

References: 14CFR part 91, FAA-H-8083-9,
FAA-H-8083-15, FAA-S-8081-4, AIM

| | |
|-----------------------------|--|
| Objectives | <ul style="list-style-type: none"> The student should develop the knowledge of the elements related to holding procedures |
| Key Elements | <ul style="list-style-type: none"> Use the entry that makes sense Standard turns are right Triple wind correction for width, Timer for length 5 T's when crossing fix |
| Elements | <ul style="list-style-type: none"> Basics Holding Instructions Entry Procedures Navigation Equipment Recognition of Arrival at Holding Fix Timing Wind Drift Correction DME in a Holding Pattern |
| Schedule | <ul style="list-style-type: none"> Review lesson objectives Review lesson material Conclusion & Review |
| Equipment | <ul style="list-style-type: none"> White Board / Markers References |
| CFI Actions | <ul style="list-style-type: none"> Present lesson Use teaching aids Ask/ answer questions |
| Student Actions | <ul style="list-style-type: none"> Participate in discussion Take notes Ask / answer questions |
| Completion Standards | <ul style="list-style-type: none"> The student has the ability to draw hold and determine correct entry procedure based on given holding instructions. The student can correct for wind once established in the hold |

Additional Notes: _____

References: 14CFR part 91, FAA-H-8083-9,
FAA-H-8083-15, FAA-S-8081-4, AIM

CE = Common Error

Introduction

Overview

Review objectives / Elements

What

A hold is an IFR maneuver used to keep an airplane in a protected area for a certain amount of time. There are various reasons an aircraft may be placed in a hold, including congestion at arrival airport, weather, runway closure, other airport on approach to uncontrolled airport, etc.

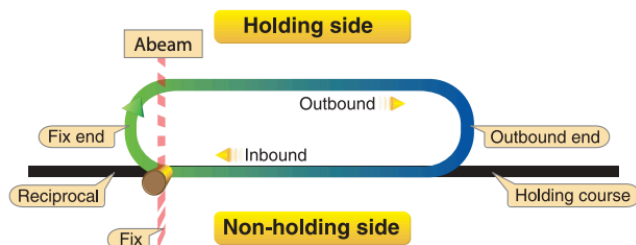
Why

Since aircraft can be placed in holds for many reasons, it's important to know how to comply with ATC's holding instructions in order to be a competent IFR pilot

How

Basics

- **Standard hold: IFH 10-10**
 - Standard turns = right
 - ATC will specify if they want left turns
- Airspeeds AIM 5-3-8:
- **CE** – Improper attitude, airspeed, and bank control
 - Maximum Holding Airspeeds are:
 - <6,000' = 200knots
 - 6,001' – 14,000' = 230knots
 - >14,001' = 265knots



Standard pattern: Right turns (illustrated)
Non-standard pattern: Left turns

Holding Instructions

CE – Failure to comply with ATC instructions

- **When issued a hold, ATC will provide the following information:**
 - Direction of hold from the fix (one of the 8 cardinal directions)
 - Holding fix
 - Radial, course, bearing, or airway that the aircraft is to hold on
 - Length of legs, in miles (for RNAV holds)
 - Direction of turns, if they want left turns
 - EFC time (expect further clearance)

References: 14CFR part 91, FAA-H-8083-9,
FAA-H-8083-15, FAA-S-8081-4, AIM

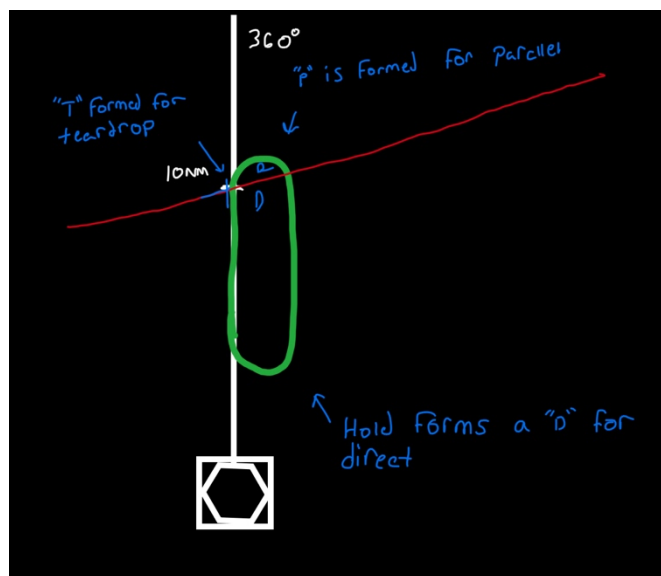
- In the case where you arrive at clearance limit before ATC has issued any further instructions, you are expected to:
 - Maintain last altitude
 - Begin holding in accordance with the depicted pattern (if it's published)
 - If not depicted, hold in standard pattern on the entry course
 - Request further clearance immediately

Drawing a hold

- Holds can be confusing, especially in a high workload environment like IFR flight. It's important to draw to hold to avoid any confusion.
- Steps to drawing a hold:
 - Draw the holding fix
 - Draw the holding course, radial, bearing, or airway that's being held on
 - Draw the inbound leg on the previous drawn line in the correct cardinal direction and facing towards the fix
 - Draw the first turn, left if stated, right if nothing was said
 - Connect with the outbound leg and second turn
 - Verify direction, fix, turns are all correct

Entry Procedures

- Holds have three different types of entries and depending on your location from the hold, this will determine the appropriate entry
 - Cut the head off the pickle
- The simple way to think about it:
 - If entering from $>180^\circ$ off inbound leg heading:
 - Parallel on protected side
 - Teardrop on unprotected side
 - If entering from $<180^\circ$ of inbound leg:
 - Direct entry
- How to fly these entries:



- **Direct entry** – Fly direct to the fix and begin turns in the holding pattern
- **Parallel entry** – Fly over the fix then the reciprocal heading of the inbound leg for 1 minute, then being a 225° turn to the protected side (holding side) to intercept inbound leg
- **Teardrop entry** – Fly over the fix and turn 30° to the holding pattern, fly for 1 minute then turn to intercept the inbound leg. (LARS Left Add, Right Subtract 30°)

References: 14CFR part 91, FAA-H-8083-9,
FAA-H-8083-15, FAA-S-8081-4, AIM

- **The 5 Ts should be completed once the aircraft has entered the holding area**
 - Turn – Turn to necessary heading for entry procedure
 - Time – Start timer
 - Twist – Twist OBS to required course for inbound leg with correct flag
 - Throttle – Set throttle to holding speed (should be done 3 min before entering)
 - Talk – Report to ATC (Skyhawk 1234 entered the hold at TFD, 4500', 1400z)

Navigation Equipment

CE – incorrect setting of aircraft navigation equipment

- If using a VOR, ensure to tune and ID the VOR as well as setting the inbound course with the OBS
- If using a DME fix from a VOR, tune and ID and ensure proper distance from the VOR before beginning hold
- If using RNAV, Ensure GPS is setup correctly
 - Build the hold in the GPS, if available for extra situational awareness

Recognition of Arrival at Holding Fix

CE – Failure to recognize holding fix passage

- If holding at a VOR, when the TO/FROM flag switches, you have arrived at the holding fix
- If using a DME from a VOR, When DME displays the proper distance and you are on the correct radial, you have reached the holding fix
- Once the fix is reached, start the determined entry procedure

Timing

CE – Improper timing

- Unless the hold was given with DME legs, the length will be determined by time
- At or below 14000' the standard holding time is 1 min
- Above 14000' the time is 1.5 min
- The goal is to get the inbound leg to the standard time (we will use 1 minute)
 - Both legs will be timed
 - The outbound leg will be shortened or lengthened to make the inbound leg 1 minute
- Timing the outbound leg will begin when wings are level or abeam the fix, whatever happens last
- The inbound leg timer will start at wings level

DME Holds

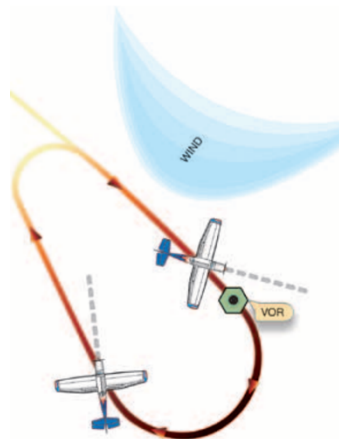
- Commonly found in RNAV holds where time is replaced with distance
- Make turns when specified DME is reached

References: 14CFR part 91, FAA-H-8083-9,
FAA-H-8083-15, FAA-S-8081-4, AIM

Wind Drift Correction

CE – Wind drift correction

- On inbound leg, Crab into the wind to maintain course (note the wind correction needed)
- On the outbound leg, triple the inbound legs wind correction into the wind
 - This will create a uneven hold shape but it will keep the aircraft in the protected side of the hold
 - Groundspeed is changing thus, turn radius is changing (this is why we triple the correction)



Review & Conclusion

Review

- Use the entry that makes sense
- Standard turns are right
- Triple wind correction for width, Timer for length
- 5 T's when crossing fix