



PERFORM A VPT APPROACH [B737]

1. Introduction

This documentation will illustrate how to perform a VPT approach (visual approach with prescribed tracks) with a Boeing B737NG.

The main difference with the circle-to-land approaches is the fact that VPT are built on published visual tracks that aircraft operators are required to follow as accurately as practicable.

The theoretical part about VPT approach structure is available in another documentation. Also, basic knowledge on how to operate the Boeing 737 is required.

Refer to ILS or VOR approach documentation for proper use of a Boeing 737 during approach phase.

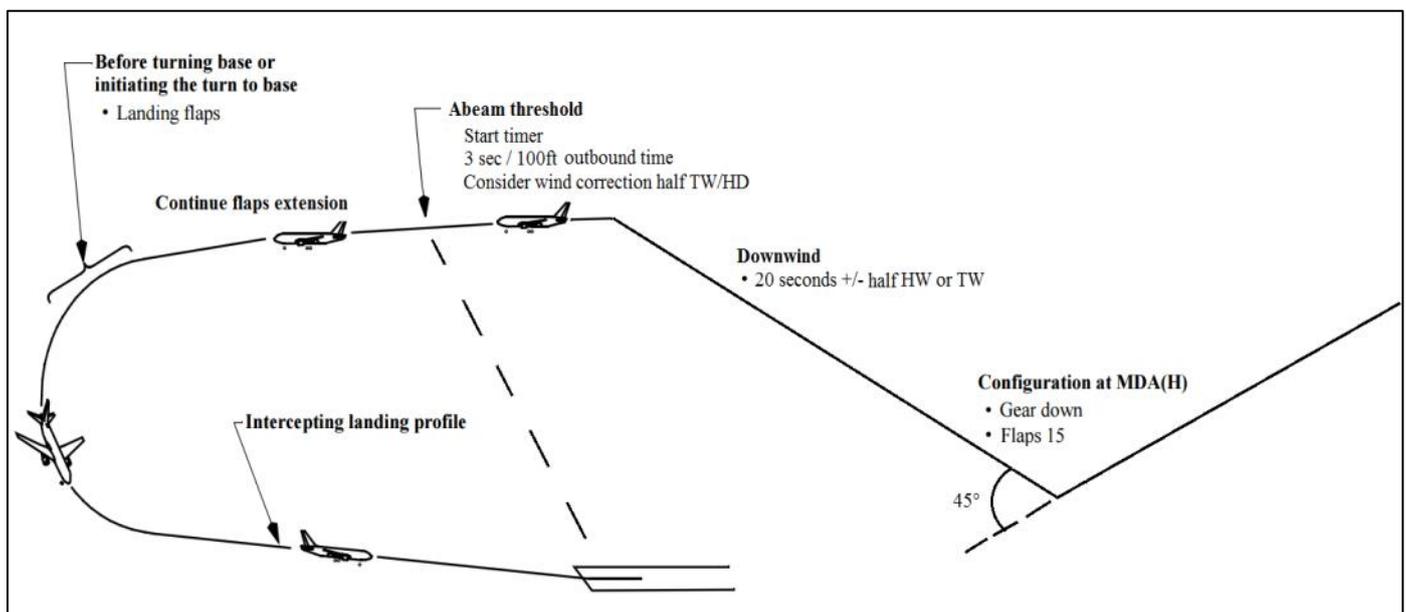
2. Theoretical aspects

2.1. Scenario

This documentation will be about performing a VPT approach using various techniques such as visual references, dead reckoning, radio-navigation means; and aircraft manual extract. We will be established on final instrument approach at LFST on ILS RWY23

2.2. Aircraft manual standard operating procedures

Modified extract from the B737 FCOM for indirect approach. **VPT trajectory may differ.**



2.3. Lateral flightpath

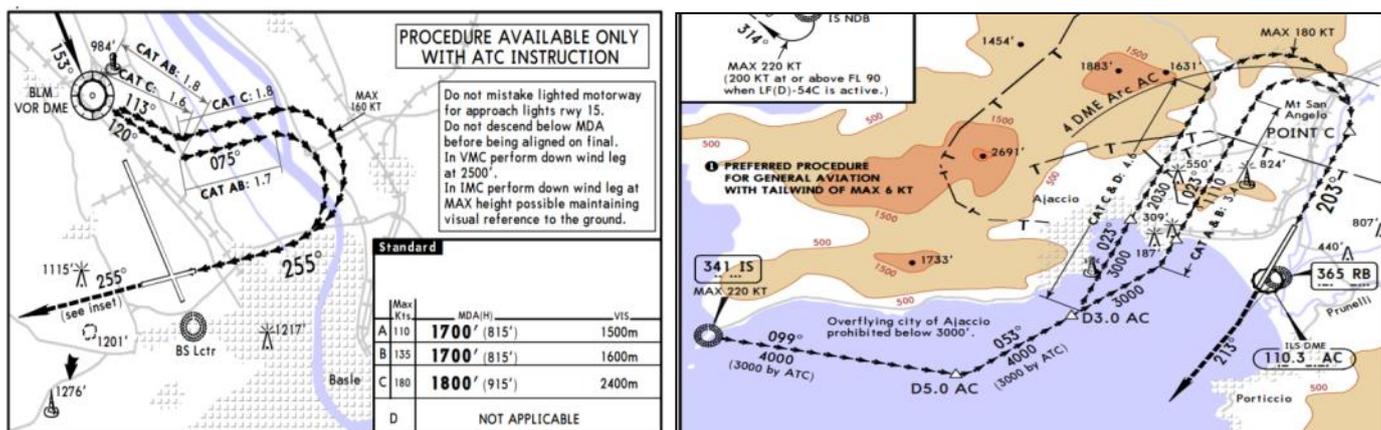
Following your instrument approach, when approaching the MAPt, you will have to follow a prescribed flightpath as accurately as possible.

It will generally have the shape of a standard circling approach.

Mainly, it will be based on visual references that may be given subsequently by your approach chart. However, you may find radio-navigation means references such as DME distance to help you as well as computed length of segments.

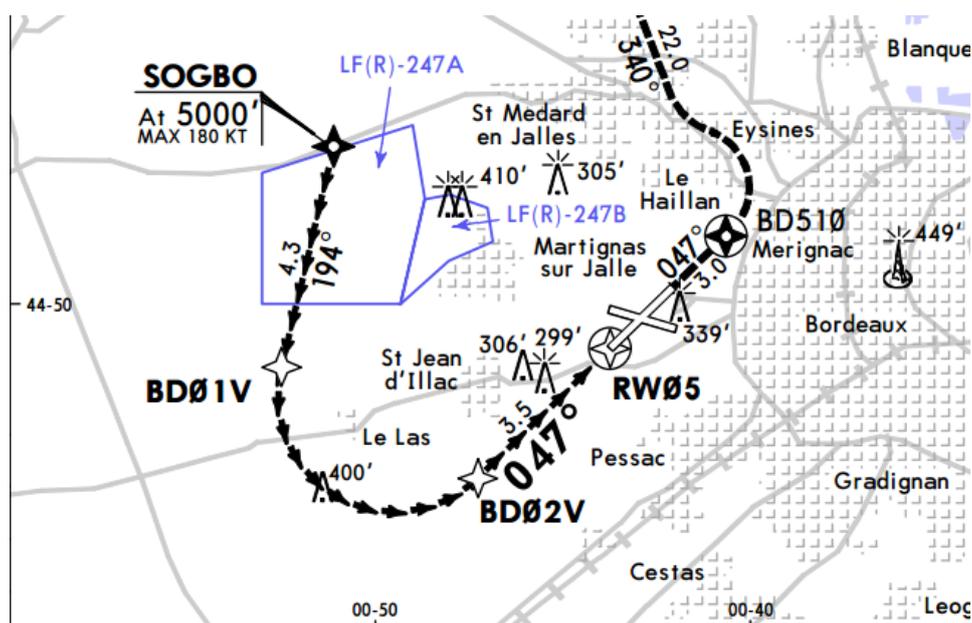
Since we will deal with a typical VPT, here are some particular examples.

Examples: VPT26 Basel LFSB – VPT20 A Ajaccio LFKJ



Having the specified meteorological conditions is critical to ensure safety since the volume of protection associated with this approach is very limited compared to typical IFR protections. However, contrary to a circle-to-land, a VPT does not require the runway to be in sight, but the pilot should only have ground surface in sight to begin the manoeuvre.

We will not deal with RNAV visual approaches, which enable the pilot to set waypoints in his GPS/FMS in order to track accurately the new flightpath. Such an example can be found below: LFBF – Bordeaux



2.4. Vertical flightpath

Our aircraft will be descending, established on the final approach course and the pilot flying should level his aircraft when clear of clouds, at the latest reaching the MDA.

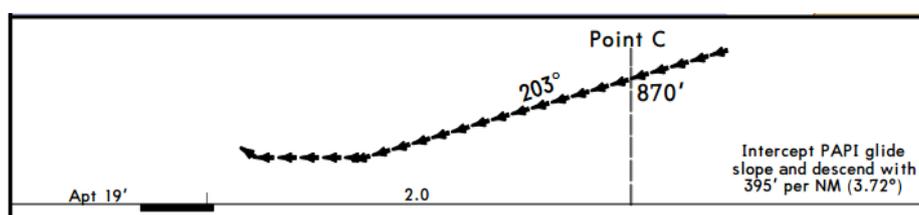
The instrument approach final descent shall not be continued below MDA, even with visual references.

Since a VPT is generally at low height (typically 700ft AGL) compared to visual traffic patterns (standard on B737 is 1500ft AAL), final descent should be initiated on final leg.

Remember, you may accept a positive deviation but you must never descend below MDA unless you are in position to perform the final descent (normally not before entering base turn).

Some procedures may include a vertical profile, which are to be followed visually.

Example: VPT20 A Ajaccio LFKJ



RNAV visual approach requires a computed descent path to be provided to the pilots.

2.5. Speed management

VPTs generally have a lower speed restriction than the general regulations. Always pay attention to the chart and these restrictions, in particular for the last turn.

As the aircraft is performing an indirect approach, the pilot flying should operate a stabilized approach. However, since we need to manoeuvre the aircraft, we will not prepare our aircraft in the landing configuration.

For the Boeing B737, we will maintain:

- Vref+15, meaning about 160 IAS, and allowing a standard 25° bank angle.
- Final approach speed Vref when established on final.

Speed is critical, in particular when auto thrust is not used. Attention to aircraft energy is important!

2.6. Missed approach

A VPT is always provided with a specific missed approach which can be:

- Entering again into the VPT procedure to attempt a new approach immediately. In this case the missed approach is visual.
- An instrument missed approach leading to a full new instrument procedure from an IAF.

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3. Preliminary work

3.1. Main parameters

Approach will be LFST ILS 23 VPT RWY 05.

- CAT C Minima: MDA - 1150' (645' AGL)
- Required visibility for CAT C: 2400m
- Missed Approach Point: 5.5NM STR DME
- Opening Turn: 45° Left
- Maximum IAS: 180 kts

3.2. Prescribed tracks

We will determine together how to make sure we are following the prescribed tracks properly, using various methods and instruments to confirm our position during the manoeuvring on each segment.

For a better understanding, we are going to split the VPT in 4 segments:

- Leg 1) Opening leg: track 182° and 4.2NM
- Leg 2) Downwind leg: track 227° and 2.5NM
- Leg 3) Base turn
- Leg 4) Final

3.2.1. Visual references

You must focus primarily on navigating visually.

For each leg, we can highlight:

- Leg 1) we will remain off the right of a railroad and will try to reach the western side of Fegersheim.
- Leg 2) right before Fegersheim, we will turn downwind as to remain off the right of some villages.
- Leg 3) the base turn should be initiated upon crossing a road, before some lakes, and adjusted to fly abeam a village off our right

3.2.2. Timing

This method can be used if it has been prepared carefully before carrying out the procedure.

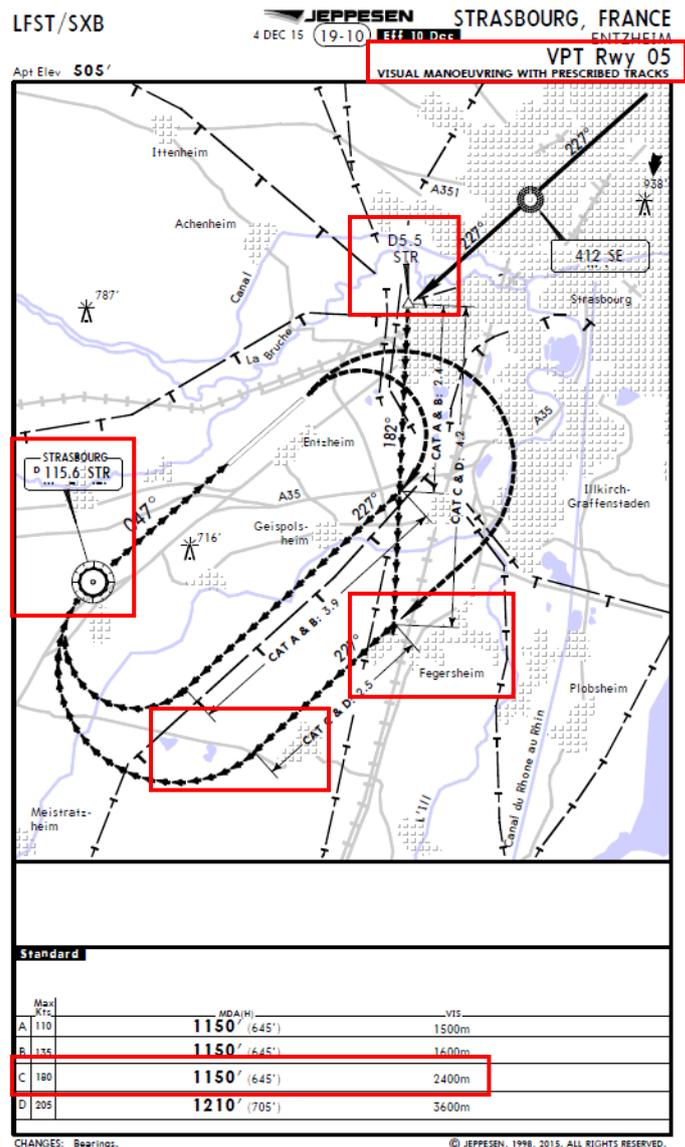
This method should only be applied to help the pilot positioning his aircraft. He should focus primarily on visual references. **It requires the speed of the aircraft to be constant!**

In this example, our aircraft ground speed will be roughly 160 knots. **Mind the wind!**

For each leg, we will determine the duration of the segment. **Remember to start the timer accordingly!**

$$\text{The general formula is: } \textit{Duration} = \frac{60}{\textit{Ground Speed}} \times \textit{Length}$$

- Leg 1) with GS=160kt, a/c flies 0.375 NM/min thus 4.2NM is flown in 1 min 35 seconds
- Leg 2) this segment is 2.5 NM long thus shall be flown in 56 seconds



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3.2.3. Radio-navigation references

Radio-navigation aids may help you to make sure you are on the right flightpath. Use them wisely.

For each leg, we can highlight:

- Leg 1) we should be around radial 090 at the end of the segment.
- Leg 2) we should be around radial 137 at the end of the segment.
- Leg 3) the base turn should be adjusted in order to overfly STR VOR at the end of the turn
- Leg 4) the final leads you to be established on radial 047 of STR VOR

3.3. Vertical flightpath

As this is a typical VPT, there is no need to descend since you will be naturally at the good height to perform the final descent at the end of the base turn.

Remember: the final descent should be initiated only when in position to do so at a correct sink rate and established on the runway axis.

Most airfields equip the runway which requires performing a VPT with a visual guidance such as a PAPI. Remember to check the descent slope they are set to.

4. Flying the circle-to-land

Even though we rely on instruments, you must acquire, maintain and use visual references!

4.1. End of ILS approach

At this point, the following aircraft configuration has to be set while descending established on the ILS:

- Aircraft is at $V_{ref}+15$ (approx. 160kts)
- Aircraft is Flaps 15 and Gear is down.
- Minima are identified: 1150 feet in this case.



When reaching MDA, level off the aircraft.

You see the runway and consider the whole circling achievable in regard to visual flight. In that case you may enter into the opening leg. Check every VPT segment (downwind, base and final).

Use the FPV (Flightpath Vector) also named "The Bird" if available for enhanced flight accuracy.

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Remember! A VPT only requires to have the ground surface in sight.

You may also stop the descent at a higher altitude than the MDA but not more than 200 feet.

4.2. Opening leg

When you are confident about performing the circling, perform the opening.

We were established on course 227°. Our new course will be 182°.

If you do use timing as a follow-up, remember starting the timer right after initiating the turn.

Do mind the wind to not get pushed onto the runway because of the drift. It will result in an overshoot when performing the last turn to final.

Aircraft remains in the same configuration.



Remember to closely monitor your position with the published tracks visually.



We can see on this picture:

- Entzheim on the right
- Geispolsheim on the left

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4.3. Downwind leg



At the end of the segment, turn toward downwind when you are sure about the aircraft's position.

On this picture we can see the village of Fegersheim and the railroad going through.

Continue setting the aircraft in landing configuration.

If you are flying an advanced depiction of this aircraft, change arrival runway during downwind (if able).

4.4. Base turn

When you are arriving at the end of the downwind leg, again check the aircraft's position.



Various ways to make sure we are at the end of the downwind leg:

- we can see the two lakes we talked about.
- we can see we are about to overfly radial 137 of STR VOR.
- we are about to cross the small road before the base turn.

At half of the turn but not before:

- Reduce speed to approach speed

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4.5. Final leg

At the end of the turn, visually adjust your position with the runway .
Normally you should be a bit below the normal descent path. Do not be too slow to correct your attitude.



Do not initiate descent below MDA if not established on final leg or if position is uncertain.

Use any means to confirm your descent:

- Visual guidance such as PAPI
- Instrumental references

Do not forget your landing checklist!

4.6. In case of aborted approach and go-around

In case of aborted approach (which can be due to loss of visual references), the situation is critical!

Your reaction is subsequent to your position in the VPT:

- Before being abeam the runway threshold, turn toward the airfield and rejoin the original instrument approach published missed approach path.
- If you are at a later stage, turn toward the airfield, climbing in circles while remaining in the protected area and rejoin as soon as possible a suitable course toward the missed approach path.

VPTs include a missed approach path, usually leading to join the downwind leg.

If unable, climb as fast as possible in circles while remaining in the circling protected area.

5. Conclusion

VPT procedures remain one of the most complex IFR procedures due to its visual part which is not particularly adapted to airliners.
However, like any IFR procedures, when it is prepared correctly with the correct methods, it is not so much difficult to perform.

See the final trajectory of our flight.



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