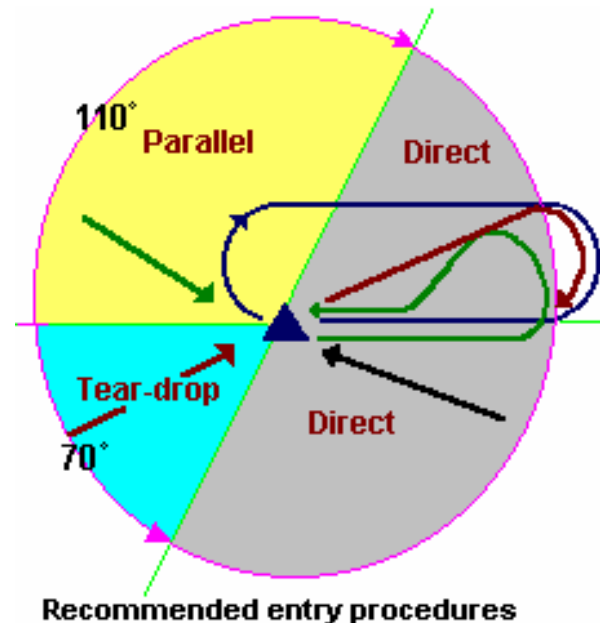
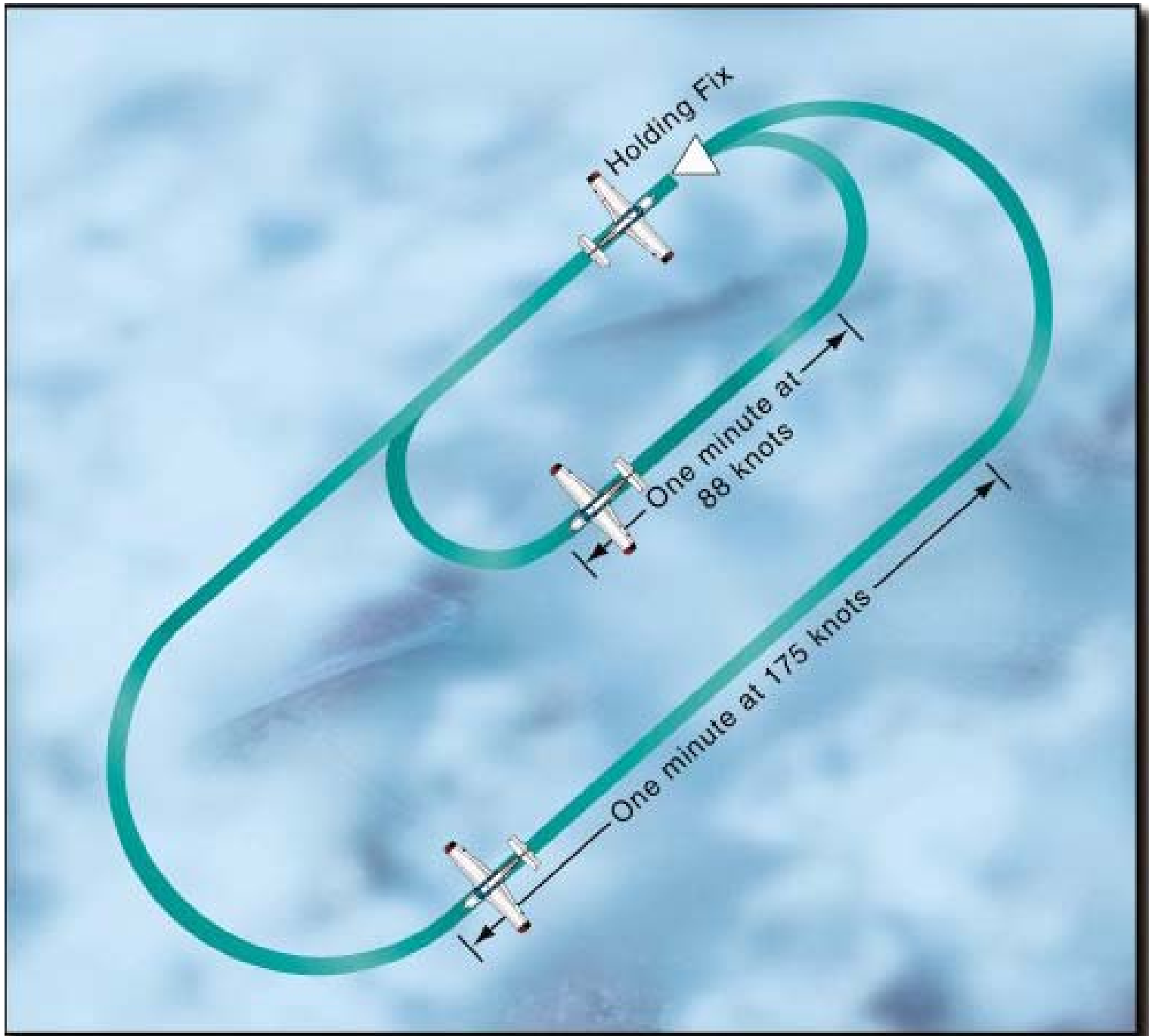


Holding Patterns and Procedures

A holding pattern provides a protected airspace for a safe operation during the hold. Pilots are expected to remain within the protected airspace (the holding side). One of the elements which causes unnecessary confusion and anxiety is the holding pattern entry.

Holding pattern *entry procedures are not mandatory*, they are merely a recommendation (as long as the airplane remains within the protected airspace). The recommendation is based on three types of entries, depending on the sector from which the airplane arrives at the holding fix. These are the **direct, parallel and tear-drop** entries.





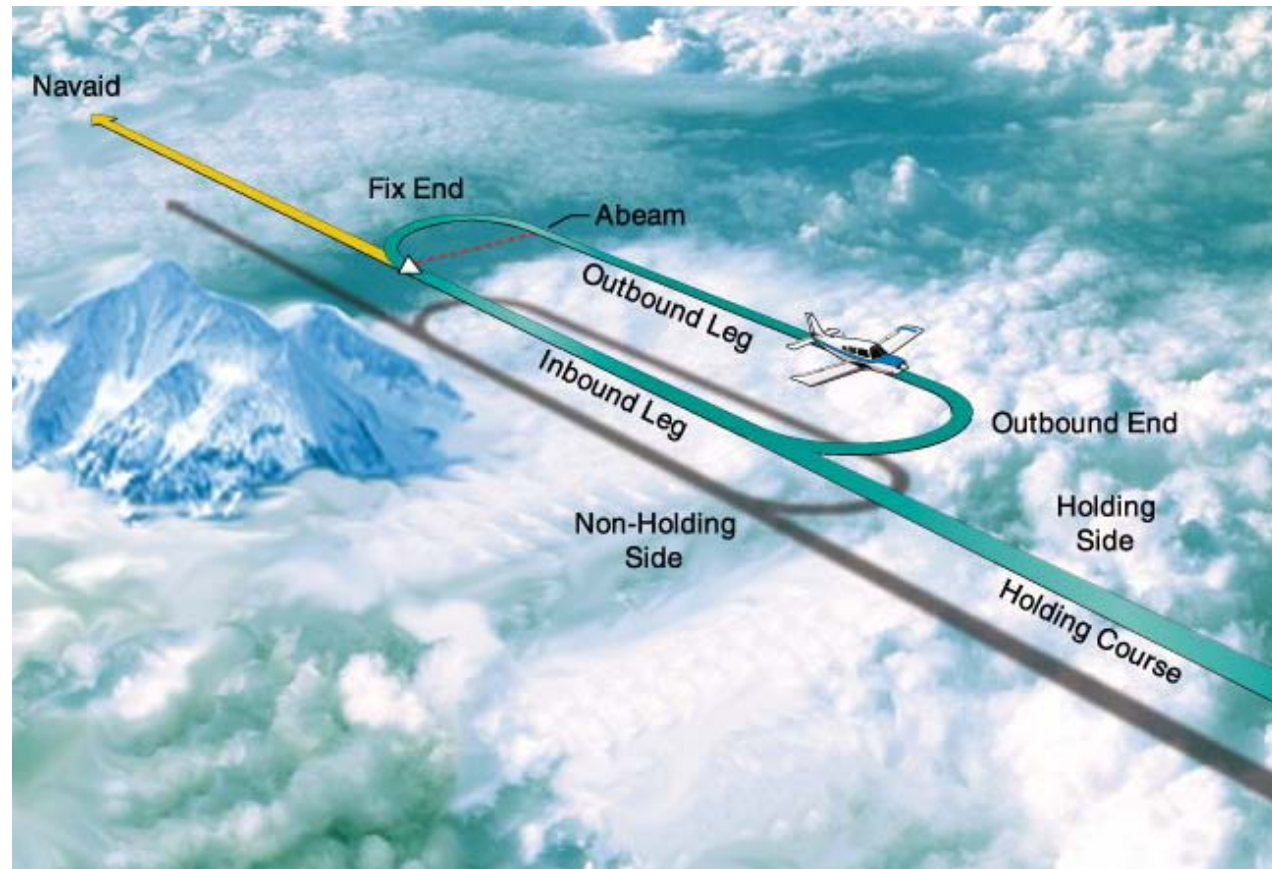
Holding Patterns

Each holding pattern has a fix, a direction to *hold FROM the fix*, and an airway, bearing, course, radial, or route on which the aircraft is to hold.

Standard holding pattern - all turns made to **right**.

The **inbound leg** of a holding pattern is **1 minute** at & below 14,000 ft. and 1.5 minutes above 14,000 ft.

Outbound leg should be adjusted to yield a 1 minute inbound leg.

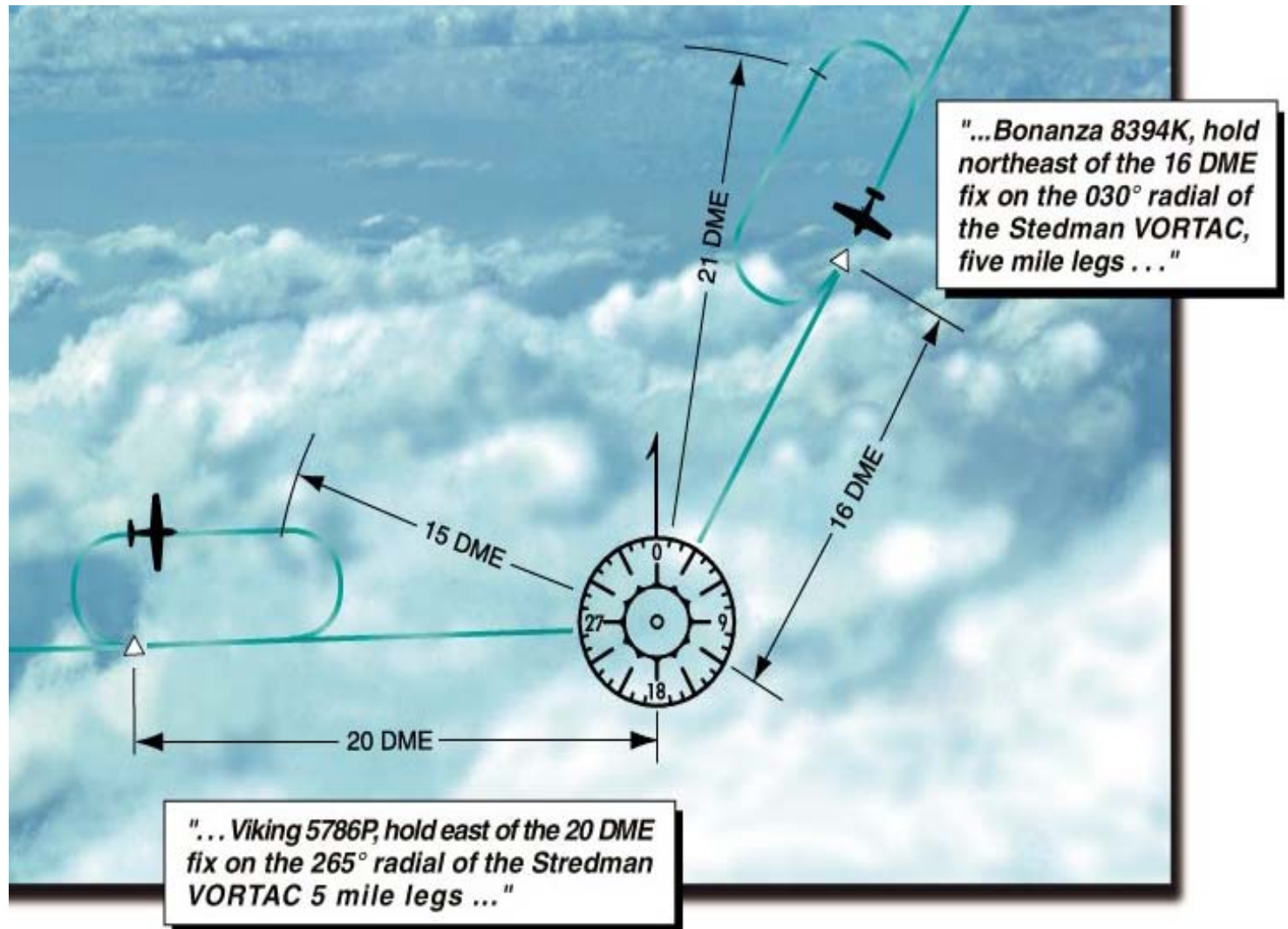


Timing of the outbound leg should begin either abeam the fix or after completing the outbound turn.

Holding Patterns

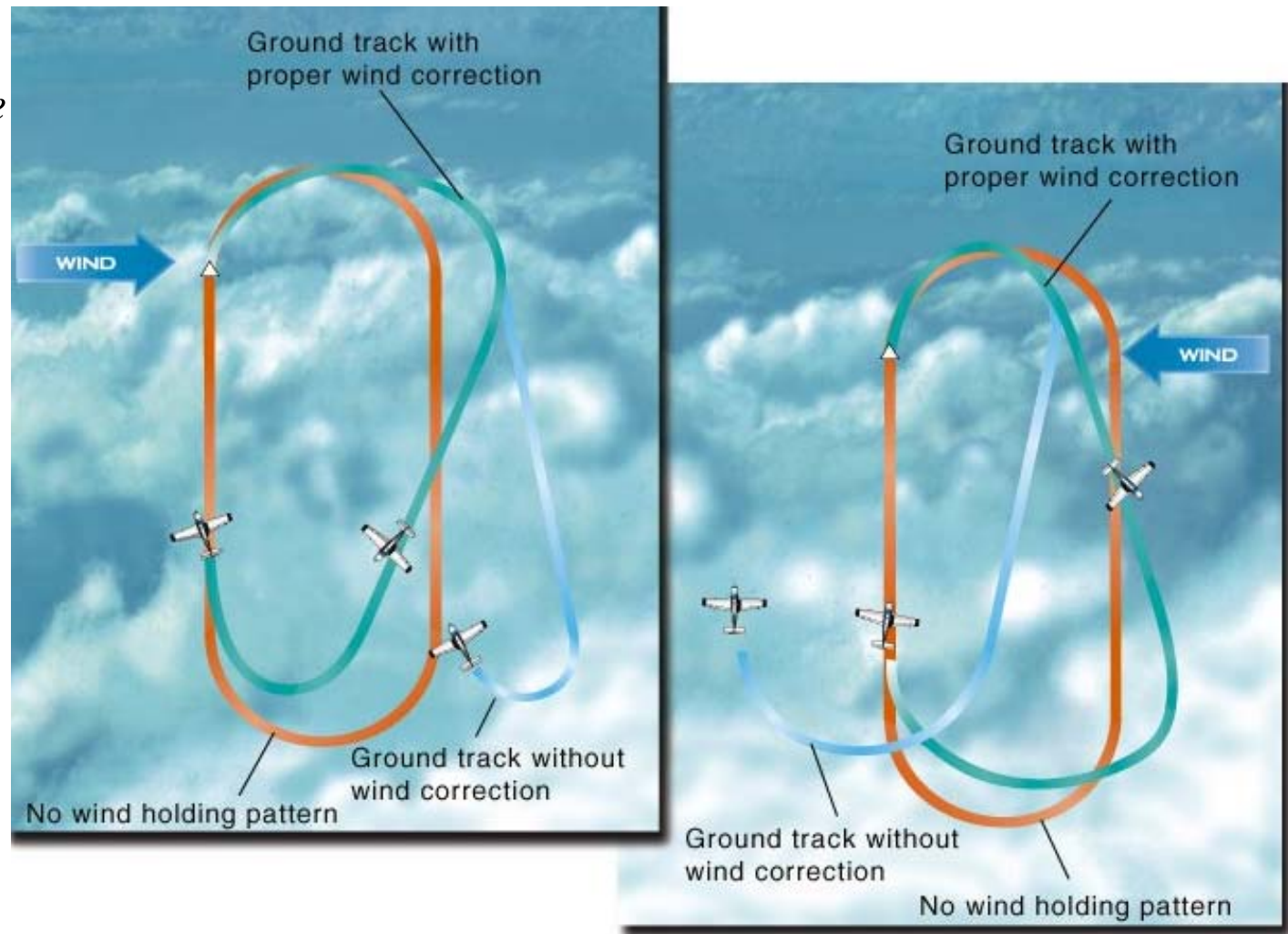
DME leg length may be used instead of time for holding patterns.

When used, **DME leg length** refers to the **outbound leg length**.



Holding Patterns

You should *triple* the crosswind correction needed on the inbound leg to determine the outbound leg heading.



Speed Limits

Maximum holding speeds are established to keep aircraft within the protected holding area during their one-minute (one-minute and a half above 14,000 ft MSL) inbound and outbound legs. For [civil aircraft](#) (not [military](#)) in the United States, these airspeeds are:

<u>Up to 6,000 ft MSL:</u>	200 KIAS
<u>From 6,001 to 14,000 ft MSL:</u>	230 KIAS
<u>14,001 ft MSL and above:</u>	265 KIAS

The ICAO Maximum holding speeds (international)

Up to 14000 ft: 230kts

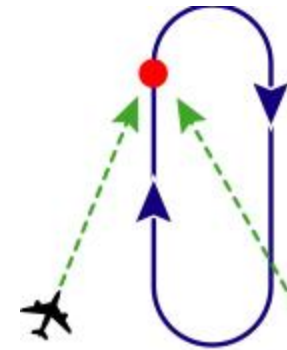
14000 ft to 20000 ft: 240kts

20000 ft to 34000 ft: 265kts

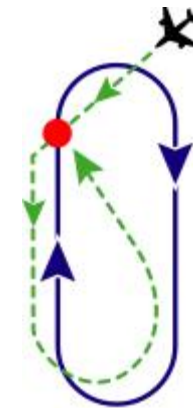
Above 34000 ft: M0.83

With their higher performance characteristics, military aircraft have higher holding speed limits.

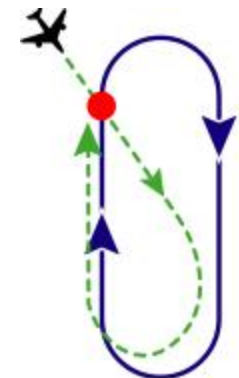
A **direct entry** is performed exactly as it sounds: the aircraft flies directly to the holding fix, and immediately begins the first turn outbound.



In a **parallel entry**, the aircraft flies to the holding fix, parallels the inbound course for one minute outbound, and then turns back, flies directly to the fix, and continues in the hold from there.



In an *offset* or **teardrop entry**, the aircraft flies to the holding fix, turns into the protected area, flies for one minute, and then turns back inbound, proceeds to the fix and continues from there.



Tutorial 1

<https://www.youtube.com/watch?v=JbiVflkwyoQ>

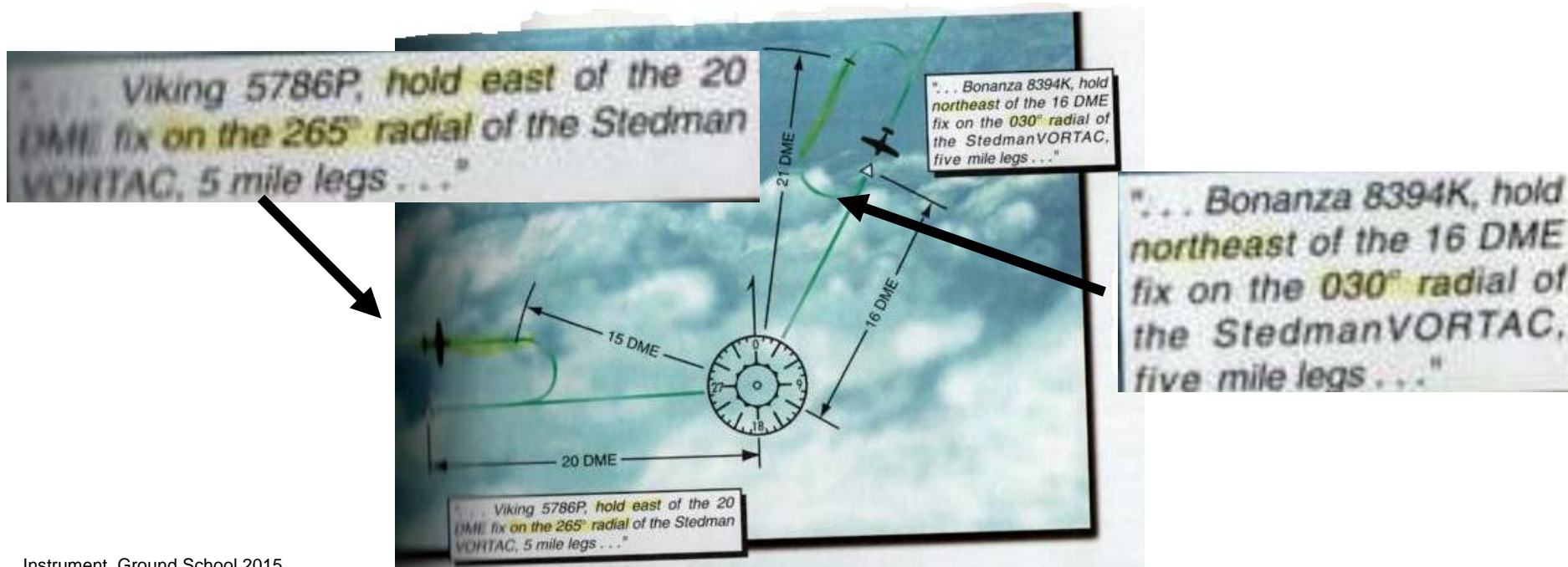
Tutorial 2

<https://www.youtube.com/watch?v=47CTI7hzXX4>

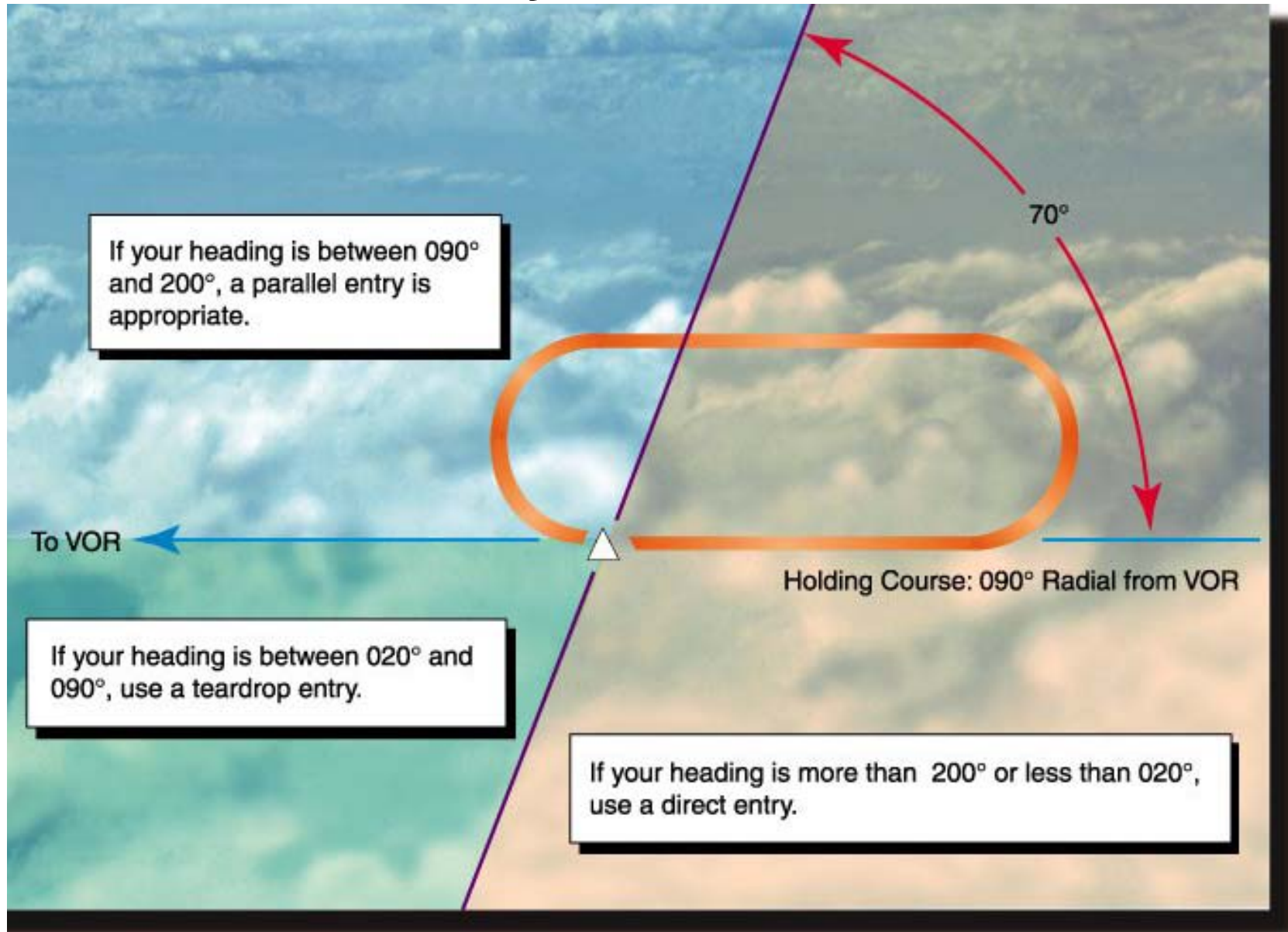
Holding Clearance

A holding clearance is given at least 5 minutes before arriving at the clearance limit or fix. If the holding pattern assigned by ATC is depicted on your aeronautical chart, you are expected to hold as published, UNLESS advised otherwise by ATC. A holding clearance includes:

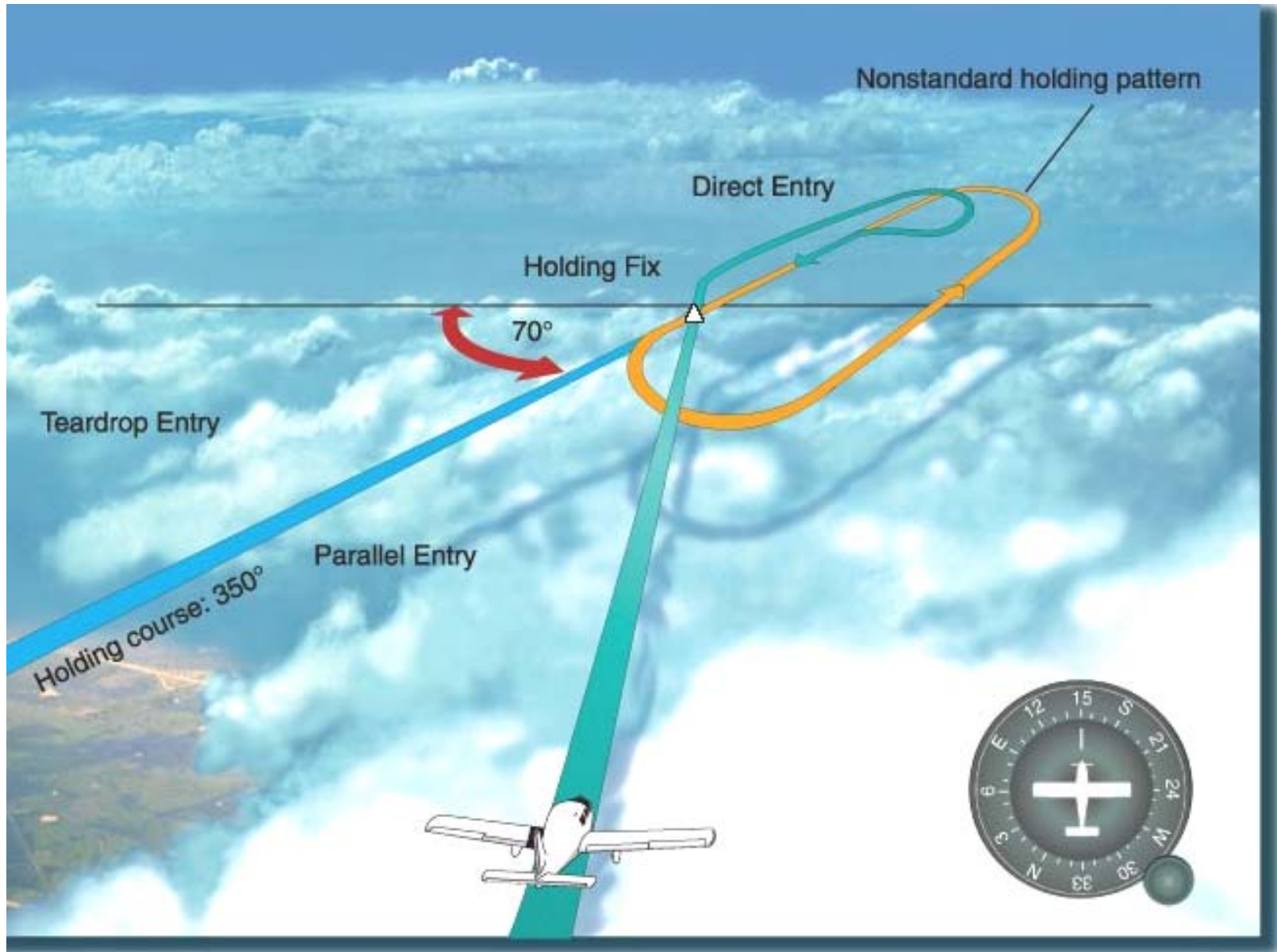
- Direction from the fix
- Name of the fix
- Course
- Leg length
- If appropriate, direction of turn if left turns are required
- Expect further clearance time (if you lose 2-way comm, the EFC allows you to exit the holding pattern at a definite time)
- Plan the last lap of the holding pattern to be at the fix as close as possible at the EFC time.



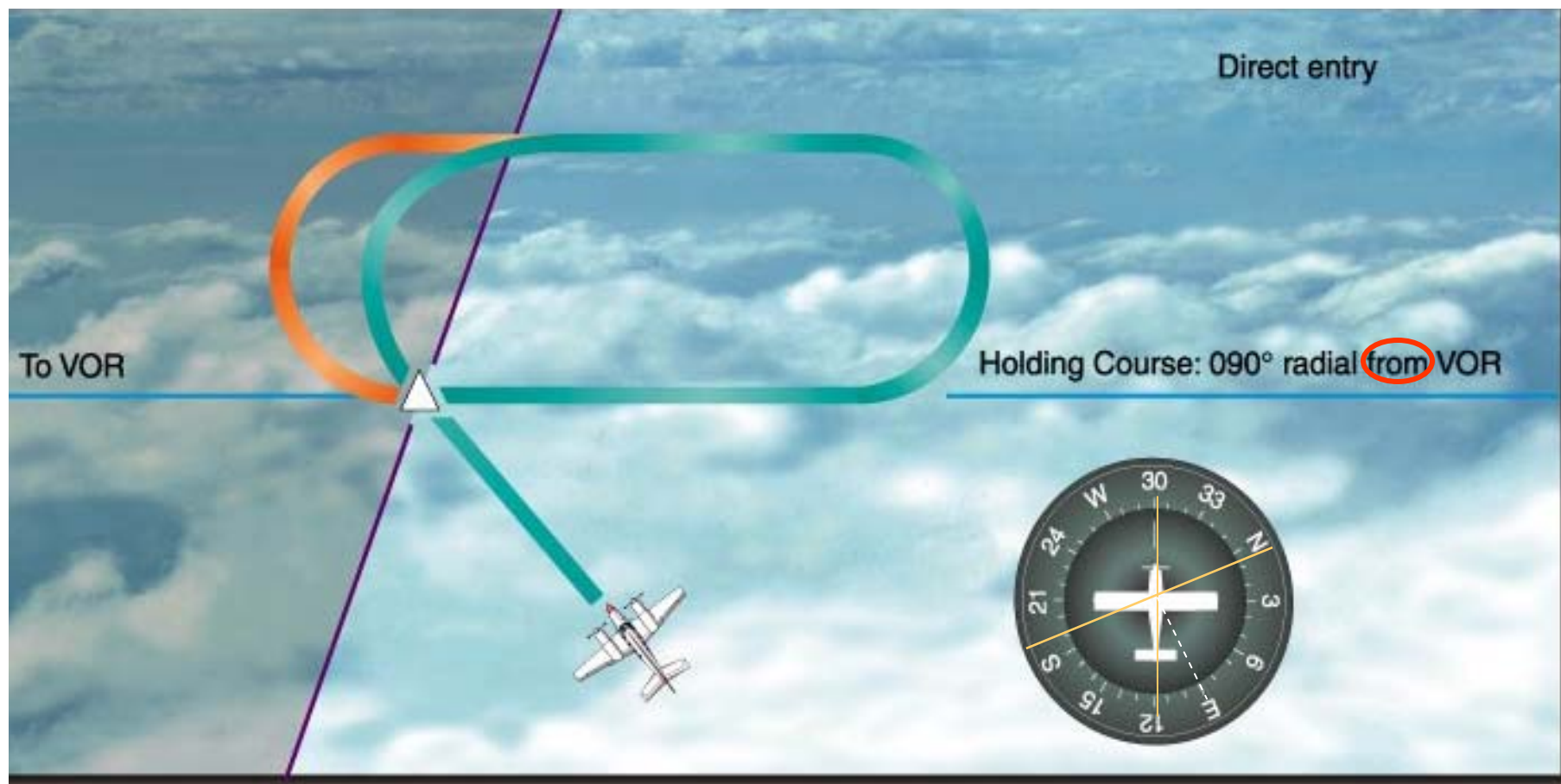
Holding Patterns – *RECOMMENDED* Entry Procedures



Holding Patterns - Entry Procedures

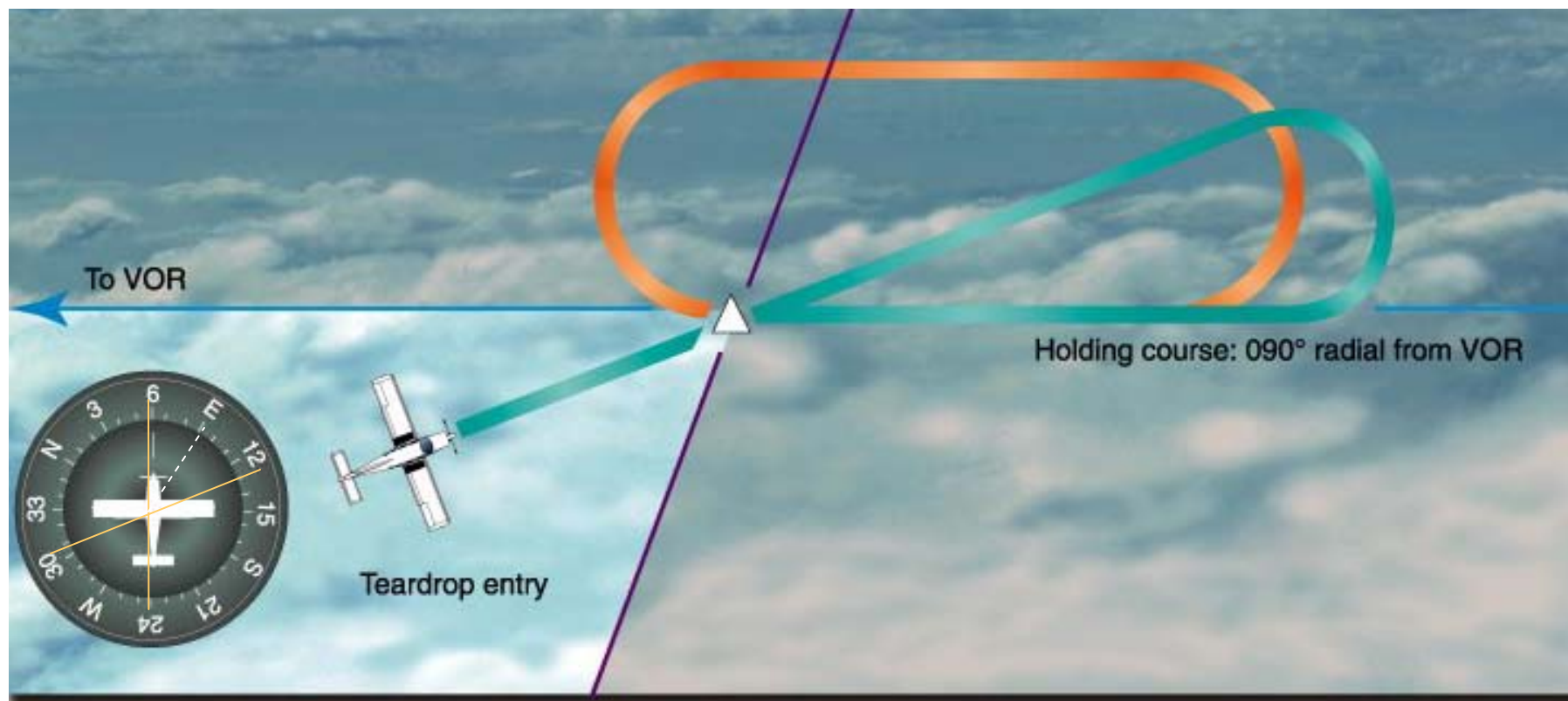


Holding Patterns - Entry Procedures



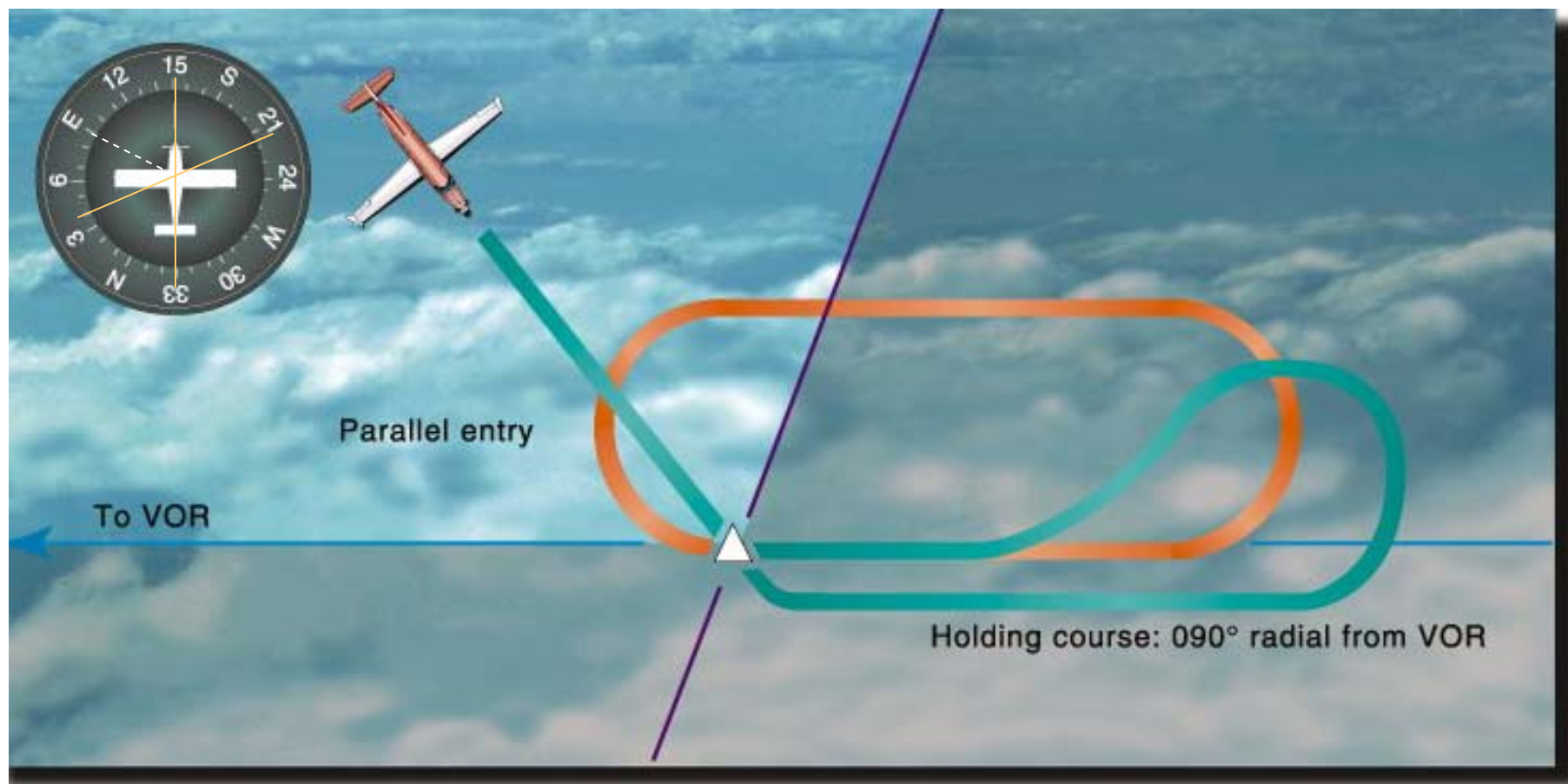
Note that outbound course falls into the direct sector

Holding Patterns - Entry Procedures



Note that the outbound course falls into the teardrop (= tiny) sector.

Holding Patterns - Entry Procedures



Note that the outbound course falls into the parallel sector.

Holding Summary Checklist

- A holding pattern is a time delay used by ATC to help maintain separation and smooth out the traffic flow.
- You may request a hold, for example, to wait for weather conditions to improve.
- Holding pattern size is directly proportional to aircraft speed; doubling your speed doubles the size of the holding pattern.
- Turns are to the right in standard holding patterns, and to the left in nonstandard holding patterns.
- Each circuit of the holding pattern begins and ends at the holding fix.
- Adjust the timing of your outbound leg to make your inbound leg one minute long.
- To correct for crosswind drift in the holding pattern, triple your inbound wind correction angle on the outbound leg.
- To keep the volume of the protected airspace for a holding pattern within reasonable limits, maximum holding airspeeds are designed according to altitude.
- The entry procedure for a holding pattern depends on your heading relative to the holding course. The 3 recommended are direct, teardrop, and parallel.
- A holding clearance should always contain: holding direction, holding fix, and expect further clearance (EFC) time. If the holding pattern is not published, the clearance will also contain the holding course. For nonstandard patterns, left turns are specified. For patterns using DME, the clearance gives the outbound leg length in nautical miles.