16.687
Private Pilot Ground School
Massachusetts Institute of Technology
IAP 2019

The How and the Why of IFR

What is IFR?

• MIT alumnus Jimmy Doolittle
  – First "blind flight" in 1929
• A system of procedures and technologies to avoid hitting things you can’t see
• Instrument Flight Rules (IFR)
  – Flight must be conducted by reference to the flight instruments
• Instrument Meteorological Conditions (IMC)
  – Visual flight cannot be safely conducted
• Goal is to stay safe even though we can't see out the window
Why IFR?

- Familiar sight in California
- VFR pilot won’t be going anywhere soon

Why IFR? (cont’d)

- Makes you a better, safer VFR pilot.
- Clouds & vis are difficult to forecast beyond the current day (and esp. beyond a few days)
- Don’t get trapped because of a thin layer!
  – VFR on top
Instrument PPL Requirement

FAR 61.109 requires, in part:

• 3 hours of flight training in a single-engine airplane on the control and maneuvering of an airplane solely by reference to instruments...

Components of the IFR system

• ATC
  – Responsible for separation of IFR traffic
  – Assigns altitudes, headings, routes, clearances
• Nav aids (e.g, Radio, GPS)
• Radar and transponder
  – Radar alone can’t provide accurate altitude, so xpd r broadcasts that
Components of the IFR system (cont’d)

- ADS-B
  - Overcomes some limitations of radar
- Departures, Airways, Arrivals
  - All are designed to ensure terrain avoidance
  - Focus on minimums and margins of safety

Phases of an IFR flight

1. Pre-flight planning
2. Filing a flight plan
3. Departure
4. Enroute
5. Approach and Landing
Pre-flight planning

- Flight can be made safely with good judgment and planning; wait for front to pass
- Use weather forecasts and in-cockpit data (ADS-B or XM) to stay clear of icing and thunderstorms
- Jets fly right over the top of most of this

Pre-flight planning (cont’d)

- Will we need an alternate? 1-2-3 rule
  - 1 - During the time 1 hour before to 1 hour after the estimated arrival time
  - 2 - Ceiling less than 2,000 feet
  - 3 - Visibility less than 3 miles
- Note that airlines also may require a takeoff alternate
  - In a jet, you work out almost all problems after you're in the air
- Rule of thumb for GA: don't take off out of an airport you can't get back into!
Filing a flight plan

Selected Radial Cross-Check

- Pilot looks at attitude indicator 80-90% of time
- Quick glances at the other flight instruments
- Eyes always move by way of the attitude indicator
Safety considerations for GA IFR

- Weather: ice, t-storms (20 miles) ... embedded thunderstorms
- Personal minimums ... what's legal vs. what's smart
- Two pilot crew, like the airlines
- High quality autopilot can increase safety
  - FAR 135 reflects this
  - no single-pilot IFR without an autopilot and the autopilots on charter planes tend to be pretty awesome
- Currency ... safety pilot and simulated IMC

Approach Plate
RNAV (GPS) RWY 16
PORTSMOUTH INTL AIRPORT (PSM)

Circling NA East of Rwy 16-34. For uncompensated turn-while-NAV systems, UNAV/NAV
NA below +10°C (50°F) or above +20°C (68°F), DME/TCF-NAV-NA VNAV, approach.
For inoperative MALSR, increase CVR if visibility to Rwy 20R, UNAV/NAV CVR if visibility to Rwy
AAS 3000, UNAV CVR if visibility to Rwy 00L, and UNAV CVR if visibility to 1/2 mile. **Rwy
1800 authorized with use of DME or VOR or ILS in DA.

Climb to 3000 feet, TAC 165*, to DREP and hold.

Procedure NA for arrival at SATAN on Y3 northbound and W3 westbound.
How can I get IFR rating?

- 14 CFR § 61.65
  - 50 hours XC time
  - 40 hours actual/sim
  - 15 hours dual instrument training
  - One long cross-country flight under IFR
14 CFR § 91.109

• Flight Instruction and Simulated IFR
  – Aircraft must have dual controls (with 1 exception)

• Simulated instrument flight requires safety pilot

How can I get IFR rating?

• "Train the way you fight"
  – Train in equipment that you use in real world
  – Train real-world missions that you expect to fly in the future

• Advice from Philip
  – Do a serious cross-country trip, like California and back, and spend more money but get fully comfortable with the real challenges.
  – Fly an approach at least once every flight hour.
Questions?