

Step Guide To Landing the 737-800

To Land - Summary

To land the 737-800, the general idea is to gradually slow the aircraft to an airspeed which at the beginning of the descent will, at idle thrust, enable the aircraft to descend on a 3 degree glide path to the runway.

As the airspeed decays, the flaps are extended as per the flaps extension schedule. The thrust levers, rather than being continually adjusted, which can cause engine spooling, are set to approximately 55%N1 with the ultimate aim of airspeed not exceeding (*going under*) $V_{ref}+20$.

At approximately 7 NM from the runway, the landing gear is lowered and flaps 15 extended. Flaps 30 and/or flaps 40 are extended as the aircraft's airspeed decays to $V_{ref}+5$. At this point the landing checklist is completed; the aircraft should be stabilised by 1500 ft AGL.

After crossing the runway threshold at 50 ft RA, the aircraft is flared at approximately 15 ft RA by raising the aircraft's nose 2-5 degrees nose-up and simultaneously bringing the thrust levers to idle.

Notes:

- This guide primarily discusses the landing of the 737-800. A generic style approach has been 'loosely' used to provide context. For brevity the Initial Approach Fix (IAF) has been used to signify the descent point.
- There are a number of ways to fly the 737 aircraft, however, the landing technique has little room for variation.

Important Points:

- This guide assumes manual flight (hand flying). If using full or part automation, disconnect the autopilot and autothrottle at ~1500-1000 ft AGL and land manually.
- Speed Check refers a possible adjustment of pitch or thrust following a change in the aerodynamics of the aircraft. For example, extending flaps or lowering the landing gear.

Prior to Initial Approach Fix (IAF)

1. Aim to be at **10,000 feet (250 kias) at 30 miles** from runway.
2. Complete initial descent briefing prior to the IAF and configure the aircraft's avionics and instruments for the chosen approach.
 - The IAF (location, distance from runway, and altitude) is printed on the approach chart.
3. Reduce airspeed to the **flaps UP** indication on the speed tape (usually approximately 210 kias) prior to reaching the IAF.
 - Reduce airspeed in level flight.
 - Bring the thrust levers to thrust idle.
 - When reaching or passing through flaps UP select flaps 1.
 - Correct flap procedure is to extend the next flap increment at, or passing through the previous flap increment.
4. Reduce airspeed to **~190 kias** and extend appropriate flaps increment as per the flaps extension schedule (usually flaps 1).
 - Note that the above airspeeds may differ slightly depending on the weight of the aircraft.

Beginning Descent

1. **Complete the approach checklist.**
 - The approach chart will indicate at what point you should begin a descent. In the absence of an approach chart, then an approximate altitude and distance to begin descent is ~ 4000-3000 feet AGL ~ 12-10 NM from the runway threshold (use *rule of thumb*: 3 NM/1000 ft loss in altitude).
2. **At the IAF, reduce thrust to idle (or near to) and lower the aircraft's nose to an attitude of ~5 degrees nose-down.**
3. **If not already at, extend flaps 5 (flaps 1 to flaps 5 jumping flaps 2). Airspeed will be approximately 190 kias.**
 - Speed Check.
 - The pitch may need to be adjusted to maintain desired airspeed.
 - If the aircraft is travelling too fast, or ATC have advised to slow down, consider slowing the airspeed to ~180 kias and extending flaps 10. If necessary, increase thrust to maintain descent rate.
 - For a step-down approach, use the same procedure as mentioned above, with the added step that you must anticipate what the aircraft will do when you level off at the end of the step-down. At the level off, you will need to adjust pitch for level flight and probably need to increase thrust. In both scenarios, the Flight Path Vector (FPV) can be very helpful in determining the attitude of the aircraft.
4. **During the descent, try to maintain a descent rate of 600-800 ft/min.**
 - Do not exceed 1000 ft/min (unless a special briefing has been carried out for a non-standard approach).
5. **The aircraft should descend on a 3 degree glide path.**
 - Use the speedbrake sparingly, especially after beginning your descent.
 - Adhere to the flaps extension schedule. Correct management of the flaps is selecting the next lower speed as the additional drag of the flaps begins to take effect. This minimises engine spooling and increases passenger comfort in addition to making the flaps transition smooth.
 - Anticipate what the aircraft will do when you extend the flaps. The flaps will cause increased drag which, assuming you want to maintain the same airspeed and rate of descent, will either require a decrease in pitch or an increase in thrust.
 - During the descent, the aircraft's airspeed will decay. As the airspeed passes through the flap indications on the speed tape extend the next flaps increment.
6. **Do not exceed (go under) Vref +20.**
 - Vref +20 is displayed as a white carrot on the speed tape (displayed after setting Vref in the CDU).
7. **As the aircraft nears the outer marker, or is ~ 8-7 NM from the runway (unless a delayed flaps approach is being performed, in which case the distance will be 5-4 NM), idle thrust should be increased to ~55%N1.**
 - Increasing %N1 is to counter the effect of drag from the flaps and soon to be the lowered landing gear. Allow thrust to stabilise for a few seconds.
 - It is a balancing act (based on aircraft weight, airspeed, and drag) to what %N1 is set. Start with 55%N1 and adjust from here.
 - The thrust setting that has been set should be enough to compensate for the increased drag from flaps and landing gear, however, you may need to adjust the thrust setting slightly to

maintain the desired airspeed and rate of descent. Think ahead and factor this into your pitch and thrust settings.

8. **At the **outer marker**, or at **~7 NM** from the runway threshold, or between 2400-2000 feet AGL, **lower the landing gear**.**
 - There is no absolute rule as to when to lower the landing gear. The longer you delay, the less noise and fuel will be used. I find that anywhere between 7-5 NM works well (weather dependent).
 - If you are carrying out a delayed flaps approach, the landing gear is usually lowered at 5-4 NM. (distance may change depending upon pilot preference and airline policy).
9. **Immediately after lowering the landing gear, **extend flaps 15**.**
 - Speed Check.
 - The drag will increase dramatically after lowering the landing gear and extending the flaps. Plan ahead and if necessary decrease pitch and/or increase thrust.
10. **Arm the speedbrake.**
11. **Set the Missed Approach Altitude in the altitude window of the MCP.**
12. **Complete the landing checklist.**

Final Approach

1. **At **~ 5-4 NM** from the runway threshold, and at an altitude greater than 1500 feet AGL, **extend landing flaps**.**
 - Extend flaps 30 jumping flaps 25 unless flaps 40 is being used, in which case you would extend flaps 25.
 - Speed Check.
2. **At this point the aircraft's airspeed will be very close to $V_{ref} + 5$ and the aircraft will be closing rapidly on the runway threshold.**
 - Add wing/gust component if necessary to $V_{ref} + 5$.
3. **Raise the aircraft's nose to an attitude of **~2.5 degrees nose-up**.**
4. **Decrease the aircraft's **descent rate** to **~ 500-600 ft/min**.**
 - This will aid in the transition to the flare by slightly increasing the nose-up attitude.
 - At 1500 ft RA each pilot's deviation alerting system self tests upon becoming armed. The test will display on the PFD an amber coloured localizer deviation that will intermittently flash for 2 seconds.
 - Depending upon airline policy, the aircraft must be stabilised between 1500-1000 ft AAE.

For example, QANTAS state that the aircraft must be stable by 1000 ft RA with a attitude pitch of 1-3 degrees nose-up.

Landing, Flare, and Reverse Thrust

1. **Select a part of the runway where you want to the land (use the **runway aiming markers**).**
2. **Adjust the **attitude** of the aircraft so that it is **aimed at this location**.**
 - For guidance, the runway centerline should be running between your legs.
3. **As the aircraft passes over the runway threshold (piano keys), adjust your aiming point to approximately **3/4 down the runway**.**

- When crossing the runway threshold and beginning the flare, focus your eyes on the end of the runway and watch the horizon. This helps to gauge whether the aircraft wings are level.
- 4. **The height that the aircraft should be at when crossing the runway threshold is ~ 50 feet AGL.**
- 5. **At ~15 feet RA, initiate the flare and increase the aircraft's attitude ~ 2-3 degrees nose-up.**
- Listen for the RA call-outs. At the RA 20 call-out begin the flare (this is because by the time your brain has processed the call-out and you have moved the control column, the aircraft will be at RA 15 ft.
- **Maintain back pressure** on the control column to keep the attitude constant until the aircraft's main gear touches down. If the flare has been done correctly, the main gear will touchdown simultaneously with the thrust levers reaching idle.
- When initiating the flare, the increased attitude will decay the +5 kias plus any gust correction that was added to Vref. The aircraft's main gear should touchdown at Vref.
- During the flare smoothly bring the thrust levers to idle. Do not suddenly chop the thrust.
- 6. **Ideally the aircraft's descent rate, when landing, will be 200 ft/min or less.**
- 7. **Lower the nose wheel** without delay by smoothly flying the nose wheel onto the runway.
- Control column movement forward of neutral should not be required.
- 8. **Engage reverse thrust** and check that spoilers have engaged.
- 9. Verify that speedbrake lever is down.
- 10. **Disarm the auto brakes as the aircraft approaches 60 knots ground speed.**
- 11. **Approaching 60 knots ground speed, and only after hearing the 60 knots call, begin to slowly retard reverse thrust.**
- The reversers should be at reverse idle as you reach taxi speed. Maintain reverse idle for a few seconds to enable the reverse thrust to fully dissipate. Close and stow the reversers.
- 12. **Apply manual braking as required.**

Important Points:

- Below ~ 200 feet AGL the landing is primarily visual.
- To assist in gauging the flare, focus your eyes nearer to the end of the runway and watch the horizon (which should be horizontal).
- A go around (TOGA) can be instigated at anytime prior to landing touchdown.

Review and Updates

Release Date	Notes
09 April 2024	review and release of .pdf