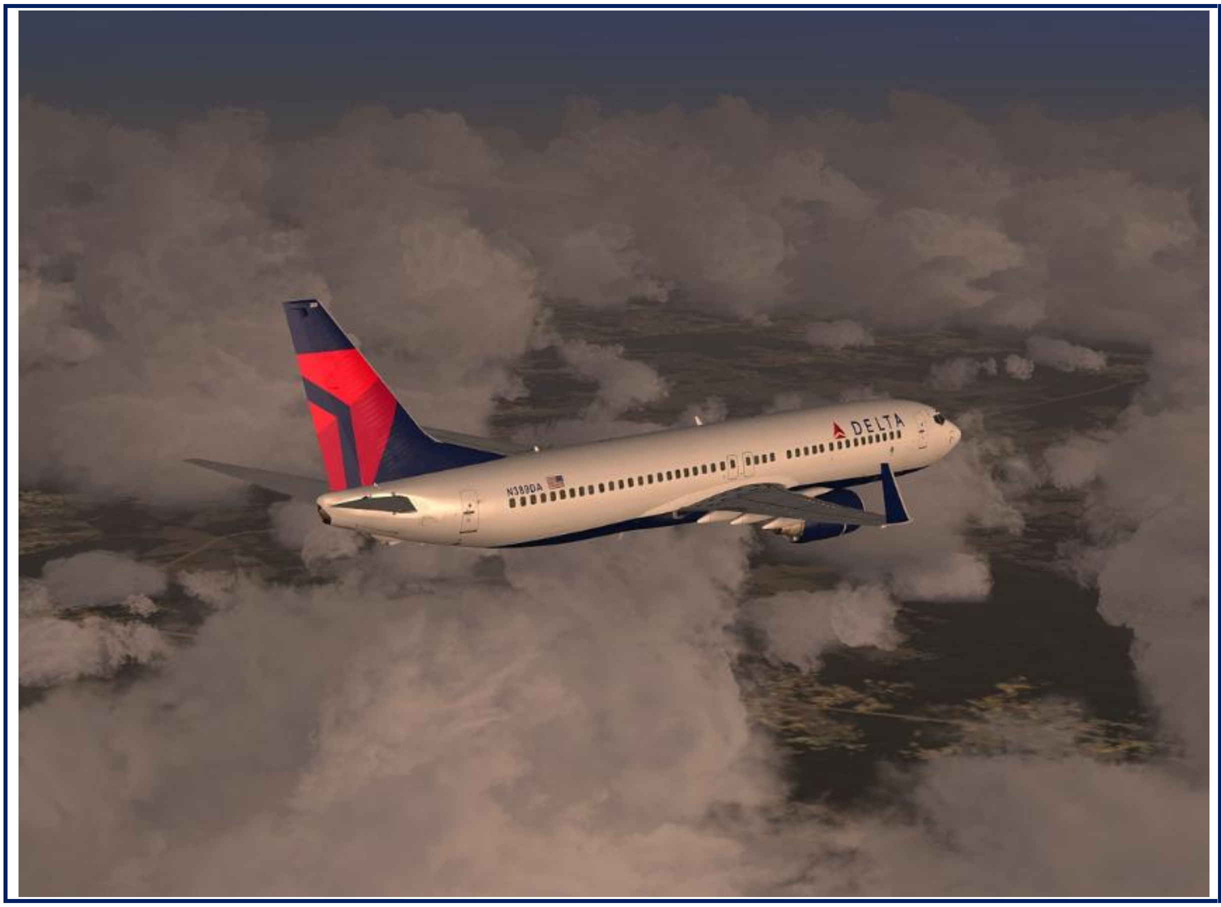
Delta Virtual Airlines



B737-800 Aircraft Operations Manual (AOM)

Fourth Edition
April 2013

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WELCOME

As Chief Pilot for the Boeing 737 program, it is my pleasure to welcome you to one of our largest and most active programs at Delta Virtual Airlines. The Baby Boeing, as it's come to be known, has served successfully in the short to medium range market since its first flight in 1967. Rather than retire this fine airliner, Boeing put it through several upgrades producing the Next Generation variant (-300 through -500 classic series) and an improved variant (-600, -700, -800, -900) series with advances in avionics, efficiency, and capacity. Boeing's continued success and study today will ultimately result in a further refinement that will be the 737 MAX.

As a new pilot to the 737 program, you have an opportunity to fly in one of the longest serving and successful aircraft in commercial airline history. Flown by over 500 operators, you've chosen one of the best the airline industry has to offer. We welcome you into the mainstay of the fleet. The Delta Virtual Airlines Boeing 737-800 Aircraft Operating Manual (AOM) based upon the DVA Fleet Installer aircraft will aid in getting acquainted and actually flying a tutorial flight.

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.deltva.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.deltva.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.

Blue skies!

B737 Chief Pilot

HISTORY AND OVERVIEW

In 1958 the Boeing Company began looking for a "twin engine feeder airliner to complete the family of Boeing passenger jets." Boeing got off to a late start with an attempt to compete with the short haul jets already in production – the Caravelle, BAC One-Eleven and the DC-9. Since the Caravelle had already been in service a full 5 years, the DC-9 was about to fly and the One-Eleven was well into the flight test stages, Boeing had to some catching up to do.

Lufthansa Airlines placed the first order in February 1965 and design work began in November 1966. The original plans called for a jet with a capacity of about 60-65 passengers and an optimal range of around 100 to 1,000 miles. After final design talks with Lufthansa, it was decided the capacity would be increased to 100 passengers, but the range figures remained.

Since the market was already in full swing for this design, Boeing needed to come up with something different. One of the first new features considered by Boeing was wing-mounted engines. These had some advantages as they offered a better center of gravity position and more space in the rear cabin. Wing-mounted engines also offered easier maintenance as well as the less space required for fuel and bleeds piping. Overall, this layout resulted in a weight savings of 700kgs (1550 Lbs.) compared to “T-tail” type aircraft. Another advantage of this design can be traced back to the earlier models of the Boeing family of airliners. The early 737s had a 60% parts commonality with the 727 including the doors, nacelles, wing leading edge devices, cockpit layout, avionics and other components. The 727 in turn had commonality with the 707; therefore, the design of the 737’s individual components can be traced back to as early as the early 1950s.

The first Boeing 737 aircraft was rolled out of the hangar on January 17th, 1967 and the first flight test was completed on April 9th, 1967. The first aircraft was certified on December 15th, delivered on December 28th and placed into service on February 10th, 1968.

This initial model (the 737-100) turned out to be the least numerous model of the entire 737 family. A fuselage stretch resulted in the 737-200 model, of which hundreds were sold over the remainder of the 1960s and 1970s. The groundwork for the Next Generation (NG) 737 models was laid with the creation of the 737-300 and –400 models in the mid-1980s, with SNECMA CFM56 turbofan engines replacing the original Pratt & Whitney JT8D engines that powered the 737-100 and 737-200.

The NG Boeing 737s were built upon the successes of the original models, incorporating improvements for reliability, simplicity and reduced operating and maintenance costs. NG 737s began with the –600 model, introducing the more efficient CFM56-7 turbofan engine, among other upgrades in avionics and various systems.

Today the Next Generation 737 sub-family includes the –700, -800 and –900 models. The 737-800 project began in 1994, with Hapag-Lloyd Airlines of Germany placing the first order for this aircraft. It rolled out of the production hangar on June 30th, 1997 and made her maiden flight on the 31st of July. She was certified on March 13th 1998 by the FAA and on April 9th by the JAA (Joint Aviation Authorities of Europe).

As of mid-2012, Delta Airlines operates 83 737s of which 10 are -700 series and 73 are -800 series. The average age of the 737's is 11.4 years for the -800's and 3.4 years for the -700's. Delta Airlines currently has 100 737-900ER's on order.

As the pressure for more economic aircraft builds in the market, Boeing has responded by developing a newer generation of the 737 labeled the 737 MAX. This new family of 737's are expected to deliver higher fuel efficiency, greater reliability and maximize passenger comfort. The first 737 MAX aircraft are anticipated to begin flying in 2016.

Takeoff Conditions						
CFM56 model	-7B18	-7B20	-7B22	-7B24	-7B26	-7B27
Max T/O Thrust (lb.)	19,500	20,600	22,700	24,200	26,300	27,300
Airflow lbs./sec	677	696	728	751	779	782
In-Flight Performance (FL350 Mach 0.78)						
Max Climb Thrust (lb.)	5,962	5,962	5,962	5,962	5,962	5,962
Max Cruise Thrust	5,450	5,450	5,450	5,480	5,480	5,480
Engine Characteristics						
Length (in)	98.7	98.7	98.7	98.7	98.7	98.7
Fan Diameter (in)	61.0	61.0	61.0	61.0	61.0	61.0
Basic Dry Wt. (lb.)	5,216	5,216	5,216	5,216	5,216	5,216
Airframe Applications						
Boeing NG Series	737-600	737-600 737-700	737-600 737-700	737-700 737-800 737-900	737-700 737-800 737-900	737-800 737-900 BBJ

Power Plant

The Boeing 737 family can be split into two – the early 737-100 and 737-200 models, and the more recent models starting with the 737-300 in 1984. The first two used the popular Pratt & Whitney JT8D turbofan that powered the Douglas DC-9 and Boeing 727, while the later versions use the SNECMA CFM56 turbofan.

Pratt & Whitney JT8D

The Pratt & Whitney JT8D is a classic early turbofan engine, and it powered the most successful first-generation medium-range airliners – the Boeing 727 and 737, and the Douglas DC-9. Over 14,000 engines were built and installed in over 4,500 aircraft, amassing over a half-billion hours of service since 1964.

Photo Courtesy of NASA

The original JT8D engines ranged from 14,000 to 17,000 pounds of thrust. In 1996, Pratt & Whitney received FAA approval for the more powerful JT8D-200 model, which offers 18,500 to 21,700 pounds of thrust. This new variant is the exclusive power plant of the MD-80 series of aircraft, as well as being used in Boeing 707 retrofits.

Boeing B737-800 Technical Specifications

Dimensions	
Length	129 Ft 6 In
Height	41 Ft 2 In
Wingspan	117 Ft 7 In Without Winglets
Wing Area	1,344 Sq. Ft
Power plants	
Engine Type	2 ea. CFM 56—7B27
Maximum Thrust	27,300 Lbs./Engine
Weights	
Empty Weight	91,300 Lbs.
Max Zero Fuel Weight	130,180 Lbs.
Max Takeoff Weight (MTOW)	174,200 Lbs.
Max Landing Weight	146,300 Lbs.
Payloads	
Max Payload	38,880 Lbs.
80% Payload	31,104 Lbs.
Takeoff Runway Length – ISA,SL	8,181 Ft
Landing Runway Length – ISA, SL Flaps 45 deg.	5,700 Ft at Max Landing Weight
Gross Weights	
Max Gross Weight	174,700 Lbs.
80% Payload Zero Fuel Weight	122,404 Lbs.
Capacity	
# of passengers in typ. Confg.	16 First Class + 144 Economy Class
Max Seating Capacity	160
Cockpit Crew	2
Service Ceiling	41,000 Ft
Maximum Range	3,115 Nm
Range Fully Loaded (@ gross weight)	3,060 Nm
Cruising Speed Range	300-522 Kts
Typical Cruise Speed @ FL350	439 KIAS
Maximum Fuel Capacity	44,520 Lbs.

COCKPIT CHECKOUT – FSX

This is the cockpit layout of the FSX 737-800 Fleet Installer. We will further break down each section in detail, covering each instrument and gauge.

1. Overhead Panel
2. MCP Panel
3. Left Main Panel
4. Right Main Panel
5. Radio Panel
6. Throttle Quadrant

Overhead Panel

1. Fuel Pump Selectors
2. Landing Lights
3. Taxi Lights
4. APU Start Switch
5. Ammeter & Voltage
6. GEN Switches
7. Master Battery Switch
8. Panel Lights Switch
9. Engine Start Switches
10. Pitot Heat Switch
11. Anti-Ice Switches
12. Hydraulic Pump Switches
13. 14. 15. Lights
16. No Smoking/Fasten Belts

Fuel Pump Selectors

Use these switches to turn on/off fuel pumps as well as CROSSFEED.

APU Start Switch
Use this switch to turn on/off the Auxiliary Power Unit.
Ammeter and Voltage
Use these gauges to monitor Amperage and Voltage of the electrical system.
GEN Switches
Use these switches to switch between electrical generators, engine or APU.
Master Battery Switch
Use this switch to control the master electrical systems.
Engine Start Switches
Use these switches to start each engine.
Pitot Heat Switch
Use this switch to heat the pitot and remove or prevent ice build-up.
Anti-Ice Switches
Turns on and off the aircraft's De-Icing systems.
Hydraulic Pump Switches
Use these switches to control the aircraft's Hydraulic Systems.
Lights
These switches control the lights of the aircraft: LOGO/POSITION/ANTI-COLLISION.
No Smoking/Fasten Belts
Turns on and off the No Smoking and Fasten Belts signs in the cabin.

MCP Panel

1. Map Options
2. Course Select
3. Flight Director On/Off Switch
4. Auto-Throttle On/Off Switch
5. Speed Select
6. NAV/GPS Toggle
7. Heading Select
8. Altitude Select
9. Vertical Speed Select
10. Autopilot On/Off Switch

Map Options
Use these to display different functions of the map.
Course Select
Click to change the Course hold.

Flight Director On/Off Switch
Click to turn on/off the Flight Director.

Auto-Throttle on/Off Switch
After entering a speed in the Speed Select field, turn on the Auto-Throttle and click SPEED or MACH to hold your entered speed.

Speed Select
Use this field to enter the speed you would like the Auto-Throttle to hold.

GPS/NAV Toggle
This switch allows you to switch between VOR navigation, and GPS navigation. Toggle to GPS and click the NAV button on the MCP Panel to slave the autopilot to your GPS flight path.

Heading Select
Use this field to input a heading you would like your autopilot to hold. Click HDG SEL to engage the heading hold function.

Altitude Select
Use this field to input an altitude you would like your autopilot to hold. Click ALT HOLD to engage the altitude hold function.

Vertical Speed Select
Use this field to input the vertical speed you would like your autopilot to use until your designated altitude. Click V/S to engage the vertical speed hold function.

Left Main Panel

1. Clock
2. Primary Flight Display (PFD)

3. Horizontal Situation Indicator (HSI)
4. Autopilot/Auto-Throttle Status Panel
5. ACARS Status
6. Annunciator Panel

Clock

This is a clock used to keep flight time, etc. Press the upper-left round switch to reset the clock.

Primary Flight Display (PFD)

This is the main instrument panel of the aircraft. It features an airspeed indicator tape on the left, an altimeter tape on the right, a heading indicator on the bottom, and an attitude indicator in the morning.

Horizontal Situation Indicator (HSI)

This is the horizontal situation Indicator. It displays your current heading, VOR navigation, GPS navigation, and winds.

Autopilot/Auto-Throttle Status Panel

These lights display the status of the Autopilot and Auto-throttle functions.

ACARS Status

This displays the current status of DVA ACARS.

Annunciator Panel

This is the main Annunciator Panel. It displays any warning or caution light in the aircraft. Click to reset.

Right Main Panel

1. Backup Gauges
2. Auto Brake Switch
3. Flap Status Indicator
4. Engine Display

5. Gear Status & Extend/Retract Lever

Backup Gauges

These are the backup gauges for use when the PFD fails. There is an Attitude Indicator, Altimeter, and a Horizontal Situation Indicator.

Auto Brake Switch

This switch allows you to set the different settings for the auto braking system.

Flap Status Indicator

This indicator shows the position of the flaps.

Engine Display

This display shows the N1, EGT, Fuel Flow, Fuel Quantity, and an overview of the aircraft’s gear, flaps, and spoilers.

Gear Status & Extend/Retract Lever

The status displays the position of the landing gear. The lever controls the gear's position.

Radio Panel

1. COMM1 & COMM2
2. NAV1 & NAV2
3. Transponder Panel
4. ADF
5. COMM/NAV Selector

COMM1

These are the COMM1 & COMM2 Panels. The left number is the Active frequency. The number on the right is the Standby frequency. Use the switch in the middle to transfer the STBY to the ACTIVE.

NAV1 & NAV2

These are the NAV1 & NAV2 Panels. The left number is the Active frequency. The number on the right is the Standby frequency. Use the switch in the middle to transfer the STBY to the ACTIVE. To turn on the ID alert, click the box between the ACTIVE & STBY.

Transponder Panel

This panel is where you input your unique transponder code. (Squawk)

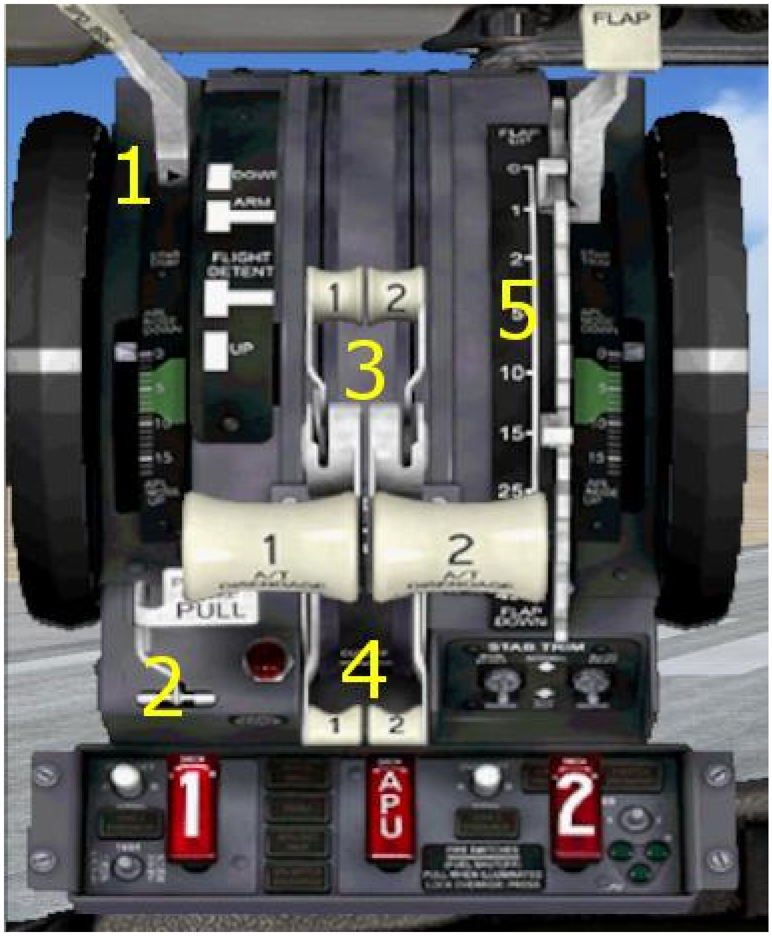
ADF

This is where you input the ADF frequency. To turn on the ID alert, click the box under the frequency.

COMM/NAV Selector

Use these switches to select which COMM/NAV systems you'd like to use.

Throttle Quadrant



1. Spoiler/Speedbrake Lever
2. Parking brake
3. Throttle
4. Fuel Cutoff
5. Flaps Lever

Spoiler/Speedbrake Lever
This lever controls the Spoilers.
Parking Brake
This controls the Parking Brake. Use this to set or click Ctrl + "Period"
Throttle
This is controls the throttle for each engine.

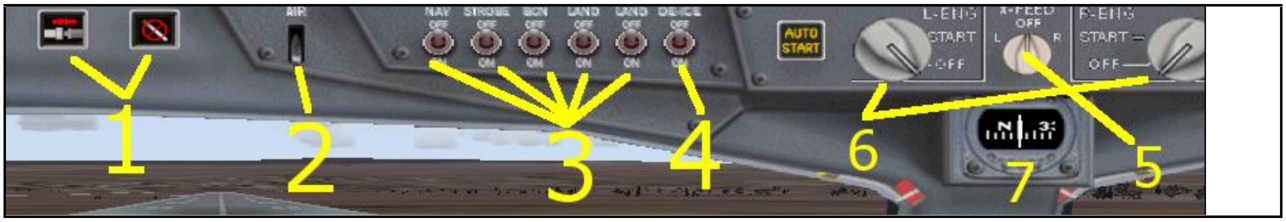
Fuel Cutoff
This is the fuel cutoff levers.
Flaps Lever
This lever controls the different settings for the flaps.

COCKPIT CHECKOUT – FS2004

This is the cockpit layout of the FS2004 737-800 Fleet Installer. We will further break down each section in detail, covering each instrument and gauge.

1. Overhead Panel
2. MCP Panel
3. Left Main Panel
4. Right Main Panel
5. Radio Panel
6. Throttle Quadrant

Overhead Panel



1. No Smoking/Fasten Belts switches
2. Air Conditioning Switch
3. Lights
4. De-Ice Switch
5. Fuel Crossfeed Switch
6. Engine Start
7. Compass

No Smoking/Fasten Belts
Turns on and off the No Smoking and Fasten Belts signs in the cabin
Air Conditioning Switch
Turns on and off the aircraft's Air Conditioning systems.
Lights
There are 5 light switches on the panel – NAV, STROBE, BCN, LAND, & LAND (Retract)
NAV controls the navigation lights – red and green and white
STROBE controls the strobe lights on the edge of the wings.
BCN controls the beacon light that is on the top of the tail
Landing lights – there are two – the first one turns the landing light on or off. The second one retracts or extends the landing light. You need to turn the light on AND extend it. Retracting it cleans up the airplane, drag wise.
De-Ice Switch
Turns on and off the aircraft's De-Icing systems.
Fuel Crossfeed Switch
It is possible to select which individual tank you want to feed from. For normal operations, this switch should be set to OFF.
Engine Start
There are 2 switches – One for each engine.
Compass
This is the basic backup compass of the aircraft.

MCP Panel

1. Course Select
2. Flight Director On/Off Switch
3. Auto-Throttle On/Off Switch
4. Speed Select
5. Heading Select
6. Altitude Select
7. Vertical Speed Select
8. Autopilot On/Off Switch

Course Select
Click to change the Course hold.

Flight Director On/Off Switch
Click to turn on/off the Flight Director.

Auto-Throttle on/Off Switch
After entering a speed in the Speed Select field, turn on the Auto-Throttle and click SPEED or MACH to hold your entered speed.

Speed Select
Use this field to enter the speed you would like the Auto-Throttle to hold.

Heading Select
Use this field to input a heading you would like your autopilot to hold. Click HDG SEL to engage the heading hold function.

Altitude Select
Use this field to input an altitude you would like your autopilot to hold. Click ALT HOLD to engage the altitude hold function.

Vertical Speed Select
Use this field to input the vertical speed you would like your autopilot to use until your designated altitude. Click V/S to engage the vertical speed hold function.

Left Main Panel

1. Clock
2. Primary Flight Display (PFD)
3. Horizontal Situation Indicator (HSI)
4. GPS/NAV Toggle
5. Autopilot/Auto-Throttle Status Panel
6. Instrument Panel Lights Switch
7. Annunciator Panel

Clock

This is a clock used to keep flight time, etc. Press the upper-left round switch to reset the clock.

Primary Flight Display (PFD)

This is the main instrument panel of the aircraft. It features an airspeed indicator tape on the left, an altimeter tape on the right, a heading indicator on the bottom, and an attitude indicator on the right.

Horizontal Situation Indicator (HSI)

This is the horizontal situation Indicator. It displays your current heading, VOR navigation, GPS navigation, and winds.

GPS/NAV Toggle

This switch allows you to switch between VOR navigation, and GPS navigation. Toggle to GPS and click the NAV button on the MCP Panel to slave the autopilot to your GPS flight path.

Autopilot/Auto-Throttle Status Panel

These lights display the status of the Autopilot and Auto-throttle functions.

Instrument Panel Lights Switch

This switch controls the lighting of the instrument panel.

Annunciator Panel

This is the main Annunciator Panel. It displays any warning or caution light in the aircraft. Click to reset.

Right Main Panel

1. Backup Gauges
2. Fuel Valve Switch
3. Auto Brake Switch
4. Flap Status Indicator
5. Engine Display
6. Gear Status & Extend/Retract Lever

Backup Gauges

These are the backup gauges for use when the PFD fails. There is an Attitude Indicator, Altimeter, and a Horizontal Situation Indicator.

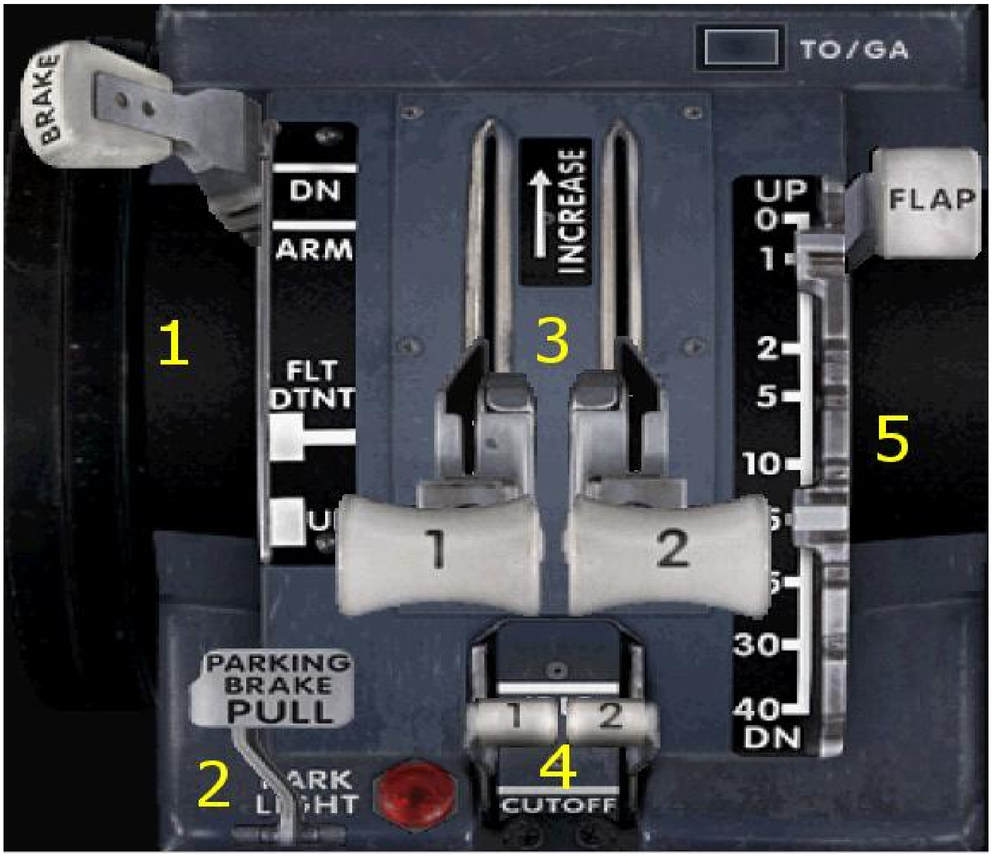
Fuel Valve Switch
This switch toggles the fuel valve.
Auto Brake Switch
This switch allows you to set the different settings for the auto braking system.
Flap Status Indicator
This indicator shows the position of the flaps.
Engine Display
This display shows the N1, EGT, Fuel Flow, Fuel Quantity, and an overview of the aircraft's gear, flaps, and spoilers.
Gear Status & Extend/Retract Lever
The status displays the position of the landing gear. The lever controls the gear's position.

Radio Panel

1. COMM1 & COMM2
2. NAV1 & NAV2
3. Transponder Panel
4. ADF
5. COMM/NAV Selector

COMM1
This is the COMM1 Panel. The left number is the Active frequency. The number on the right is the Standby frequency. Use the switch in the middle to transfer the STBY to the ACTIVE.
NAV1 & NAV2
These are the NAV1 & NAV2 Panels. The left number is the Active frequency. The number on the right is the Standby frequency. Use the switch in the middle to transfer the STBY to the ACTIVE. To turn on the ID alert, click the box between the ACTIVE & STBY.
Transponder Panel
This panel is where you input your unique transponder code. (Squawk)
ADF
This is where you input the ADF frequency. To turn on the ID alert, click the box under the frequency.

Throttle Quadrant



1. Spoiler/Speedbrake Lever
2. Parking brake
3. Throttle
4. Fuel Cutoff
5. Flaps Lever

Spoiler/Speedbrake Lever
This lever controls the Spoilers.
Parking Brake
This controls the Parking Brake. Use this to set or click Ctrl + "Period"
Throttle
This is controls the throttle for each engine.
Fuel Cutoff
This is the fuel cutoff levers.
Flaps Lever
This lever controls the different settings for the flaps.

Tutorial - Flying the aircraft

Unlike many other aircraft, even in the same class, the 737-800 is very pilot-friendly and forgiving. The aircraft is one of the largest in the 737 family of Boeing airliners and has had many upgrades since the first models rolled out of the hangar in the late 1960s. Some of these upgrades include the relatively new "glass cockpit". All of the old analog gauges have been replaced by a series of MFDs (Multi Function Displays) and, in some cases, a HUD (Heads Up Display). The HUD displays critical information to the pilot and reducing the need to look down, especially important in critical stages of flight such as takeoff and landing. The 737-800 fleet installer does not have a HUD.

As compared to earlier versions, the 737-800aircraft has a larger turn radius both in the air and on the ground due to the increased size. It is also extremely stable in flight and is very maneuverable.

One drawback to the 737, as with many other aircraft, is the flaps. It is easy to over-speed the flaps. This creates a serious condition as it increases the air load on the wing surface beyond its specified design parameters causing additional stress to the airframe. Once an aircraft has over-speeded the flaps, an exhaustive inspection must be completed which may take the aircraft out of service for a considerable amount of time. If you are careful and attentive, you will be fine. Just remember to pay attention to your indicated airspeed and extend flaps in accordance with the schedule presented in the Tables in Appendix D.

Hard landings are normally a serious problem with heavier aircraft. It is just as important to reduce the number of hard landings in the 737. You will not get the same results from a "semi-hard" landing in the 737-800 as you would in a Boeing 777. A 737-800 is more likely to skip off the runway on a hard touchdown rather than dig in like a heavier jet would.

Another very important note regarding hard landing is to be very cautious with nose touchdowns. In the 737-800, the space between the main landing gear and nose landing gear is 51'-2" (15.60M). This long distance makes a hard nose touchdown a very dangerous event. The forward fuselage may or may not endure the very high stress factors placed on it from a nose touchdown.

This photo is an example of the damage to an aircraft's fuselage caused by the stress of a hard nose gear touchdown:

As the costs of fuel and maintenance costs increase, most airlines these days are constantly looking for ways to save money and conserve resources. One of the most successful attempts was the design of a cross-platform family of aircraft. Boeing's own 757 and 767 are prime examples. These aircraft were designed with near identical cockpit layouts, gauges and other equipment making it possible for a pilot qualified to fly one to be easily qualified on another. The 737 is no different. A pilot who is checked out in any variant of the 737 including the nostalgic -100 model may be easily certified all the way up the line to new latest -900 series. Of course, with recent upgrades a familiarization and final checkout is required to gain this full rating. This approach allows the operating airlines more flexibility in crew tasking and route planning, which in turn, results in cost savings.

It is important to point out that some of the items contained in the checklists will not apply to all variants of the 737. The checklists were designed for "cross-platform" use. Delta Virtual Airlines operates 737-200s and -300s, -700s as well as the -800 series of aircraft in its fleet.

Many pilots' 737 flying experience will begin in the 737-400. The aircraft is notably smaller and has some very different characteristics that should be pointed out. As mentioned above, the turn radius is smaller in the 737-400 compared to the 737-800. Ground handling is very important as it can easily ruin what began as a routine day. There's no greater embarrassment for a pilot than to show poor ground handling skills. If the pilots can't manage the aircraft on the ground, how are they going to manage it in the air?

There are differences to note in the air as well. The smaller 737 models tend to be easier to over speed than the larger ones due to smaller fuselage cross sections and less drag. Be mindful of your speed in this aircraft! With shorter wingspans, you will notice more maneuverability in earlier models. If you plan to frequently interchange use of the different models, take a few minutes to do some practice "circuits". Remember, there's not much room for error when you're at 37,000 feet so safety should be your primary concern.

This is a very enjoyable and rewarding aircraft to fly. Always remember to stay vigilant and aware and you'll be just fine. Enjoy the skies and happy landings!

Pre-Flight Configuration

To get started, we are first going to configure a standard "at the gate" configuration that will have the same payload and fuel every time you fly. This will save you a lot of time and you will only have to adjust enroute fuel based on the specific flight distance.
Start Flight Simulator and select the default flight and click "FLY NOW!" button. Once the simulator has loaded, select Create a Flight. Select the Boeing 737-800 aircraft and a livery of your choice. Next, select the airport you want to fly from (home base). Be sure to select a starting position at a gate or ramp, not the active runway. You can ignore the weather and time/season entries unless you want to specify these for every flight. Be sure also to change the Failures tab so that zero failures occur for each aspect of the simulation.

Next select Fuel and Payload. For this orientation flight we will use 1200 Lbs. of fuel for taxi, and 7500 Lbs. of fuel calculated by MS Flight Plan. Be sure also to set all failures to zero.

Click on Fly Now and let the flight start up.

Set Indicated Airspeed (IAS) at 250kts (max a/s below 10,000ft) altitude 10,000 (good general start) and vertical speed at 3000 fpm, Flight Director (F/D) OFF, auto-throttle (AT/T) OFF, fuel flow switch in re-set position up, (this is the kill switch for engines, do not turn off in-flight!). This is a reasonable standard default configuration. Additional fuel loading and V-speeds are in the checklist of this manual.

From the Flights menu on top, select Save Flight, name this flight a name you will remember, such “my 737" or “Home base.”
Now whenever you wish to make a flight, you can start up Flight Simulator, load this saved flight from the Flights menu and this aircraft will be configured for a flight out of your home base, needing only a flight plan and fuel loading to be updated.

Preparing Flight Plan

Now we will get your flight plan into Flight Simulator. From the Flights menu, Flight Planner to get started creating your flight plan. How to create a flight plan is covered in documentation elsewhere in the DVA Document Library.

For the purpose of this flight, we are going to assume that you are flying offline using ACARS only (no VATSIM) and there is no live ATC available. Make sure you get the appropriate KSLC and KBOI airfield diagram, departure and approach charts from our website www.deltava.org in the Pilot Center, Approach Charts, or from www.myairplane.com or www.airnav.com.

Tutorial Flight

We are going to fly a short trip from Salt Lake City, Utah (KSLC) to Boise, Idaho (KBOI) using the Delta Virtual Airlines fleet installer 737-800. The flight is only 273 miles and will provide you with one hour of exciting training and orientation in this magnificent aircraft.

Power-Up Aircraft and Nav Settings

Use the checklist in this manual to get your plane ready while parked at the gate. If you set up the default aircraft in Pre-Flight Configuration, much has already been done in preparation. On the overhead panel turn ON Nav and Beacon lights, Landing light should be OFF. Bring up the radio stack by pressing the appropriate icon below the clock. Set COMM 1 to 122.8 (UNICOM). Next set your NAV 1 radio to 116.80 TCH VOR, and your NAV course to 300 degrees (course display left of A/T). Now set NAV 1 radio standby freq. to 115.8 TWF VOR. This is your second waypoint and the push of the transfer switch will tune up that waypoint. In the NAV 2 radio you should tune 115.8 TWF VOR and set the standby freq. to 113.3 BOI VOR, located at our destination. These frequencies are listed in the flight plan printout.

Now we are ready to start engines. A good practice is to go to external (Spot View) by pressing S, and use numeric pad to view from rear. The Fleet 737-800 does not have a trim indicator, so you must visually check and set about 3 - 5 degrees of UP trim. With practice, you will develop this skill. Once done, check flight controls (ailerons, elevator and rudder) for response. Press S back to panel view.

Pushback and Taxi

Set parking the brake (Ctrl +.). Ensure throttles are at flight idle, on the overhead panel press Auto Start. After engines are started and stabilized, Pushback (Shift P) until you have sufficient room to turn for taxi. Stop pushback with same Shift P. Turn ON Yaw Damper if illuminated, turn OFF de-ice (Shift H), Set Auto brake to RTO (Rejected T/O) Set flaps to 5 degrees for takeoff. Now we are ready to taxi to Rwy 34L.
Announce on UNICOM that you are taxiing to Rwy 34L. Release Brakes (.), smoothly advance throttles to about 40 percent to start moving, apply directional steering to Rwy 34L. Reduce throttles as necessary to taxi at 20 Kts straight and slow down to 10 kts. in turns.

When you reach the Hold Short Line for Rwy 34L, set brakes (ctrl +.) and complete checklist for this position. Set Autopilot Alt to10000, Vertical Speed at 3000 fpm, set first course heading of 341 degrees. NAV/GPS switch to NAV. Check Autobrake is set to RTO and Spoilers armed (Ctrl + /). Elevator Trim set to takeoff (a few notches pitch up). Flaps set for take-off. Set Landing light and Strobes to ON. As you can see most of this has already been done in the checklist and this is a re-check prior to take-off.

Departure

If all is set, announce on UNICOM that you are departing KSLC on Rwy 34L to the north. Look at both ends of the runway to be sure you are clear and then release your brakes (.) Taxi onto the centerline of the runway. Set throttles at 40 percent and make sure engines stabilize, and then advance to 89 percent. You did remember to set the A/T speed to 250, right? Apply a slight down pitch pressure on the yoke. Maintain centerline as you accelerate to 138kts (V1) then at 140kts (Vr) apply backpressure to rotate to a 10-degree nose up attitude. When a positive rate of climb is established above 100 ft., retract the landing gear. Accelerate to 149 + 20 (V2) raising flaps to 1 degree. N1 should not exceed 90 percent. Vertical speed must be adjusted to maintain airspeed when climbing out. At 3000 ft. AGL, engage autopilot (A/P) by changing the NAV/GPS switch to GPS and pressing LNAV, turn OFF Autobrake, disarm spoilers, flaps up and complete Climb Checklist.

After Climb Out

At 10,000ft MSL, set cruise altitude of 26000 ft. and adjust Vertical Speed to maintain climb speed of 290 KIAS. Turn Seat Belt Lights Off, Landing Lights Off. At 18,000 ft. MSL reset altimeter to standard pressure of 29.92. At 23,000 ft., adjust Vertical Speed to 1000 fpm. Continue to fly your flight plan. The HSI is set to 300. Monitor the HSI. The HSI is set by rotating the lower DU knob full right, located just to the left of the NAV/GPS switch. The broken red line on your HSI will tell you if your course is to your right or left and you can adjust your heading to intercept the course. When you intercept the course, turn left to 300 degrees and proceed to TWF VOR. Monitor NAV2 to see when you pick up the TWF VOR. When you do, switch NAV1 to 115.8 and track toward the Twin Falls VOR. Change the standby freq. on NAV1 to 113.30 BOI VOR. When you overfly the first VOR (TWF), tune NAV 1 to the BOI VOR and reset the new course. Repeat this procedure for each VOR on your flight plan so that you can see how the radio equipment picks up the VOR signal. OK, great, now you are flying!

Top of Descent

At some point, you will probably think about descending. Where do I start my descent? Here is an easy way to calculate when you should start your descend. Take your current altitude (26,000) and subtract the altitude you want to descend to (6300) and then move the decimal point 3 digits to the left. 26,000 - 6000 = 20,000 or 20. Then multiply that number by 3 to get the distance away you need to start your descent. 20 x 3 = 60 miles. It is a good idea to add 5 miles to this number and start your descent a little early. It is always easier to reach your target altitude a little early than to dive to make an altitude and risk over speeding. At 65 (60 + 5) miles from BOI VOR (you did remember to tune in the BOI VOR correct?), set your altitude to 10,000 ft., and set your speed to 280 KIAS, and set your descent rate to -2500 fpm. Alternatively, you can disengage the Auto-throttle and Autopilot, cut your throttle back to idle, and adjust pitch using trim to maintain this descent rate and approximately 265-280 KIAS. At 18,000 ft., reset altimeter to destination pressure (press B). At 15,000 ft. reduce speed to 250 KIAS. At 10,000 ft., reset your altitude to 6000 ft., speed to 230 KIAS, 5 degree flaps and descent rate to 1,500 fpm. Seat belt and landing light ON. After crossing CANUK intersection, turn right heading 300 and descend and maintain 6,000 ft. Reset your course heading to 280. Continue to decelerate to 210 kts. 10 degree flaps by 15 miles from the BOI VOR. The BOI VOR is located at the southwest edge of the airport on the approach end of runway 28L. You will be on an inbound course of 280 degrees. The airport will be to at your 10 o'clock position out the front window. When the HSI needle centers, turn left heading 280 and track inbound to the BOI VOR. The airport will now be at your 12 o'clock and approximately 19 miles.

Arriving and Approach

At about 10 miles from airport, announce you're landing intentions on UNICOM, for Rwy 28L at KBOI. Look for the runway and line up and begin descent. Turn off autopilot. Reduce speed to 180, flaps at 15 degrees; continue to reduce speed to 160 KIAS, 30 degrees flaps. At 5 miles, landing gear down, decelerate to landing speed of 135 KIAS. Turn OFF A/T. Cross the runway threshold at about 100 ft. in a level attitude. At 50 ft. reduce throttle to flight idle, flare nose up no more than 4 degrees to cushion the landing. Do not float! Fly the aircraft on to the runway and do not try to land it in a stall as you would a Cessna 152. After touchdown, apply full reverse thrust (F2) and brakes to slow down. The spoilers should self-deploy if you remembered to arm them. Maintain thrust reverse until 80 kts. or when sure of stopping distance, then disengage thrust reverse, lower spoilers, turn right next taxiway and taxi clear of the runway.

Taxi to the Gate

Follow the Taxi checklist after clearing Rwy 28L. Then taxi to gate of your choice at the terminal making sure that no one is taking off on Rwy 28R BEFORE you cross. Once at the gate, set your parking brake (Ctrl +). Follow the shutdown checklist at the gate and you are done. Be sure to file the flight report in your logbook on the DVA website so you can get credit for the flight flown.

B737-800 FUEL PLANNING AND WEIGHT AND BALANCE

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

Fuel burn test flights in the 737-800 were made with a constant Gross Weight of 158,000 Lbs. with airspeeds set to M .75 for each altitude except for 20,000 ft. and below where the over speed alarm displayed.

Example Fuel Burn Charts – PPH/Engine

Altitude	Indicated Airspeed	True Airspeed	Fuel Burn PPH/Eng.
Ground Ops	Taxi 12K-20K	N/A	4,500
10,000	344 KIAS	413 KTAS	4,330
15,000	344 KIAS	447 KTAS	4,530
FL200	344 KIAS	482 KTAS	4,800
FL250	324 KIAS	486 KTAS	4,570
FL300	290 KIAS	464 KTAS	3,970
FL350	258KIAS	439 KTAS	3,570
FL400	228 KIAS	410 KTAS	3,320

These burn numbers were taken from the DVA fleet 737-800 in clear skies and no wind. 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.

- Max Gross Wt. = Empty Wt. + Max Fuel Wt. + Max Payload
- = 91,300 Lbs. + 44,520 Lbs. + 38,800 Lbs. = 174,620 Lbs.
- ZFW = Fully loaded Wt. (Including Payload) – Fuel Wt.
- Example 1: Max Gross Wt. And Max Payload
- ZFW = 174,620 – 44,520 = 130,100 Lbs.

- Example 2: Gross Wt. = 146,701 Lbs.   Fuel Wt. = 24,297 Lbs.
- ZFW = 146,701 – 24,297 = 122,404 Lbs.

Fuel Loading Example 405 nm

Orlando, FL to Atlanta, GA: 405 nm
Alternate Airport: KCLT, Distance from Atlanta: 91 nm
Cruise Altitude: FL300
80% Payload: 31,103 Lbs.
80%Payload Zero Fuel Weight: 122,404 Lbs.
Takeoff and Landing Outside Air Temperature: 59º F
Winds Aloft: 0

Calculations:
We will assume the unusable Fuel = 50 Lbs. per tank x 3 tanks or 150 lb. We can prorate this to each of the two engines as = 150/2 PPH/Eng. or 75 Lbs. per Engine
The Burn Rate Chart shows the Ground Operations Burn Rate = 4,500 PPH/Eng. 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 4,500 PPH/Eng. or 2,250 Lbs. per Engine.

The Enroute Fuel Burn Rate of 3,970 PPH/Eng. is shown in the Burn Rate Table FL300 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 FL300 = 290 + (.02 x 290 x 30,000/1,000) = 464 KTAS

- The Enroute Flight Time = Trip Distance / TAS = 405 / 464 + 10 min
- = 0.8728 + 0.16666 = 1.040 hr.

- The Flight Time To Alternate = Distance / TAS = 91/464 = 0.1961 hr.

- The Enroute Fuel Used = Burn Rate x hrs. = 3970 x 1.04061 = 4,127 Lbs. /Eng.

- The Fuel To Alternate Allowance = Burn Rate x hrs. = 3970 x 0.1961 = 779 Lbs. /Eng.

- The aircraft Zero Fuel Weight = 139,100 Lbs. for an 80% Payload

- Gross Weight: Zero Fuel Weight + Fuel to Load (not including hold or reserve) = 139,100 Lbs. + 28,374 Lbs. = 167,474 Lbs.

- In addition to fuel for the trip, it is necessary to plan for a 30 minute hold and 45 minute reserve. These can be determined similar to calculating the enroute fuel burn. Taking 30 minutes to be equal to 0.5 hours times 3,970 pounds per hour per engine results in 1,984 Lbs. per engine. Perform a similar calculation for a 45 minute reserve.

Summarizing for both Engines:

Flight Event	Each Engine	Two Engines
Unusable Fuel	75	150
½ hr. Ground Operations	2,250	4,500
Enroute Consumption	4,127	8,254
Fuel to Alternate	779	1,557
30 Minute Hold	1,984	3,970
45 Min Reserve	2,978	5,955
Total Fuel to Load	12,193	24,386

Takeoff Weight:

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

122,404 Lbs.
24,386 Lbs.

146,790 Lbs.

Landing Weight:

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

146,790 Lbs.
- 8,254 Lbs.

138,536 Lbs.

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:

- o Unusable Fuel 150 Lbs.
- o Ground Operations 4,500 Lbs.
- o 30 Min Hold 3,970 Lbs.
- o 45 Min Reserve 5,955 Lbs.
- o Total Base 14,575 Lbs.

This 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. These formulas may be programmed into an Excel spreadsheet if desired for easier reference.

Fuel Loading Example – 1,000 nm

Total Flight Distance: 1,000 nm
Alternate Airport Distance: 232 nm
Cruise Altitude: FL360 @ Mach 0.80
Typical Payload: 46,570 Lbs.
Zero Fuel Weight: 172,320 Lbs.
Takeoff and Landing Outside Air Temperature: 59º F
Winds Aloft: 0

Calculations:

- o There is no unusable fuel calculation in this example. Enough reserves and contingencies are built into the calculation to account for any unusable fuel.

- o A B737-800 typically burns 2,670 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 2,670 PPH/ENG or 1,335 Lbs. /ENG.

- o The Enroute Fuel Burn Rate of 2,823 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.

- o The formula for True Airspeed is KTAS = KIAS + (.02 x KIAS x Altitude/1,000).

- Therefore the True Airspeed at FL360 = 272 + (.02 x 272 x 30,000/1,000) = 468 KTAS
- The Enroute Flight Time = Trip Distance / TAS = 1,000 / 472 + 10 min = 2.118 rounded up to the nearest half hour = 2.5 hr.
- The Flight Time To Alternate = Distance / TAS = 232 / 472 = 0.5 hr.
- The Enroute Fuel Used = Burn Rate x hrs. = 2,823 PPH/ENG x 2.5 = 7,058 Lbs. /Eng.
- The Fuel To Alternate Allowance = Burn Rate x hrs. = 2,823 x 0.5 = 1,411 Lbs. /Eng.
- The aircraft Zero Fuel Weight = 172,320 Lbs.
- Gross Weight: Zero Fuel Weight + Fuel to Load (not including hold or reserve) x 2 engines = 172,320 Lbs. + 2 * 9,804 Lbs. = 191,928 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 2,823 Lbs. /hour per engine results in 1,411 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. Before takeoff remember to check the center fuel pumps (on overhead panel). They should be turned off if no fuel is in the center tank.

Summarizing for both Engines:

Flight Event	Each Engine	Two Engines
Ground Operations	1,335	2,670
Enroute Consumption	7,058	14,116
Fuel to Alternate	1,411	2,822
30 Minute Hold	1,411	2,822
45 Min Reserve	2,117	4,234
Total Fuel To Load	13,332	26,664

Takeoff Weight:

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

172,320 Lbs.
26,664 Lbs.

198,984 Lbs.

Landing Weight:

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

198,984 Lbs.
- 14,116 Lbs.

184,868 Lbs.

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 2,670 Lbs.
- 30 Min Hold 2,822 Lbs.
- 45 Min Reserve 4,234 Lbs.
- Total Base 9,726 Lbs.

This 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. These formulas may be programmed into an Excel spreadsheet if desired for easier reference.

B737-800 CHECKLIST

Note: Printable abbreviated checklists are included in Appendix G.

At Gate Parked-Before Engine Start

o All Charts/Flight Plan	On Board
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	ON
o Gear Lever	VERIFY Gear Lever Down
o Clock/Stopwatch	VERIFY SET
o Fuel on board	Document Left/Center/Right Amt.
o Avionics Master	ON
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)
o IAS	SET V2 (SPD)
o Altitude	SET (ALT)
o Vertical Speed	SET (VS)

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

o Transponder	SET Code/VERIFY Squawk Standby
o Crew Takeoff Briefing	Completed

-BEFORE ENGINE START CHECKLIST COMPLETED-

Engine Start

o Parking brakes	VERIFY ON
o Simulator time at start	Document
o Battery	ON
o Beacon	Verify On

When Cleared to Start

o Throttle Power Levers	IDLE
o Fuel X-Feed	VERIFY ON
o Right engine ignition start	ON
o Engine instruments/fuel flow	VERIFY Stable
o Left engine ignition start	ON
o Engine instruments/fuel flow	VERIFY Stable

After Engine Start

o Parking brakes	VERIFY ON
o Navigation, Tax Lights	ON
o De-Ice	ON
o Elevator Trim	SET
o Flap Selector	SET As Calculated

Taxi

ATC TAXI CLEARANCE- Request taxi to active runway

o Throttle Power Levers	IDLE
o Parking Brakes	Release
o Pushback (reverse thrust not allowed)	Shift+P
o Toe Brakes	VERIFY OPS
o Taxi Power	60 % N1 until rolling-adjust for speed
o Instrument Check-taxi	VERIFY Compass/HSI/Turn/Bank move
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
o Landing Lights	ON
o Taxi Lights	OFF
o Strobe Lights	ON

Document takeoff time-fuel amount	Left/Center/Right
o Flap Selector & Trim	VERIFY Settings
o COM's, NAV's & ADF	VERIFY Settings
o Transponder	Squawk Normal

ATC Take off CLEARANCE – Request for takeoff

Takeoff-Cleared or Taxi to Line Up and Wait

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

-BEFORE TAKEOFF CHECKLIST COMPLETED-

Takeoff And Initial Climb

o Autobrake	RTO
o Rotate at Vr	+10 Degrees
o Gear Up	100 ft. AGL
o Raise Flaps	On Schedule

See Emergency Procedures for Abnormal Flight Conditions

Climb to Altitude

o Fuel flow rate-engine instruments	Monitor
o Autopilot/Autothrottle On	3000 ft. AGL
o Climb Profile	200 KIAS to 2,500 AGL at 2,500 fpm 250 KIAS to 10,000 at 2,500 fpm 290 KIAS to 18,000 at 2,500 fpm 290 KIAS to FL230 at 1,200 fpm 290 KIAS to Cruise Alt at 1,200 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 0.72 – 0.78
o Crew Approach Briefing	Completed

Descent

ATC Descent CLEARANCE – Descend

o Throttle Power Levers	FLIGHT IDLE
o De-Ice	ON
o Landing Airport altimeter below FL180	SET
o Airspeed 280 KIAS till 10,000 ft.	VERIFY 2,500 fpm descent
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 Autobrakes	SET
o Flight Spoilers	ARM
o COMM Frequencies	SET
o Navigation Radios	SET Freq./IDENT
o Flap Selector	Flaps 5, Speed 180
o Flap Selector	Flaps 10, Speed 170
o Flap Selector	Flaps 15, Speed 160
o Flap Selector	Flaps 25, Speed 155
o Landing Gear	DOWN Speed 155
o Flap Selector	Flaps 30, Speed (Vref + 10)
o Stabilized Approach	Established-Flaps 30
o Final Approach	Speed Vref + 5 (10 max)

Landing

ATC Landing CLEARANCE - to Land

o Crossing Threshold	Flaps 30, Speed (Vref)
o Throttle Power Levers	GND IDLE at 30 ft. above Rwy
o Flight/Ground Spoilers (GLD)	Extended
o Engine Reverse	Reverse (> 60 KIAS – “F2”)
o Toe Brakes	APPLY (< 60 knots)

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

-AFTER LANDING CHECKLIST COMPLETE-

Gate Shutdown

o Parking brakes	ON
o Taxi Lights	OFF
o Navigation/Panel Lights	OFF
o De-Ice	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
- 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 take-off 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

- 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.

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:
  1. 5000' Smooth/flat field
  2. Grass beside runway (assuming no taxiways to be crossed)
  3. Runway
  4. Large lake or wide river
  5. Bay
  6. 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

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 Vr (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, 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 (#)

CHARTS

Boeing 737-800			
170,000 LBS			
Takeoff N1: 98% Trim +4			
Flaps15		Flaps 5	
V1	154	V1	148
Vr	157	Vr	150
V2	163	V2	157
Landing Gross Wt.: 146,300 Lbs.			
Flaps	30		
Maneuvering	-		
Vref	156		
Vapp	158		

APPENDIX A—TYPICAL CONFIGURATION

DVA B737-800 CAT II Aircraft (< 200’ > 100’)

Empty Weight	91,300 Lbs.		Fuel	2,846 Lbs.
80% Payload	31,104 Lbs.		Left 80 %	6,817 Lbs.
Bus. Class Fwd.	2,176 Lbs.		Center 0%	0 Lbs.
Economy Aft	19,312 Lbs.		Right 80 %	6,817 Lbs.
Gross Weight	136,038 Lbs.		Max Allowable Fuel	445,201 Lbs.
Max Gross Weight	174,700 Lbs.			

Example Fuel Settings

Tank	%	Quantity	Capacity
Left	80	6,817 Lbs.	8,521 Lbs.
Center	0	0 Lbs.	28,539 Lbs.
Right	80	6,817 Lbs.	8,521 Lbs.
Total Fuel		13,634 Lbs.	45,581 Lbs.*
Fuel Weight Lbs./gal: 6.7			

*Note: Maximum Allowable Fuel = 44,520 Lbs.

Payload Settings

Maximum Payload

Station	Pounds
Std. Economy Fwd.	2,720
Std. Economy Aft	24,140
Lwr. Dk Cgo Fwd.	7,108
Lwr. Dk Cgo Aft	4,738
Lwr. Dk Co Bulk	174
Total	38,880

80% Payload

Station	Pounds
Std. Economy Fwd.	2,176
Std. Economy Aft	19,312
Lwr. Dk Cgo Fwd.	5,686
Lwr.. Dk Cgo Aft	3,790
Lwr.. Dk Cgo Bulk	139
Total	31,104

APPENDIX B – V SPEED TEMPLATE

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

Boeing 737-800____ __________ LBS			
Takeoff Gross Weight ________________			
Flaps 5		Flaps 15	
V1 (Vr –3)	—————— ———	V1	
Vr		Vr	
V2 (Vr+6)	—————— ——	V2	

Landing Gross Weight _______________					
Flaps	0	5	15	30	40
Maneuvering					
Vref					
Vapp (Vref + 20K)					

APPENDIX C – TAKEOFF SPEEDS

Flaps 1	Takeoff Speeds in KIAS by Weight (Lbs.)				
Temperature					
20º C	130,000	140,000	150,000	160,000	170,000
V1	132	138	144	149	154
Vr	134	141	146	152	157
V2	146	151	155	159	163

Flaps 5	Takeoff Speeds in KIAS by Weight (Lbs.)				
Temperature					
20º C	130,000	140,000	150,000	160,000	170,000
V1	127	133	138	143	148
Vr	129	135	140	146	150
V2	141	145	149	153	157

APPENDIX D – APPROACH AND LANDING SPEEDS

130,000 Lbs. Landing Wt.	Approach	Vref
Flaps		
0	196	176
5	164	144
10	162	142
15	158	138
25	154	134
30	153	133
40	147	127

142,000 Lbs. Landing Wt.	Approach	Vref
Flaps		
0	202	182
5	170	150
10	167	147
15	163	143
25	161	141
30	159	139
40	151	131

153,000 Lbs. Landing Wt.	Approach	Vref
Flaps		
0	210	190
5	177	157
10	175	155
15	172	152
25	167	147
30	162	142
40	160	140

164,000 Lbs. Landing Wt.	Approach	Vref
Flaps		
0	219	199
5	181	161
10	175	155
15	164	144
25	168	148
30	160	140
40	159	139

174,000 Lbs. Landing Wt.	Approach	Vref
Flaps		
0	225	205
5	183	163
10	180	160
15	177	157
25	171	151
30	164	144
40	166	146

APPENDIX E – MINIMUM RUNWAY LANDING DISTANCES

B737-800 Minimum Landing Runway Length @ Flaps 40					
Landing Wt.	Pressure Altitude (see below)				
Lbs.	0	2,000	4,000	6,000	8,000
90,000	3,800	3,900	4,000	4,175	4,250
95,000	3,900	4,000	4,150	4,350	4,375
100,000	4,000	4,125	4,300	4,525	4,500
105,000	4,100	4,250	4,450	4,700	4,667
110,000	4,200	4,375	4,600	4,733	4,834
115,000	4,300	4,500	5,650	4,766	5,000
120,000	4,400	4,600	4,700	4,800	5,133
125,000	4,550	4,700	4,750	4,967	5,266
130,000	4,700	4,800	4,800	5,134	5,400
135,000	4,850	4,900	4,925	5,300	5,533
140,000	5,000	5,033	5,050	5,475	5,666
145,000	5,100	5,166	5,175	5,650	5,800

B737-800 Minimum Landing Runway Length @ Flaps 30					
Landing Wt.	Pressure Altitude (see below)				
Lbs.	0	2,000	4,000	6,000	8,000
90,000	5,454	5,598	5,741	5,992	6,100
95,000	5,598	5,741	5,956	6,243	6,279
100,000	5,741	5,920	6,172	6,495	6,459
105,000	5,885	6,100	6,387	6,746	6,698
110,000	6,028	6,279	6,602	6,793	6,938
115,000	6,172	6,459	8,109	6,840	7,176
120,000	6,315	6,602	6,746	6,889	7,367
125,000	6,530	6,746	6,818	7,129	7,558
130,000	6,746	6,889	6,889	7,369	7,750
135,000	6,961	7,033	7,069	7,607	7,941
140,000	7,176	7,224	7,248	7,858	8,132
145,000	7,320	7,415	7,427	8,109	8,325
150,000	7,463	7,607	7,607	8,360	8,515
155,000	7,607	7,786	7,894	8,612	8,706
160,000	7,750	7,966	8,181	8,899	8,899
165,000	7,894	8,145	8,325	9,186	9,042
170,000	8,037	8,325	8,468	9,473	9,186
175,000	8,181	8,540	8,612	9,760	9,329

See below for how to calculate Pressure Altitude:

- Density Altitude represents the altitude of a given airport elevation corrected for temperature. The formula is:
- DA = PA (ft.) + (120 x (OAT – Standard Temperature)) where
  - DA = Density Altitude for selected airport
  - PA = Pressure Altitude – Altitude reading when Altimeter is set to Standard Pressure (29.92)
- Standard Temperature = 15º C (59º F)

Density Altitude can become critical in hot and high elevations because engine performance declines as the air becomes less dense with higher altitudes and resulting longer takeoff runs.
Negative DA values represent the rhetorical depth below sea level for the stated Pressure Altitude (PA) and temperature.

APPENDIX F – CLIMB AND DESCENT PROFILES

Maximum Flap Deployment Speeds

Flap Position	Maximum Speed
5	180 KIAS
10	170 KIAS
15	160 KIAS
25	155 KIAS
30	150 KIAS
40	140 KIAS

Climb Profile

Speed	Altitude
V_2 + 40 KIAS	1,000 ft. AFE
200 KIAS	2,500 ft. AFE
250 KIAS	10,000 ft.
290 KIAS	Cruise Alt
.75 Mach	Level Cruise

Standard Climb Rate

FPM	Altitude
2500	Below 10,000 feet
1500	10,000 to 15,000 feet
1000	15,000 to FL200
500	Above FL200

Descent Rate

Target Speed	Descent Rate	With Flight Spoilers
310 KIAS	2300 fpm	5500 fpm
250 KIAS	1400 fpm	3600 fpm
Vref 30 + 80 KIAS	1100 fpm	2200 fpm

Approach/Landing Speeds

Speed	Altitude	Distance from Airport
210 KIAS	Below 10,000 feet	30 nm
180-190 KIAS		24 nm
170 KIAS		15 nm
Vref + 10	147K	Final Approach Fix
Vref @ Flaps 30	137K	Runway Threshold

APPENDIX G – PRINTABLE CHECKLISTS FOR EASY REFERENCE

The following checklist also 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. Note that 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. Note: If you print double-sided, all the abbreviated checklists can fit on one sheet.

Boeing 737 Checklist for printing – page 1

At Gate	
All Charts/Flight Plan	On Board
Weight/Balance	Verify
V speeds/Flap Settings	Calculate V speed card
Parking Brakes	ON
ACARS	Connect +Start
All doors	VERIFY Closed
Flight Controls	Demonstrate
Battery	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 Code/VERIFY
Crew Briefing	Completed
Engine Start	
Parking brakes	VERIFY ON
Simulator time at start	Document
Battery	ON
Beacon	Verify On
Clear to Start	
Throttle Power Levers	IDLE
Fuel X-Feed	VERIFY ON
Right engine ignition start	ON
Engine instruments/fuel flow	VERIFY Stable
Left engine ignition start	ON

Clear to Start – cont.	
Engine instruments/fuel flow	VERIFY Stable
After Engine Start	
Parking brakes	ON
Nav/Taxi Lights	ON
De-Ice	ON
Elevator Trim	SET
Flap Selector	SET
Taxi	
ATC	Request taxi to active Rwy
Throttle Power Levers	IDLE
Parking Brakes	Release
Pushback	Shift+P
Toe Brakes	VERIFY OPS
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
Document	Fuel/Time
Flap Selector & Trim	VERIFY
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	Advance 50% N1
Engine Instruments	VERIFY Movement

Boeing 737 Checklist for printing – page 2

Before Take-off – cont.	
Toe Brakes	Release
Throttles	Advance to 89% N1
Vr (as calculated)	Rotate to 10 degree pitch up
Landing Gear	UP at V2 + positive rte.
Takeoff/Initial Climb	
Autobrake	RTO
Rotate at Vr	+10 Degrees
Gear Up	100 ft. AGL
Raise Flaps	On Schedule
Climb To Altitude	
Fuel flow/Instruments	Monitor
A/P & A/T On at	3,000 ft. AGL
Climb Profile	Per Tables
Landing Lights (10K ft.)	OFF
Cabin Crew Notify	1 chime
Crossing FL180	Altimeter 29.92 in.
Enroute	
Elevator Trim	ADJUST for Cruise
Flight progress, fuel flow and engine ops	MONITOR
Cruise speed	Mach 0.72 – 0.78
Crew Approach Briefing	Completed
Descent	
ATC	Request clearance
Throttle Power Levers	FLIGHT IDLE
De-Ice	ON
Landing Airport altimeter below FL180	SET
Airspeed 280 KIAS till 10,000 ft.	VERIFY -2,500 fpm
Airspeed 250 KIAS below 10,000 ft.	VERIFY -1,500 fpm
Flight Spoilers	As Required
Landing lights (crossing 10,000 ft.	ON
Cabin Crew Notify	2 chimes

Approach	
ATC	Request Clearance
Autobrakes	SET
Flight Spoilers	ARM
COMM Frequencies	SET
Navigation Radios	SET Freq./IDENT
Flap Selector	Flaps 5, 180KIAS
Flap Selector	Flaps 10, 170KIAS
Flap Selector	Flaps 15, 160KIAS
Flap Selector	Flaps 25, 155KIAS
Landing Gear	DOWN 155KIAS
Flap Selector	Flaps 30, Speed (Vref + 10)
Stabilized Approach	Established-Flaps 30
Final Approach	Speed Vref + 5 (10 max)
Landing	
ATC	Clearance to Land
Crossing Threshold	Flaps 30, Speed (Vref)
Throttle Power Levers	GND IDLE at 30 ft. above Rwy
Engine Reverse	Reverse (> 60 KIAS – "F2")
Toe Brakes	APPLY (< 60 knots)
Aircraft exit speed	8-12 kts.
After Landing	
ATC	Request Clearance to taxi to gate
Transponder/TCAS	SET Standby
Landing Lights	OFF
Strobe lights	OFF
Taxi Lights	ON
Flap Selector	UP
Spoilers	Retract
Elevator Trim	SET to Zero
Gate Shutdown	
Parking brakes	ON
Taxi Lights	OFF
Navigation/Panel Lights	OFF
De-Ice	OFF

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

While we strive to mirror real-world operations, this manual is not designed for use in the operation of real-world aircraft.

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