Range	300-520 KTAS
Typical Crz Spd @FL350	320 IAS (Mach 0.80 to M 0.84)
Maximum Fuel Capacity	302,974 Lbs

COCKPIT CHECKOUT –FS2004

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This cockpit checkout reflects the current panel used on the DVA 777 installer, keep in mind this is a freeware panel that does include a virtual cockpit. Some of the features in the 2D cockpit work in the 3D cockpit.

This is a general description of the 777 systems. Cockpits are identical for both -200 and -300 versions of the 777.

MAIN PANEL

The 777 cockpit is much different than the steam gauges and dials of aircraft from earlier eras. Three LCD's, called Multifunction Displays are capable of doing the work of multiple gauges in the cockpit.

1. Multifunction Displays (MFD's).
2. Autopilot Panel (Mode Control Panel, MCP)
3. Overhead Panel
4. Backup artificial horizon, altimeter and airspeed indicator.
5. Radio stack and pedestal
6. Engine Start/Stop, Brakes, Landing Gear and Trim

MULTIFUNCTION DISPLAYS (MFD'S)

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The three primary MFD's are the Navigation Display, Primary Flight Display, and EICAS as described below.

NAVIGATION DISPLAY

The middle MFD can be controlled by the white knob below it. By clicking on the right side of the knob, the MFD will cycle through various views of the HSI. These are shown below. When a NAVAID frequency is dialed into the NAV1 radio, the navigation display will show the Navaid code, frequency and DME.

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PRIMARY FLIGHT DISPLAY

The left MFD is the primary flight display. Its primary indicators are indicated airspeed, pitch, attitude, and altitude. It also displays heading, rate of climb/descent, and mode of flight. The Primary flight display is shown below.

EICAS

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Similarly to the left MFD, the right MFD, which displays the Engine Indicating and Crew Alert System (EICAS), can be adjusted to display different information. The display is adjusted using the white knob furthest to the left as indicated below.

The primary EICAS screen displays EPR, N1, EGT, Flap Indicator, and Fuel and can be cycled using the knob highlighted above through various types of displays. The above screenshot shows the engine/fuel data screen and the control knob. This aircraft is not equipped with a TCAS display.

AUTOPILOT CONTROL PANEL (MCP)

1. Autopilot Master Switch

ON: Activates the Auto-pilot system

OFF: Deactivates the Auto-pilot system

2. Flight Director Switch

ON: Displays the flight director command bars on the associated ADI

Turn on the F/D switch on the ground with no autopilots engaged. If no autopilot is engaged, the flight director defaults to heading hold and vertical speed mode.

OFF: Turns off the flight director display bars on the ADI

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3. Autothrottle Switch

ON: Arms the autothrottle for engagement.

Engagement requires you to push the SPD switch.

Off: Disarms the autothrottle.

4. SPD Hold

Pushing the SPD switch will cause the autothrottle to hold speed displayed in the airspeed indicator, subject to maximum speeds.

Speed is displayed in ADI

5. Mach Hold

Pushing switches between air speed setting and Mach number. Twisting knob adjusts for both.

6. GPS Switch

Holds the aircraft of the GPS Route entered into the GPS System. The GPS switch is not labeled in the graphic above. It is the POS switch just to the left of the Flight Director Button.

7. NAV Switch

Holds the aircraft heading at the course entered or, in combination with the GPS switch, directs the aircraft to follow the flight plan entered in the flight planner. If no flight plan is entered or loaded, there is no guarantee that the aircraft will fly you to your destination.

8. APR Hold

Armed the AFDS to capture and fly the localizer and glide slope. The correct NAV1 frequency and approach heading must be entered for this mode to work properly. Your experience may vary and this type of approach in the fleet installer is not a guaranteed autoland.

Glide slope will not capture if intercept angle is greater than 80 degrees.

Approach mode allows for multiple autopilots to be armed for autoland and rollout.

9. FLCH LVL Switch

The flight change level switch does not operate as it does in most payware FMC applications. Flight level and vertical speed should be controlled manually or using the autopilot digital dials mentioned below.

10. Heading Bug

The heading bug will adjust the heading of the aircraft or VOR direction depending upon the operation of the aircraft within the other modes of flying. While flying in autopilot heading mode, this dial will directly control the course the aircraft flies.

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12. HDG Heading Hold Button

The heading hold button will maintain the aircraft flying the heading above it when activated.

12. Vertical Speed Switches

Top – changes the vertical speed which is displayed on the VSI

Bottom – press to engage vertical speed mode. V/S is displayed on each ADI. When pressed the autopilot/FD will maintain vertical speed displayed on VSI.

13. Yaw Damper

The Yaw Damper switch activates the yaw damper which is required for autopilot to function. The yaw damper on an aircraft is required to reduce the yawing and rolling oscillations during flight.

14. Altitude Selector and Hold Button

Cursor to left or right of knob to change altitude setting. Push “Hold” button to hold specified altitude.

15. Localizer Course Button

Theoretically holds back-course of established Localizer (NAV1 tuned).

16. Approach Course Button

Both the localizer and approach course buttons are designed to hold the aircraft on the ILS glide slope and path. This feature in the simulator is unstable and should not be relied upon for autoland sequences.

OVERHEAD PANEL

The overhead panel in the 777 fleet installer operates the de-icing and lighting systems. Alternatively, there is an additional yaw damper switch labeled “YD” which can be used in lieu of the aforementioned autopilot panel.

STANDBY INSTRUMENTS

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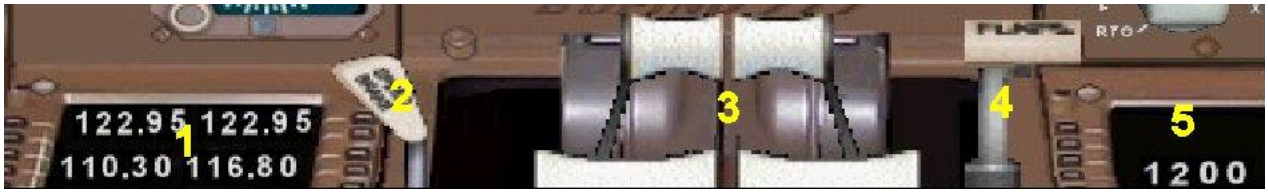
Standby instruments represent three of the six-instrument panel and display Attitude/Horizontal Horizon, Airspeed, Pressure and Altimeter. These settings correspond with information displayed in the EHSI and can be used upon EHSI failure. The standby altimeter is where the pilot can enter the altimeter information for the airport or standard altimeter of 29.92 when flying above FL180. Standby or backup instruments are used when the primary instruments are not operable. The standby instruments are always operable.

RADIO STACK AND PEDESTAL

The figure below depicts the radio stack and pedestal. The instruments in the area are represented according to the numbers indicated below:

1. COM/NAV Radios COMM1 COMM2
   NAV1 NAV2
2. Spoilers
3. Throttle
4. Flaps
5. Transponder



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1. COM/NAV Radios

Click on the value to change it up or down. A "+" or "-" should display. Alternatively, you can use the ACARS program to input the values (see the DVA ACARS manual).

2. Speed Brake/Spoilers

Click this icon to engage the speed brake/spoilers to slow down during flight or once you land. Pressing "Shift /" key will arm the spoilers and they'll automatically deploy once the wheels touch down upon landing.

3. Throttle

Throttle levers. Does not display when reverse engines is engaged.

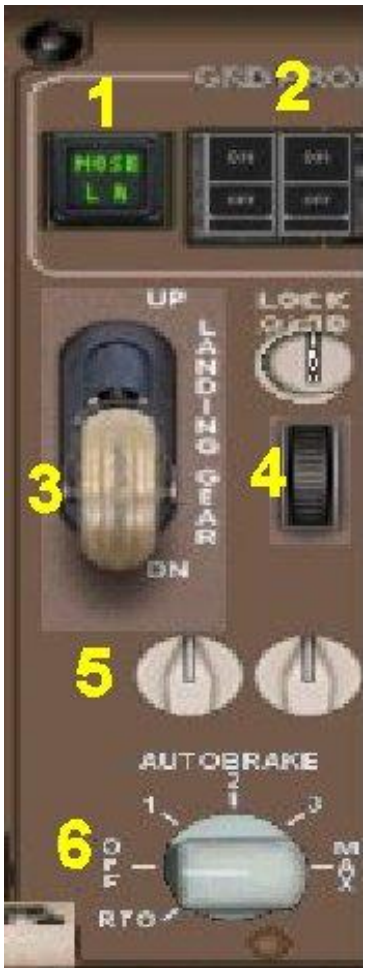
4. Throttle

Flaps Each advance of flaps moves the handle downward.

5. Transponder

Similar to the NAV and COM radios, click each digit to increase the value.

ENGINE START/STOP, BRAKES, LANDING GEAR AND TRIM



The figure to the left depicts the Engine Start/Stop, Brakes, Landing Gear and Trim instruments as indicated below:

1. Landing Gear Indicator Light

Color display shows the condition of the landing gear.

2. Engine On/Off Switches

Must be up in the "On" position prior to starting engines.

3. Landing Gear Lever

Operates landing gear up or down.

4. Trim indicator

Displays when trim is being activated. Can be clicked to adjust trim.

5. Engine Start Switches

Click to start engines.

6. Automatic Brakes

Settings are Rejected Take-Off (RTO), Off, 1, 2, 3 and Max. Set to RTO prior to taking-off.

TUTORIAL - FLYING THE AIRCRAFT

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The purpose of this tutorial is to demonstrate the proper procedures for flying the Delta Virtual Airlines 777. The starting point of this flight will be at the gate, with the airplane in a cold and dark configuration. The 777 is a Stage 5 aircraft at Delta Virtual Airlines, so we will assume that the pilot has basic knowledge of ATC communication and aircraft navigation.

Prior to getting started some discussion of the handling and performance of the fleet installer is necessary. While the aircraft model is excellent and an improvement over the default 777 that was included in FSX and FS2004, there are some nuances of which any pilot flying the fleet installer should take note. First is with regard to taxiing and climb-out for a domestic flight or relatively short flight (1,500 miles and less) compared to long range flights the aircraft is capable of making. Since shorter flights will require less

fuel than longer flights, the aircraft will be relatively light. As discussed earlier, the 777's engines are the largest used by a commercial airliner. The massive thrust of these engines can be overpowering to the aircraft when it is light on fuel. On short routes, the 777 will feel more like a small overpowered jet on the ground and will require only slight thrust when taxiing. The throttles should be backed off as soon as the aircraft begins to move. Upon take-off, the 250 KIAS maximum speed will approach in a hurry if the throttles are at too high a setting and pitch is too shallow. Be cognizant of the strength of the 777's thrust for ascent on shorter domestic flights.

It is also important to note that in the air the 777 is a very heavy aircraft and upon descent and approach, can be affected quite easily by throttle changes. The heavier an object at a speed, the more momentum it will carry with it. Only slight adjustments in

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throttle on final approach should be required. A pilot panicking because he's too low on final can easily apply too much throttle and float down the runway if he's not careful. Similar to other large aircraft, thinking ahead is critical and planning is crucial for achieving successful landings.

Let's get started. Start flight simulator, and load up the fleet 777-200. Make sure the proper payload and fuel is loaded into the aircraft. In order to properly load fuel, the ACARS fuel planner can be used, as well as the fuel planning information that is contained in this AOM. It is not recommended that the ACARS fuel planner be used for check rides as this may give inaccurate results. The first panel that we look at once we get into the aircraft is the captain's seat in the main panel. This is where the first start checks will begin. Go through the checklists elsewhere in this AOM to complete the preliminary flight checks. Now that the safety checks are complete it's time to power up the aircraft. This starts at the overhead panel.

Per the checklist, go through the pre-engine start sequence. If you are flying online, obtain your necessary ATC clearance. Now that you have received your clearance, you should program the route into the flight simulator GPS. This can be done manually, or more easily the FS flight plan can be loaded directly into the GPS using the flight simulator flight planner. At this stage of flying, the use of SIDS and STARS should be well known to you and should be implemented. These can be programmed into the GPS by putting the correct waypoints into the flight planner, then loading the flight plan into the flight simulator GPS.

After the GPS is configured, preparations for pushback and start begin. Be sure the checklist items prior to pushback are completed. The aircraft is now configured for pushback and engine start. Obtain the proper clearance from ATC if flying online before pushback. Prior to pushback, turn on the RED Beacon light located on the overhead panel. Pushback using the method of your choice, typically Shift-P.

After pushback has been completed, set the Parking brakes. It is now time for engine Start. As you go through the engine start sequence, you should see the N2 setting for the right engine of the

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airplane start increasing. Once the N2 has accelerated past 20% then the right fuel selector should be turned to on. Once the Engine has finished starting, the right ignition switch will automatically flip back into the AUTO position. Repeat this same process for starting the left engine.

Perform your post-engine startup checklist items, turn on the lights and you're ready to taxi. If flying online, obtain the necessary taxi clearance. Taxi the aircraft to the hold short line of the appropriate runway, and complete the before takeoff checklist.

Once holding short of the runway, obtain your takeoff clearance prior to crossing the hold short line and taxiing onto the active runway.

Line up on the runway centerline. Once aligned, activate the auto throttle. Maintain runway alignment and monitor engine performance during takeoff roll. Monitor your speed and at Vr apply backpressure and smoothly rotate to an approximate 10º nose up attitude. Rotation rate should be about 3º per second. Maintain this attitude until liftoff and a positive rate of climb is achieved. Watch your airspeed and ensure you stay below the maximum flap speed (whether for flaps 5 or 15). Once a positive rate of climb is established and the altitude has increased beyond 50' AGL, retract the gear. You may also turn off the taxi light.

Once safely airborne, click the A/P button and engage the heading, speed, and altitude modes by pressing the specific knobs. Ensure that the airspeed continues to increase towards your selected airspeed and do not exceed the 250 knots speed restriction. Do not exceed 20º angle. Retract the flaps to 0 when passing 220 knots.

As your speed stabilizes at the target speed, you can increase the rate of climb. Don't be too aggressive or your speed will decay. Continue your climb out complying with any departure restrictions. Passing 10,000 feet set the target speed to 290 knots, unless your departure procedure dictates otherwise, and turn off the landing lights.

Once you are given clearance to proceed as filed, press the GPS button on the main panel and select LOC. The aircraft will begin to turn towards your first programmed waypoint. Although the GPS is now guiding the aircraft, be sure to monitor each waypoint segment to ensure proper navigation.

CRUISE FLIGHT

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As you pass through 18,000' MSL reset your altimeter to 29.92" (1013 mb) and continue to monitor the enroute climb speed of 300 KIAS. Passing through FL270 reduce the climb rate to 500 - 2000 fpm and 88% N1. Typical cruising altitude for the 777 is between FL310 and FL410 depending on flight length and the aircraft's gross weight. Typical cruising speed is Mach 0.84

Keep an eye on those systems! Be sure to watch the engine instruments for any problems with the oil temperature and oil pressure on the ECIAS display. Serious problems will display with red text and minor problems in yellow text. A drop in pressure and rise in temperature means you are on borrowed time. You will want to closely monitor the affected engine in the event you need to declare an emergency and divert to an alternate. Watch the fuel flow as well. A rise in fuel flow that is much higher than the opposite engine or a sudden imbalance can mean a fuel leak. That is an emergency also. An imbalance in the fuel tanks can also mean a fuel leak, monitor the tanks for some time before deciding to cross feed to balance them as crossfeeding with a fuel leak will only make your problem worse

You can turn off the seatbelt sign if your preflight briefing didn't show any forecasted turbulence, but advise the passengers to keep buckled up while they're sitting in their seats as turbulence can hit without warning.

DESCENT

At about 120 miles from your destination, turn on the fasten seatbelt sign and begin to review the STAR and complete the approach briefing. The briefing would include everything from forecasted weather, any dangerous terrain (manmade or natural), expected approach based on the prevailing wind and other airport conditions that you obtained in your preflight.

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As you are cleared to descend, dial in the correct altitude on the altitude selector and set your descent rate. Be sure to keep an eye on the airspeed so that you do not exceed Mmo. You should know by now that in large jets you can either get down quick or have a higher airspeed or you can slow the airspeed but have a much slower descent rate. You cannot do both so advise ATC if they give you descent instructions that you cannot follow. Alternatively you can descend at about 285 KIAS and 2,500 fpm. This equates to about 3nm per 1,000 feet of altitude change. You may need to use the spoilers to slow down. This is acceptable and encouraged if your airspeed gets too high. You may also want to slow to 2,000 fpm descent rate.

PASSING FL180

Set your altimeter to the destination airport's altimeter setting. Start to slow your speed to 280 KIAS. As you pass 15,000 MSL slow to 250 KIAS, and below 12,000 MSL slow to 240 KIAS. Turn on the landing lights as you pass 10,000 MSL. On the Auto-Pilot Panel, set the approach speed, or Vref. Your descent rate will now be around 1,200 fpm.

APPROACH

ATC will advise which runway you can expect to land on so make sure you have the same runway selected in your GPS. Double check the ILS/LOC frequency and set NAV1 to the correct frequency and set the approach course on NAV1. Either activate the approach in the GPS using vectors to final or from the initial approach point, whichever ATC has advised to you expect. Arm the spoilers and auto brakes. As you get to within about 20 miles of the field begin to slow to 190 KIAS and set flaps to 5. A speed of 180 KIAS is ideal for intercepting the final approach course when you are about 10-15 miles

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out. After the autopilot captures the glide slope (assuming you are flying an ILS approach) set your missed approach altitude in the altitude selector. Begin to slow your airspeed to about 170 KIAS and lower flaps to 15. When the glide slope is 1-½ dots above select the gear down. Make sure you check for 3 green gear indications! As the glide slope is one dot above select flaps 25 and slow to about 150 KIAS. At glide slope intercept the autopilot will begin to descend on the glide path. Set full flaps (30) and slow to your Vref+Correction speed, usually this is Vref+5 knots. You should also see the appropriate auto land annunciation.

LANDING

Following the glideslope or VASI/PAPI will have you touching down at around the 1,000 ft. marker. If on a visual approach, aim to touchdown on the 1,000 ft. markers (the blocks). You should maintain a descent rate of around 750 fpm on your final approach until your flare. Plan to cross the threshold at Vref. At about 30-40 ft. AGL bring the throttles back to idle, at about 30 ft. AGL begin your flare to slow your rate of descent for touchdown. After touchdown the auto brakes will activate and the spoilers will deploy if they were armed. If they were not armed they will deploy once reverse thrust is set. Slow the aircraft on the centerline of the runway to 80 KIAS then stow the reversers. Focus on the runway! You are still flying this plane until you park at the gate and walk away! Once you are cleared from the runway then you can clean things up. Stow the spoilers, retract the flaps, turn off the landing lights and strobes and turn on the taxi light and start the APU and turn off the autopilot. Contact ground control for your taxi instructions and keep your eyes outside the cockpit looking for ground traffic and obstructions. Now taxi to the gate and complete the after-landing checklist items.

PARKING

As you approach the gate be nice to the ground personnel and turn off the taxi light. Once at the gate set the parking brake and shut down the engines. The APU should be running now and will take over the bleed air that powers the packs and the electrics. After you shut down the engines turn off the beacon and the fasten seatbelt sign. Open the door and greet the happy passengers as they make their way out after having a great flight. Secure the aircraft per the checklist.

Congratulations on your first flight in the 777!

B777-200 Fuel Planning and Weight and Balance

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Detailed instructions on fuel planning are covered in the Flight Encyclopedia in the DVA Document Library.

Fuel Burn Charts – PPH/Engine

Altitude	Indicated Airspeed	True Airspeed	Fuel Burn PPH/Eng
Ground	12-20 KIAS	0 KTAS	3,000
12,000	250 KIAS	310 KTAS	6,600
FL180	275 KIAS	374 KTAS	6,300
FL240*	326 KIAS	482 KTAS	6,800
FL300**	275 KIAS	440 KTAS	7,200
FL360***	275 KIAS	473 KTAS	7,100
FL410***	258 KIAS	462 KTAS	6,700

*Indicated Mach 0.74.
**Indicated Mach 0.82.
***Indicated Mach 0.84

The burn numbers were determined using the DVA fleet 777-200LR in clear skies and no wind. The numbers are averages from a couple minutes spent at each altitude. They are just to give an estimate to your expected burn rate in pounds per hour. It is up to the pilot to ensure the aircraft has enough fuel to complete the flight. Fuel requirements for normal IFR operations require fuel to reach your destination plus reserves of 45 extra minutes. If an alternate is required, then fuel the aircraft to reach your destination, alternate, then an extra 45 minutes. Further information can be found in FAR 91.167.

Zero Fuel Weight (ZFW)

ZFW is the fully loaded airplane weight less fuel weight. ZFW will remain constant throughout the flight as the gross weight and fuel weight decrease by the same amount. However, ZFW will change with Payload and must be recalculated whenever passenger or cargo weight changes. Example below is for a Boeing 777-200LR.

- Max Gross Wt = Empty Wt + Max Fuel Wt + Max Payload
- = 320,000 lbs + 337,138 lbs + 91,420 lbs
- = 748,558 lbs

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- ZFW = Fully loaded Wt (Including Payload) – Fuel Wt
- Example 1: Max Gross Wt And Max Payload
  - ZFW = 766,000 – 337,138 = 428,862 lbs

FUEL LOADING EXAMPLE

Total Flight Distance: 1,000 nm
Alternate Airport Distance: 232 nm
Cruise Altitude: FL360 @ Mach 0.84
Typical Payload: 91,420 Lbs
Zero Fuel Weight: 411,420 Lbs
Takeoff and Landing Outside Air Temperature: 59º F
Winds Aloft: 0

Calculations:

- There is no unusable fuel calculation in this example. Enough reserves and contingencies are built into the calculation to account for any unusable fuel.
- A B777-200LR typically burns 3,000 PPH/ENG on the ground. This includes startup, taxi + misc. ramp time + hold at runway, etc. We will assume 1/2 hr. total ground time at both Departure and Arrival Airports. This amounts to: 0.5 hr. x 3,000 PPH/ENG or 1,500 Lbs/ENG.
- The Enroute Fuel Burn Rate of 7,100 PPH/ENG is shown in the Burn Rate Table FL360 column. This value will be greater during climb out and less in descent and should average out to the published value during the course of the flight.
- The formula for True Airspeed is KTAS = KIAS + (.02 x KIAS x Altitude/1,000).
- Therefore the True Airspeed at FL360 = 275 + (.02 x 275 x 36,000/1,000) = 473 KTAS
- The Enroute Flight Time = Trip Distance / TAS = 1,000 / 473 + 10 min = 2.28 rounded up to the nearest half hour = 2.5 hr.
- The Flight Time To Alternate = Distance / TAS = 232 / 473 = 0.5 hr.

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- The Enroute Fuel Used = Burn Rate x hrs. = 7,100 PPH/ENG x 2.5 = 17,750 Lbs/Eng
- The Fuel To Alternate Allowance = Burn Rate x hrs. = 7,100 x 0.5 = 3,600 Lbs/Eng
- The aircraft Zero Fuel Weight = 411,320 Lbs
- Gross Weight: Zero Fuel Weight + Fuel to Load (not including hold or reserve) x 2 engines = 411,320 Lbs + 2 * 22,850 Lbs = 457,020 Lbs
- In addition to fuel for the trip, it is necessary to plan for a 30 minute reserve and 45 minute hold. These can be determined similar to calculating the enroute fuel burn. Taking 30 minutes to be equal to 0.5 hours times 7,100 Lbs/hour per engine results in 3,550 Lbs/ENG. Perform a similar calculation for a 45 minute hold.

Fuel should be loaded in the wings first. Once 100% full then begin loading the center fuel tank. The center tank will drain out first.

Summarizing for both Engines:

Flight Event	Each Engine	Two Engines
Ground Operations	1,500	3,000
Enroute Consumption	17,750	35,500
Fuel to Alternate	3,550	7,100
30 Minute Hold	3,550	7,100
45 Min Reserve	5,325	10,650
Total Fuel to Load	31,675	63,350

Takeoff Weight:

The Takeoff Weight will be the Zero Fuel Weight + Fuel to Load or:

411,320 Lbs
63,350 Lbs
474,670 Lbs

Landing Weight:

The Landing Weight will be the Takeoff Weight – Enroute Consumption or:

474,670 Lbs
- 35,500 Lbs
439,170 Lbs

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Note that only the “Enroute Consumption” and “Fuel to Alternate” change from flight to flight and this does not include the fuel burned when holding at an altitude to cross a STAR at an assigned altitude. Therefore, our non-changing “Base” fuel for every flight is the sum of

- Ground Operations 3,000 Lbs
- 30 Min Hold 7,100 Lbs
- 45 Min Reserve 10,650 Lbs
- Total Base 20,750 Lbs

The base quantity should be included in every flight, regardless of planned distance and route. Add to the above your enroute fuel to determine total fuel required for your actual flight. Your results may vary slightly based on the number of significant numbers used in calculation. Do not use the fuel calculated by the FS program in the route planner. The formulas above may be programmed into an Excel spreadsheet if desired for easier reference.

Long Haul Planning:

Winds aloft are important aspect of flying a long haul flight, especially a Trans-Atlantic or Trans-Pacific flight. For the above example, we assumed zero winds aloft. It is important that any calculations of true airspeed to take into account winds aloft as this speed should be deducted from true airspeed if flying into the wind and added to true airspeed when flying with the wind. Be conservative with your calculations. You don’t want to end up with too much fuel in the tanks for landing or leave yourself short because you hit 100 knot headwinds you didn’t plan for. For long haul flights you will normally have an additional fuel field “Contingency Fuel” which will have you landing with around 5,000 lbs more than you would for a domestic flight.

B777 CHECKLIST

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Note: Abbreviated checklists are included in Appendix B.

AT GATE PARKED-BEFORE ENGINE START

o All Charts	On Board
o Flight Plan	Loaded in Flight Planner
o Weight/Balance	Verify Configuration
o V speeds/Flap Settings	Calculate V speed card page
o Parking Brakes	ON
o ACARS (Optional)	Connect Flight Start (Optional)
o All doors (Outside View)	VERIFY Closed / Locked
o Flight Controls (Outside View)	Demonstrate FREE & CLEAR
o Battery Master Switch	ON
o Engine Pos Switches	AUTO
o Passenger Signs ‘	ON
o Gear Lever	VERIFY Gear Lever Down
o Clock/Stopwatch	VERIFY SET
o Fuel on board	Document Amounts
o COMM Radio	TUNE ATIS
o Altimeter	SET
o COMM Radio	SET
o NAV Radio’s	SET IDENT
o ADF	SET IDENT
o HSI/CDI	SET (CRS)
o Heading bug	SET (HDG)

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- IAS — SET V2 (SPD)
- Altitude — SET (ALT)
- Vertical Speed — SET (VS)

ATC CLEARANCE- Call for IFR/VFR Departure-Push/Start Request

- Transponder — SET Code/VERIFY Squawk Standby
- Crew Takeoff Briefing — Completed

-BEFORE ENGINE START CHECKLIST COMPLETED-

ENGINE START

- Parking brakes — VERIFY ON
- Simulator time at start — Document
- Battery — ON
- Beacon — Verify ON
- Recognition Lights — ON

WHEN CLEARED TO START

- Throttle Power Levers — IDLE
- Engine Area — CLEAR
- Right Ignition Switch — RIGHT/START
- Fuel Flow — CHECK
- N1 increasing as N2 incr. — CHECK
- Oil Pressure — CHECK
- Eng 2 Start Switch — RIGHT/START
- Fuel Flow — CHECK
- N1 increasing as N2 incr. — CHECK
- Oil Pressure — CHECK

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AFTER ENGINE START

o Parking brakes	VERIFY ON
o APU	OFF
o Navigation, Tax Lights	ON
o De-Ice	ON
o Elevator Trim	SET
o Flap Selector	SET 5 degrees
o Standby Instruments	SET
o Avionics	SET For Departure

TAXI

ATC TAXI CLEARANCE- Request taxi to active runway

o Fasten Seat Belts	ON
o No Smoking Sign	ON
o Throttle Power Levers	IDLE
o Parking Brakes	Release
o Pushback	Shift+P
o Taxi Power	Speed Max. 20 kts (straight away) 10 kts (in turns)
o Instrument Check-taxi	VERIFY movement: Compass/HSI/Turn/Bank
o Cabin Announcements	Perform during Taxi

-TAXI CHECKLIST COMPLETED-

BEFORE TAKEOFF/HOLD SHORT LINE

o Parking Brakes	ON
o Flight Director	ON
o Autopilot	CYCLE ON/OFF – VERIFY OFF

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- Landing Lights — ON
- Taxi Lights — OFF
- Strobe Lights — ON
- Spoilers — VERIFY Retracted

Document takeoff time-fuel amount

- Autobrake — RTO
- Flap Selector & Trim — VERIFY Settings
- COM's, NAV's & ADF — VERIFY Settings
- Transponder — Squawk Normal

ATC Take off CLEARANCE – Request for takeoff

TAKEOFF-CLEARED OR TAXI TO LINE UP AND WAIT

- Cabin Crew Notify — 2 chimes
- Runway — VERIFY Clear
- Toe Brakes — ON
- Heading bug — VERIFY Runway heading
- Throttle Power Levers — Advance 50% N1
- Engine Instruments — VERIFY Movement
- Toe Brakes — Release
- Throttles Power Levers — Advance to 89% N1
- Vr (as calculated) — Rotate to 10 degree pitch up
- Landing Gear — UP at V2 + positive rate of climb

-BEFORE TAKEOFF CHECKLIST COMPLETED-

TAKEOFF AND INITIAL CLIMB

- Thrust — Smoothly to 40% N1, let spool up
- Takeoff Thrust — Smoothly to 90% N1

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o V1	Per take-off charts (Safety speed)
o V2	Per take-off charts (Safety speed)
o Gear Up	100 ft AGL
o 210 KIAS	RETRACT FLAPS FULL UP
o Trim	ADJUST for <250kts

See Emergency Procedures for Abnormal Flight Conditions

CLIMB TO ALTITUDE

o Fuel flow rate-engine instruments	Monitor
o Autopilot/Autothrottle On	ARM & SET/GPS/LOC
o Autobrake/Taxi Lights	OFF
o Climb Profile	225 KIAS to 2,500 AGL <250 KIAS to 10,000 320 KIAS to 18,000 320 KIAS to FL270 Above FL270: 300-320 KIAS at rate of 500-2000 fpm
o Landing Lights (10,000 ft)	OFF
o Cabin Crew Notify	1 chime
o Crossing 18,000 feet MSL	Reset Altimeter to 29.92 in.

ENROUTE

o Elevator Trim	ADJUST for Cruise
o Flight progress, fuel flow and engine ops	MONITOR
o Cruise speed	Mach 0.84
o Crew Approach Briefing	Completed

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DESCENT

ATC Descent CLEARANCE – Descend

o Field Elevation (ovrhd panel)	SET
o Throttle Power Levers	FLIGHT IDLE or A/T & A/P
o De-Ice	ON
o Landing Airport altimeter below FL180	SET
o Airspeed M 0.84 till 320 KIAS	SET
o Airspeed 310 KIAS till FL180	SET
o Airspeed 270 KIAS till 15,000 ft.	VERIFY
o Airspeed 250 KIAS till 12,000 ft.	VERIFY
o Airspeed 240 KIAS passing 10,000 ft	VERIFY
o Fuel Quantities & Balance	CHECK
o Vref	NOTE
o Airspeed 250 KIAS below 10,000 ft	VERIFY 1,500 fpm descent
o Flight Spoilers	As Required
o Landing lights (crossing 10,000 ft)	ON
o Cabin Crew Notify	2 chimes

APPROACH

ATC Approach CLEARANCE – Approach

o Fasten Seat Belts	ON
o No Smoking Sign	ON
o Avionics & Radios	SET
o Speed:	160 KIAS
o Autobrakes	SET
o Flight Spoilers	ARM

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o COMM Frequencies	SET
o ILS/LOC frequency	SET
o Navigation Radios	SET Freq/IDENT
o Flap Selector @20nm	Flaps 20, Speed 160

At ILS Capture

o Flap Selector	Flaps 30, Speed Vref + 15
o Altitude Selector	SET Missed app. altitude

1-1/2 dots above the glideslope

o Landing Gear	DOWN
o Flap Selector	Flaps 30, Speed Vref + 15
o Stabilized Approach	Full Flaps
o Final Approach	Speed Vref + 5

LANDING

ATC Landing CLEARANCE - to Land

o Crossing Threshold	Flaps FULL, Speed (Vref)
o Flight/Ground Spoilers (GLD)	Extended
o Engine Reverse	Reverse (> 80 KIAS – “F2”)
o Toe Brakes	APPLY (< 80 knots)

Note: Do not execute an Autoland with a crosswind component of 25 knots or greater. Exit high-speed taxiways at 30kts, or 8-12 knots at any other runway turn off.

-LANDING CHECKLIST COMPLETED-

AFTER LANDING (WHEN CLEAR OF THE RUNWAY)

ATC Taxi CLEARANCE - To gate

o Transponder/TCAS	SET Standby
o Landing Lights	OFF

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- Strobe lights — OFF
- Taxi Lights — ON
- Flap Selector — UP
- Flight/Ground Spoilers (GLD) — Retract
- APU — START
- Elevator Trim — SET to Zero

-AFTER LANDING CHECKLIST COMPLETE-

GATE SHUTDOWN

- Parking brakes — ON
- Taxi Lights — OFF
- Fuel Flow — OFF (Ctrl –Shift-1)
- Engines — Shutdown
- Seat Belt Sign — OFF
- Beacon/Navigation/Panel Lights — OFF
- De-Ice — OFF
- Generators — OFF
- Battery — OFF

EMERGENCY PROCEDURES

STALL RECOVERY

- Pre-Stall Symptoms:
  - Airspeed slowing below Vr – 20Kts
  - Stall Warning Display Appears
  - Unable to Hold Autopilot Altitude
  - Aircraft Attitude above 30 degrees

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- Stall Recovery Procedure
  - Disable Autopilot and Autothrottle
  - Apply Full Power
  - Push Nose to Horizon
  - Retract Landing Gear
  - Raise Flaps on Schedule
  - Reduce power to pre-stall speed when lost altitude regained

ATC COMMUNICATIONS IN EMERGENCY SITUATIONS

Decide whether situation merits the declaration of an emergency.

If so, call “Mayday, Mayday, Mayday, Delta Virtual Airlines (flight number) declaring an emergency. (State intentions)”

Continue as instructed by procedures plus ATC if possible.

By declaring an emergency, you will receive the right of way unless other aircraft has more serious emergency.

MISSED APPROACH

Execute Missed Approach if at minimums with no visual reference, or if uncomfortable with the landing. Never try to salvage a landing out of a poor final approach.

Call for Max Thrust and flaps 20°.

- Engage autopilot missed approach course.

Once positive rate of climb attained, select gear UP.

At 1,500 feet AGL lower nose appropriately and continue with the takeoff procedure for cleaning the aircraft up.

REJECTED TAKE-OFF (RTO)

Note: Procedure only used if problem occurs on the ground before V_1.

- Set Throttles Full Reverse Thrust (Autobrake should engage).
- Put Spoilers UP.
- Ensure Auto brake has engaged and if not engage manually.
- Call the Tower and inform you are aborting Take-off.

SINGLE ENGINE DEPARTURE

Note: For use when Engine fails after V_1

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- Compensate for lack of power by adding the appropriate rudder.
- Reduce climb rate to 1000 fpm as opposed to 3000 fpm.
- Reduce throttle to 75% N_1.
- Return to departure airport.

ENGINE FAILURE MID-FLIGHT

- Cut-off fuel to Engine.
- Set Fuel Cross feed from tank on failed engine side.
- Reduce altitude to one where acceptable power setting can be established.
- Reduce cruise speed.
- If possible continue to destination otherwise attempt to return to origin.

ENGINE FIRE

- Pull fire extinguisher handle on appropriate engine.
- Cut off fuel to appropriate engine.
- Declare emergency.
- Cross feed fuel.
- Continue to Single engine Landing procedures (see below).

SINGLE ENGINE LANDING

- Use rudder to compensate for lack of power.
- Use flaps full as opposed to 30°.
- Stay on or above the glide slope at all times.
- Set Auto-brake FULL.
- Do NOT use Thrust reversers on rollout.
- Proceed as if normal landing with the exceptions listed above.

TOTAL POWER LOSS

- Determine if possible to reach airfield, if not search for an appropriate field or clearing to land in.
- Stay on or above the glide slope at all times during approach. Once you get below it, you cannot get back up above it.
- Use full flaps for landing.
- Set Auto-Brake FULL.
- Continue as if normal landing.

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GEAR STUCK UP

- Attempt to lower gear using backup hydraulic system.
- Inform Air Traffic Control of your situation.
- Follow ATC instructions on where to land. If options given, preferences are:
- 5000’ Smooth/flat field
  - Grass beside runway (assuming no taxiways to be crossed)
  - Runway
  - Large lake or wide river
  - Bay
  - Open Ocean
- Use full Flaps.
- Use lowest possible landing speed to minimize damage.
- Reduce landing impact to less than 200 ft per minute.
- Sound evacuation alarm on landing.

CREW TAKE-OFF BRIEFING

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Captain to Co-pilot

We will be taking off on RWY (active runway), climbing to (altitude). If we encounter an engine malfunction, fire or other emergency before V_1 (critical engine failure recognition speed) KIAS, the flying pilot will retard the throttles to flight idle and bring the aircraft to a complete stop on the runway. The non flying pilot will notify the proper ATC of our intentions and assist the flying pilot as requested or needed to operate the aircraft in a safe manner.

If the aircraft has reached V_r (rotate speed) KIAS, the flying pilot will fly the aircraft per company procedures and the non flying pilot will notify the appropriate ATC of our intentions and assist the flying pilot as requested or needed to operate the aircraft in a safe manner and land the aircraft as soon as possible.

Aircraft Weight is: _____ Taxi Instructions to Active: _____

V Speeds for this flight are (calculated) See prepared Flip Chart(s)

Flap Settings: Takeoff _____ Engine Failure Approach _____

Discuss the Departure Procedures for this flight (Ref Charts, SIDs)

Discuss Weather considerations (Ref ATIS, METAR, and TF)

CREW APPROACH / LANDING BRIEFING

Captain to Co-pilot

Weather conditions are (obtain from ATIS, METAR and TAF).

Landing on RWY (active runway) at (airport) using the (???) approach (Ref STAR)

Descend at (???). Our Final Approach altitude will be (???)

V Speeds for this approach are (calculated) (See prepared Flip Chart(s))

Missed approach Procedures are (Ref Approach Plates)

Taxiway Turnoff _____ Taxi Route from Active _____

Parking at Gate (#)

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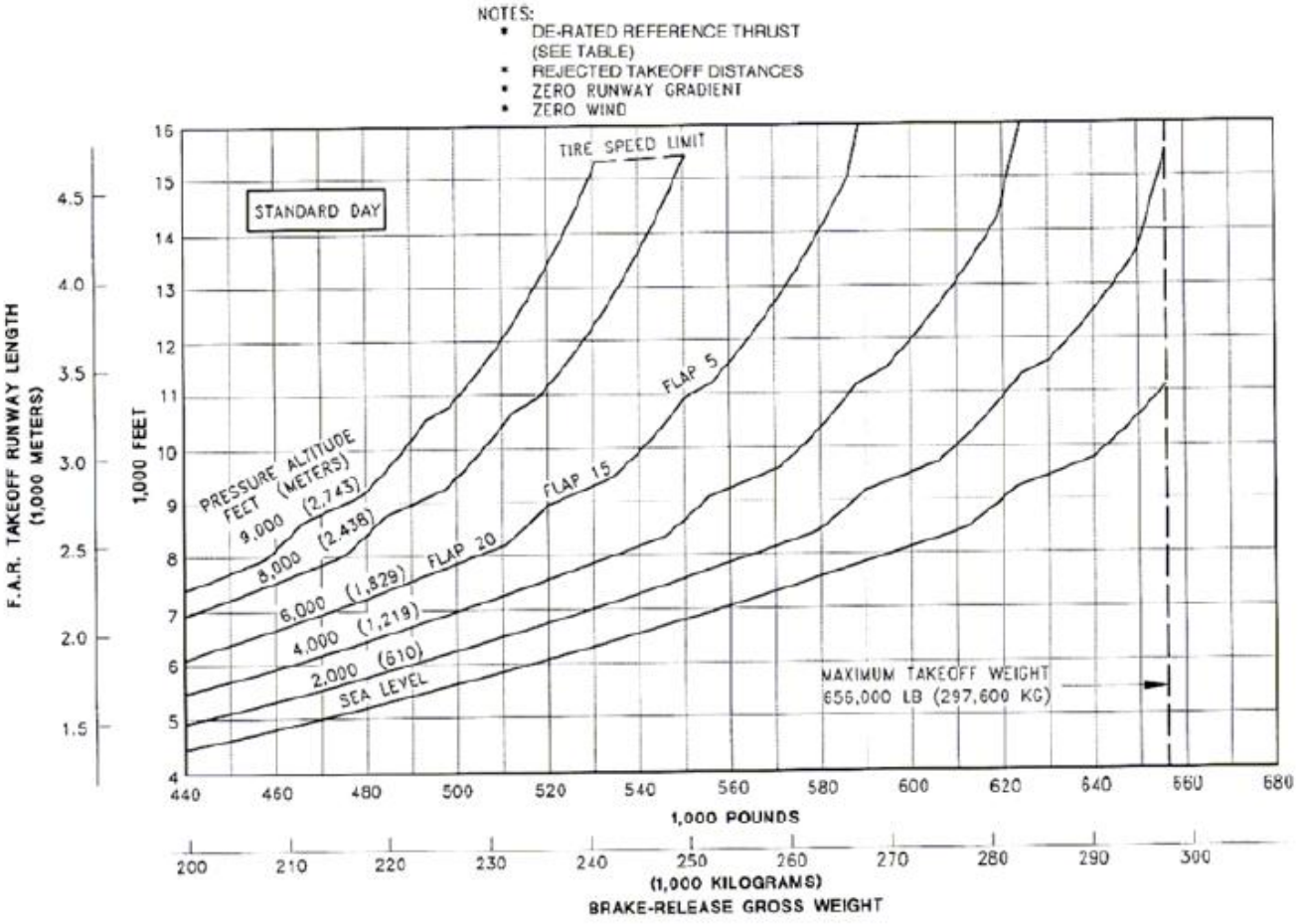
APPENDIX A—CHARTS

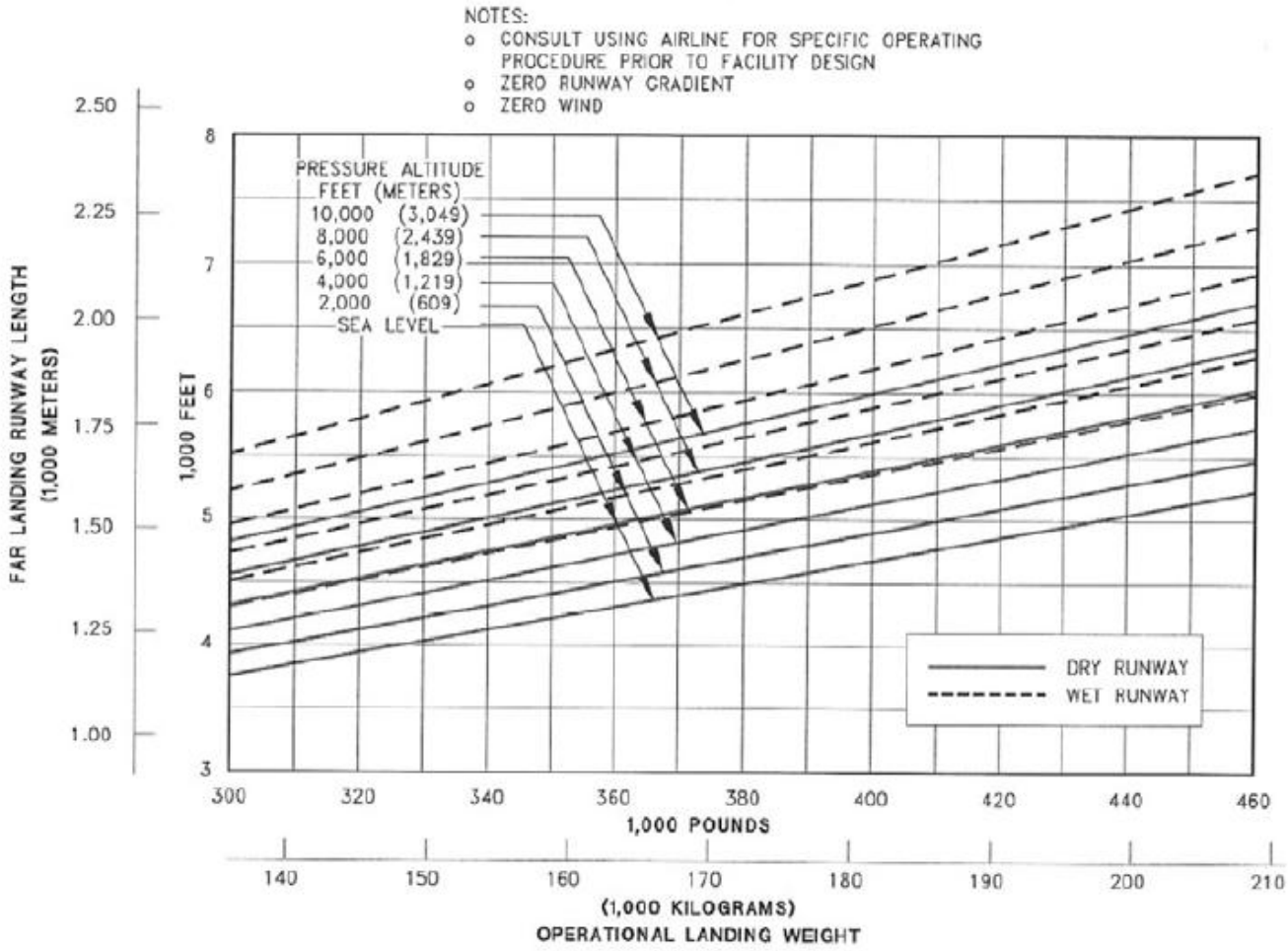
TAKE-OFF CHART



TAKE-OFF V-SPEEDS

Flaps	WT. 1000 Lbs.	V_1	V_R	V_2
5	630	150	159	165
	610	147	156	162
	590	144	153	160
	570	141	150	158
	550	139	147	156
	530	136	145	153
	510	133	142	150
	490	129	140	147
	470	125	137	144
	450	121	132	140
	430	116	128	137
	410	114	126	135
	390	112	124	133
	370	110	122	131
	350	109	121	128
	330	108	120	125
	310	108	119	123
15	630	150	154	160
	610	147	151	157
	590	144	148	155
	570	141	145	152
	550	139	142	149
	530	136	139	146
	510	133	136	143
	490	129	133	141
	470	125	129	138
	450	121	126	135
	430	116	123	132
	410	114	121	129
	390	112	117	126
	370	110	114	125
	350	108	111	124
	330	106	110	123
	310	106	110	122
20	630			
	610			
	590	141	143	155
	570	138	140	153
	550	136	137	150
	530	133	134	147
	510	130	131	145
	490	126	128	141
	470	122	125	137
	450	118	122	134
	430	114	119	132
	410	112	117	130
	390	110	114	131
	370	108	112	127
	350	106	110	124
	330	105	109	123
	310	105	109	122

LANDING CHART

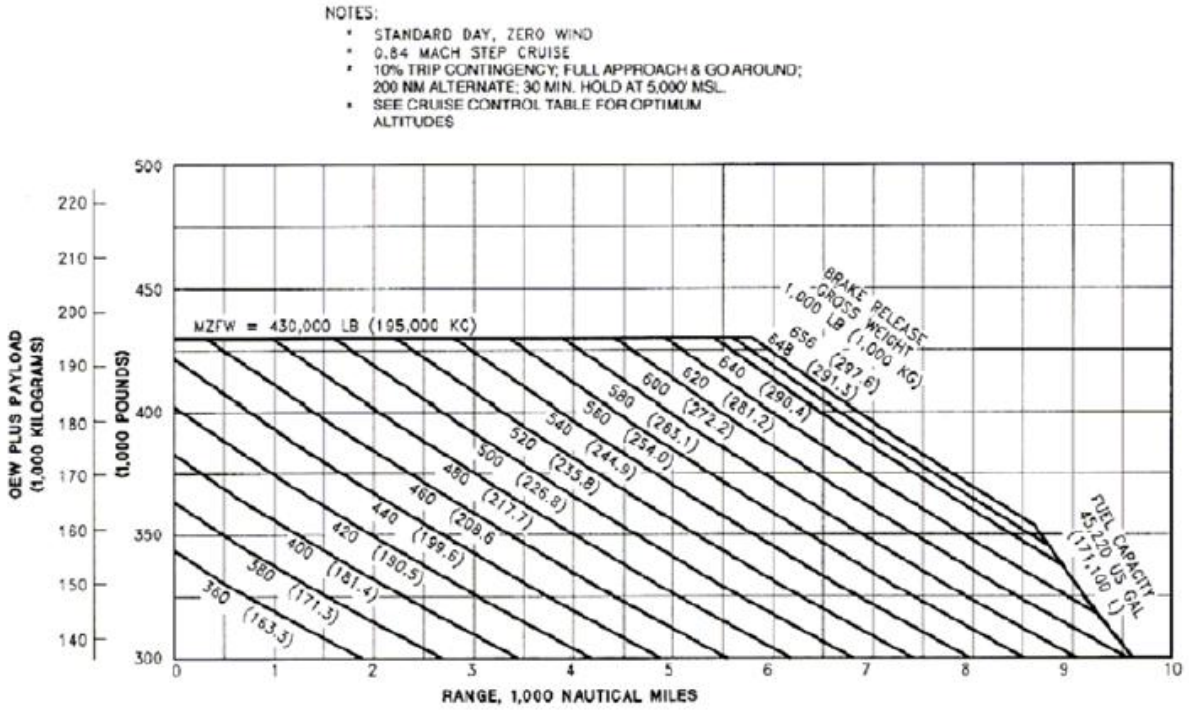


LANDING V SPEEDS

VREF (KIAS)

WEIGHT	FLAP 30	FLAP 25	FLAP 20
630,000	168	173	179
610,000	165	170	176
590,000	162	167	173
570,000	160	164	170
550,000	157	162	168
530,000	154	159	165
510,000	151	156	162
490,000	148	153	159
470,000	145	150	156
450,000	142	147	152
440,000	139	144	149
430,000	136	141	146
410,000	133	138	143
390,000	131	135	140
370,000	129	132	137
350,000	126	130	134
330,000	124	128	131
310,000	122	126	129

RANGE



PAYLOAD/RANGE FOR 0.84 MACH CRUISE
MODEL 777-200ER

1) DETERMINE ZERO FUEL WEIGHT (OEW + PAYLOAD)
2) INTERSECTION OF ZERO FUEL WEIGHT & REQUIRED TRIP DISTANCE ON GRAPH EQUALS TAKEOFF WEIGHT
3) TAKEOFF WEIGHT - ZFW = FUEL WEIGHT
4) NORMAL LANDING WEIGHT = ZFW + 25,000 LBS

ALTITUDES

Standard Cruise Altitudes: FL300 to FL410

Operational Service Ceiling: 43,100 ft

V SPEED TEMPLATE

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Prior to a flight, fill in all cells in the empty template below after completing the Fuel and Weight Calculations. Print this sheet.

Boeing 777-____ _____ LBS					
Takeoff Gross Weight _____					
Flaps 5		Flaps 15			
V1		V1			
Vr		Vr			
V2		V2			
Landing Gross Weight _____					
Flaps	0	5	15	25	30
Maneuvering					
Vref					
Vapp (Vref + 20K)					

APPENDIX B – PRINTABLE CHECKLISTS FOR EASY REFERENCE

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The following checklist found in Delta Virtual Airline's document library is formatted to fit on one double-sided sheet for printing and ease of reference on the following pages. This checklist is for handy reference and should not be used for testing purposes. The checklist in a prior section of this AOM is concise and accurate.

Boeing 777 Checklist for printing

At Gate	
All Charts/Flight Plan	On Board
Flight Plan	LOADED
Weight/Balance	Verify
V speeds/Flap Settings	Calculate V speed card page
Parking Brakes	ON
ACARS	Connect +Start
All doors	VERIFY Closed
Flight Controls	Demonstrate
Battery Master Switch	ON
Engine Pos Switches	AUTO
Passenger Signs	ON
Gear Lever	VERIFY DOWN
Clock/Stopwatch	VERIFY SET
Fuel on board	Document
COMM Radio	TUNE ATIS
Altimeter	SET
COMM Radio	SET
NAV Radio's	SET IDENT
ADF	SET IDENT
HSI/CDI	SET (CRS)
Heading bug	SET (HDG)
IAS	SET V2 (SPD)
Altitude	SET (ALT)
Vertical Speed	SET (VS)
ATC	Call for Dep./Start
Transponder	SET
Crew Briefing	Completed
Engine Start	
Parking brakes	VERIFY ON
Simulator time at start	Document
Battery	ON
Beacon	Verify On
Recognition Lights	ON
Clear to Start	
Throttle Power Levers	IDLE
Engine Area	CLEAR
Right Ignition Switch	GND
Fuel Flow	CHECK
N1 increasing as N2 inc.	CHECK
Oil Pressure	CHECK
Eng 2 Start Switch	GND
Fuel Flow	CHECK
N1 increasing as N2 inc.	CHECK
Oil Pressure	CHECK

After Engine Start	
Parking brakes	ON
APU	OFF
Nav/Taxi Lights	ON
De-Ice	ON
Elevator Trim	SET
Flap Selector	SET 5 Degrees
Standby Instruments	SET
Avionics	SET For Departure
Taxi	
ATC	Request taxi to active runway
Fasten Seat Belts	ON
No Smoking Sign	ON
Throttle Power Levers	IDLE
Parking Brakes	Release
Pushback	Shift+P
Taxi Power	60 % N1
Instrument Check-taxi	VERIFY Compass/HSI/Turn/Bank
Cabin Announcements	Perform during Taxi
Before Take-off	
Parking Brakes	ON
Flight Director	ON
Autopilot	CYCLE ON-OFF-VERIFY OFF
Landing Lights	ON
Taxi Lights	OFF
Strobe Lights	ON
Spoilers	VERIFY Retracted
Document	Fuel/Time
Flap Selector & Trim	VERIFY
Autobrakes	Select RTO
COM's, NAV's & ADF	VERIFY
Transponder	Squawk Normal
ATC	Request for takeoff
Take-off or Taxi to Pos.	
Cabin Crew Notify	2 chimes
Runway	VERIFY Clear
Toe Brakes	ON
Heading bug	VERIFY Rwy heading
Throttle Power Levers	Adv to 40% N1
Engine Instruments	VERIFY Movement
Toe Brakes	Release
Throttles	Adv to 90% N1
V1	Per Charts
Vr (as calculated)	ROTATE to 10° up
Landing Gear	UP at V2 + positive rate of climb

Takeoff/Initial Climb contd.	
V2	Per Charts
220 KIAS	RETRACT FLAPS FULL UP
Trim	ADJUST <250Kts
Climb To Altitude	
Fuel flow/Instruments	Monitor
A/P & A/T	ON SET/GPS/LOC
Autobrake/Taxi Lights	OFF
Climb Profile	225 KIAS to 2500 AGL
	<250 to 10,000
	320 to 18,000
	320 to FL270
Above FL270	320KIAS & 500-2000fpm
Landing Lights	OFF
Cabin Crew Notify	1 Chime
Crossing 18,000 MSL	Altimeter 29.92
Enroute	
Elevator Trim	ADJUST for Cruise
Flight progress, fuel flow and engine ops	MONITOR
Cruise speed	Mach 0.84
Crew Approach Briefing	Completed
Descent	
ATC	
Throttle Power Levers	FLIGHT IDLE or A/T
De-Ice	ON
Landing Airport altimeter below FL180	SET
Airspeed M.84 till 320KIAS	SET
Airspeed 310 till FL180	VERIFY
Airspeed 270 till 15,000	VERIFY
Airspeed 250 till 12,000	VERIFY
Airspeed 240 past 10,000	VERIFY
Fuel Quantities & Balance	CHECK
Vref	NOTE Charts
Airspeed 250KIAS <10K	VERIFY 1500fpm
Flight Spoilers	As Required
Landing lights (crossing 10Kft)	ON
Cabin Crew Notify	2 chimes
Approach	
ATC	Request Clearance
Fasten Seat Belts	ON
No Smoking Sign	ON
Avionics & Radios	SET
Speed:	160 KIAS

Approach contd	
MFD	EICAS
Autobrakes	SET
Flight Spoilers	ARM
COMM Frequencies	SET
Navigation Radios	SET Freq/IDENT
Flap Selector@20nm	Flaps 20, 160KIAS
At ILS Capture	
Flap Selector	Flaps 30, Vref+15
Altitude Selector	SET Miss App.
1-1/2 Dots above GS	
Landing Gear	DOWN
Flap Selector	Flaps 30 Vref+15
Stabilized Approach	FULL FLAPS
Final Approach	Speed Vref +5
Landing	
ATC	Clearance to Land
Crossing Threshold	Flaps FULL, Vref
Engine Reverse	Reverse (> 60 KIAS – “F2”)
Toe Brakes	APPLY (< 60 knots)
After Landing	
ATC	Request Clearance
Transponder/TCAS	SET Standby
Landing Lights	OFF
Strobe lights	OFF
Taxi Lights	ON
Flap Selector	UP
Spoilers	Retract
APU	START
Elevator Trim	SET to 0
Gate Shutdown	
Parking brakes	ON
Taxi Lights	OFF
Fuel Flow	OFF (Ctrl-Shift 1)
Engines	SHUTDOWN
Seat Belt Sign	OFF
Beacon/Nav/Panel Lights	OFF
De-Ice	OFF
Generators	OFF
Battery	OFF

ACKNOWLEDGEMENTS AND LEGAL STUFF

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The current version of this manual was updated by the DVA Director of Manual Services, Andrew Vane, with input from senior staff and the Chief Pilot, Oliver McRae.

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