

References: 14 CFR part 91, FAA-H-8083-15, AIM

Objectives	<ul style="list-style-type: none"> The student should develop knowledge of the elements related to developing a cross country IFR flight plan.
Key Elements	<ul style="list-style-type: none"> Applicable IFR Regulations Choosing course/altitude Filing a Flight Plan
Elements	<ul style="list-style-type: none"> IFR Regulatory Requirements Estimated Time En Route and Fuel Requirements En Route Charts, DPs, STARs & Instrument Approach Charts NOTAM Information IFR Flight Plan Control Sequence GPS & RAIM VOR Minimum Operating Network (MON) Airframe Icing
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 Chair Fly at home
Completion Standards	<ul style="list-style-type: none"> The student can competently develop and file an IFR flight plan based on current weather and NOTAM information obtained.

Additional Notes: _____

Introduction

Overview

Review objectives / Elements

What

The information and regulations necessary for an IFR flight plan, a process somewhat simpler than creating a VFR flight plan.

Why

You can't take an IFR flight without it.

How

IFR Regulatory Requirements

IFR Preflight

- [FAR 91.103](#) - Preflight Actions
 - IFR Specific:
 - Weather reports and forecasts
 - Fuel requirements
 - Alternatives available if the planned flight cannot be completed
 - Any known traffic delays which the PIC has been advised by ATC
 - For any flight: Runway lengths, T/O and LDG distances, etc.
- [FAR 91.167](#) - Fuel Requirements
 - Must carry enough fuel to:
 - Complete the flight to the first airport of intended landing
 - Fly from that airport to the alternate airport (if required)
 - Fly for an additional 45 minutes at normal cruising speed
- [FAR 91.169](#) - IFR Flight Plan & Alternate Requirements
 - IFR flight plan must include:
 - Information required in [FAR 91.153](#) - VFR Flight Plan: Information Required
 - Alternate airport (unless not required)
 - An alternate is not required when:
 - At least 1 hour before/1 hour after the ETA the ceiling is $\geq 2,000'$ **AND** visibility is ≥ 3 SM
 - If ceiling is forecast $< 2,000'$ **OR** visibility is forecast < 3 SM an alternate is needed
 - An airport cannot be an alternate unless at the ETA, the ceiling/visibility are at/above:
 - For a Precision Approach: 600' and 2 SM
 - For a Non-Precision Approach: 800' and 2 SM

- No Approach: Ceiling and visibility must allow descent from MEA, approach and landing under VFR

IFR Departure

- [FAR 91.173](#) - ATC Clearance and Flight Plan Required
 - You may not operate in controlled airspace under IFR unless you have:
 - Filed an IFR flight plan
 - Received an appropriate ATC clearance
- [FAR 91.175](#) - Takeoff and Landing Under IFR
 - 0/0 takeoffs are legal under part 91
 - Recommended to use published T/O mins or approach mins (if no T/O) as a guideline

IFR En Route

- [FAR 91.135](#) - Operations in Class A airspace
 - Must be conducted under IFR with ATC clearance
- [AIM 3-2-3\(b\)\(5\)](#) - Class B Airspace
 - For IFR operations, an operable VOR or TACAN receiver is required
- [FAR 91.177](#) - Minimum Altitudes for IFR Operations
 - Except for takeoffs and landings, you may not operate below:
 - The applicable minimum altitudes prescribed in [Part 95](#) and [Part 97](#)
 - 95: IFR altitudes on ATS routes (MEA, MOCA), mountainous areas/changeover points
 - 97: Approach procedures, as well as takeoff/ODP and landing weather minimums
 - However, if no minimum is prescribed:
 - Mountainous Area: 2,000' above the highest obstacle w/in 4 nm of the course flown
 - Non-Mountainous: 1,000' above the highest obstacle w/in 4 nm of the course flown
 - If an MEA and MOCA are prescribed, you may operate below the MEA, but not below the MOCA, when w/in 22 NM of the VOR concerned
 - Climb to a higher minimum IFR altitude immediately after passing the point beyond which that minimum altitude applies
 - Except when ground obstructions intervene, the point shall be crossed at or above the applicable MCA
- [FAR 91.179](#) - IFR Cruising Altitude or Flight Level
 - Controlled Airspace: Maintain the altitude of FL assigned by ATC
 - If cleared for VFR on top, maintain altitude based on VFR cruising altitudes [FAR 91.159](#)
 - Uncontrolled Airspace: Below 18,000' MSL, and
 - On a magnetic course of 0° through 179°: Any ODD Thousand-foot MSL altitude
 - On a magnetic course of 180° through 359°: Any EVEN Thousand-foot MSL altitude
- [FAR 91.181](#) - Course to be Flown
 - You must:
 - Be on an ATS route, along the centerline of that airway
 - On any other route, along the direct course between nav aids or fixes defining the route
 - Doesn't prohibit maneuvering to pass well clear of other aircraft/clearing flight path

- [FAR 91.183](#) - IFR Communications
 - You must report the following as soon as possible
 - The **time / altitude** passing each designated reporting point, or any points specified by ATC
 - Except while under radar control: Report only those points specifically requested by ATC
 - Any **unforecast weather conditions** encountered
 - Any other information relating to the **safety** of the flight
- **Restricted Area**
 - If not active, ATC will allow IFR traffic to operate without issuing a specific clearance to do so
 - If active, and has not been released, ATC will issue a clearance which will avoid the airspace
 - Unless ATC has permission to allow aircraft to enter the restricted area
- **MOA**
 - May be cleared through if IFR separation can be provided

Time En Route and Fuel Requirements

- **Choose and record your route on an IFR nav log**
 - Departure Procedure
 - En route fixes
 - Consider preferred IFR, tower en route control (TEC), airway, and direct (RNAV, GPS) routes
 - STARs, IAPs and IAFs
 - List defining navigation fixes/waypoints for each leg
 - Record magnetic courses and distances (each leg and total)
- **Choose operating altitude or flight level based on:**
 - Minimum IFR altitude ([FAR 91.177](#))
 - Airplane performance and equipment (POH/FM)
 - Weather factors - Winds aloft; temperature, freezing level, icing, cloud tops; turbulence
 - Duration of flight
 - Oxygen availability
- **Choose power setting (MP, RPM) at cruise altitude and estimate TAS and fuel flow**
- **Use TAS/wind data to determine GS, ETE (each leg and total) and fuel requirement (record on nav log)**
 - Start with time, fuel and distance to climb to cruise altitude using POH Section 5
 - Include fuel for start, taxi and takeoff
 - Add time and fuel for flight from reaching the cruise altitude to first point of intended landing
 - This ETE added to the takeoff time determines ETA at the first point of intended landing
 - This is the time to start the approach in case of radio failure, if no EFC was received ([FAR 91.185](#))
 - If an alternate is required ([FAR 91.169](#)), estimate time/fuel for flight from first point of intended landing to alternate airport
 - Add fuel for 45 minutes at normal cruise speed to determine minimum fuel required by [FAR 91.167](#)

En Route Charts, DP's, STAR's, and Instrument Approach Charts

- **Confirm correct and current en route charts and TPPs (includes DPs, STARs and IAPs)**
 - Confirm effective dates on charts and booklets/ the application being used (Jepp, Foreflight, etc.)
 - Check for changes between effective dates
 - [NOTAMs](#)
 - [Safety Alerts and Charting Notices](#)
 - Aeronautical Chart Bulletin or in a current Chart Supplement
 - **Chart Bulletins have been removed from the Chart Supplement as of Feb 2021
 - Reference: [FAA Charting Notice](#)
- **[FAA Aeronautical Chart User's Guide](#) for interpretation of chart symbols**
 - Recommend: Having VFR charts on hand may also prove helpful

NOTAM (Notice to Air Mission) information (AIM 5-1-3)

- Time-critical aeronautical information of a temporary nature, or not known in time to be published on charts or other publications, receives immediate dissemination via the [NOTAM system](#)
 - [NOTAM information](#) could affect a pilot's go/no-go decision
- Types of NOTAMs
 - **NOTAM (D)**
 - Disseminated for all nav facilities and all public use aerodromes in the Chart Supplement
 - Given distant dissemination beyond just the area of responsibility of the Flight Service Station
 - Types
 - Aerodrome activity and conditions (taxiway closures, personnel and equipment, etc.)
 - Airspace
 - Visual and radio navigational aids
 - Communications and services
 - Pointer NOTAMs – Point to additional aeronautical information
 - Also includes (U) and (O) NOTAMs
 - (U) NOTAM: Unverified NOTAM received from a source other than airport management and have yet to be confirmed by management personnel
 - (O) NOTAM: Other aeronautical information which does not meet NOTAM criteria but may be beneficial to aircraft operations
 - **FDC NOTAMs**
 - Regulatory information
 - Chart and IAP changes, Laser activity, TFRs, WAAS / GPS, ADS-B availability, Special Notices
 - Center Area NOTAM
 - FDC NOTAM issued for a condition not limited to one airport
 - Filed under the ARTCC that controls the airspace
 - Very important when looking for NOTAMs on your own

- Ex: Must retrieve ZAN FDC NOTAMs for flights in Alaska because ZAN is the code for Anchorage ARTCC which is the controlling center for all of Alaska
- Security NOTAM
 - FDC NOTAM informing pilots of security activities or requirements
 - Found on the federal NOTAM system under the location designator KZZZ
- **International NOTAMs**
 - Published in ICAO format and distributed to multiple countries
 - Not included in a weather briefing unless specifically requested
- **Military NOTAMs**
 - AF, Army, Marine, Navy NOTAMs pertaining to military or joint use airports / nav aids / airspace
- Domestic and International Notices
 - NTAP (Notices to Airmen Publication) was discontinued as of June 2020
 - Information for the international and domestic notices have been transferred to new websites:
 - [Domestic Notices](#)
 - Contains notices pertaining to almost every aspect of domestic aviation, such as military training, large scale sporting events, air shows, and airport-specific information
 - Includes:
 - General Information
 - General Notices
 - Airport and Facility
 - Special Military Operations
 - Major Sporting and Entertainment Events
 - Airshows
 - [International Notices](#)
 - Features significant international information and data which may affect a pilot's decision to enter or use areas of foreign or international airspace
 - Includes:
 - Flight Prohibitions Notices
 - International Oceanic Airspace Notices
- GPS NOTAMs available from the [FAA NOTAM page](#)

IFR Flight Plan

- Before entering controlled airspace, file an IFR flight plan and receive ATC clearance - [FAR 91.173](#)
 - [AIM 5-1-6](#): IFR flight plan information
 - FSS transitioned to only ICAO Flight Plans for domestic/international flights in August 2019
 - [AIM Appendix 4. International Flight Plan](#)
 - Breaks down ICAO flight plan information requirements
- ICAO Flight Plans
 - Much of the information is identical to the FAA Domestic flight plan. The biggest changes are to Flight Rules, Type of Flight, Wake Turbulence Category, and Aircraft Equipment Categories

- Flight Rules - Always required, and should indicate:
 - I for IFR; V for VFR
 - For a composite flight, (IFR to VFR or VFR to IFR), submit separate plans for the IFR/VFR portions. The IFR plan will be routed to ATC, the VFR flight plan will be routed to an FSS
 - Y (YFR) for flights beginning under IFR with one or more changes in flight rules
 - Z (ZFR) for flights beginning under VFR with one or more changes in flight rules
 - For both Y and Z, the point where the flight rules change will need to be noted in the route of flight. This point determines when the flight plan will be sent to ATC
- Type of Flight
 - Optional for flights wholly within US Domestic Airspace
 - In the case that you do need to include the type of flight, indicate it as follows:
 - G - General Aviation; S - Scheduled Air Service; N - Non-Scheduled Air Transport Operation, M – Military; D – DVFR; X - other than any of the defined categories above
- Wake Turbulence Category
 - H – HEAVY: Maximum certificated take-off mass of 300,000 lbs. or more
 - M – MEDIUM: Maximum certificated take-off below 300,000 lbs. but above 15,500 lbs.
 - L – LIGHT: Maximum certificated take-off mass of 15,500 lbs. or less
- Aircraft Equipment
 - Whereas the Domestic flight plan used single letter designations to represent entire avionics packages, ICAO has the pilot choose the specific capabilities of their aircraft
 - Equipment and capabilities that requires indication include:
 - Navigation
 - Transponder
 - ADS-B
 - Additional information may be required in the Remarks section for:
 - PBN, RVSM, and Data Communications - More on this [below](#)
 - There are two parts to the Equipment box: Aircraft equipment & Transponder capability
 - Aircraft Equipment
 - Standard Capability (S)
 - In order to simplify filing, “S” indicates Standard: VHF radio, VOR, and ILS
 - The use of S removes the need to list these 3 capabilities separately
 - No Capability (N) – If no nav/comms/approach capability then file only the letter N
 - See [AIM Appendix 4. International Flight Plan](#) for all equipment and designators
 - Transponder Capability
 - See [AIM Appendix 4. International Flight Plan](#) for all transponder designators

- Example
 - If your aircraft had:
 - A VHF Radio, VOR and ILS S
 - An IFR approved GPS G
 - PBN Capable R
 - If you can accept PBN routes/procedures (RNAV or RNP for any phase of flight)
 - Mode C Transponder C
 - The final entry into Box 10 would be SGR/C
 - We mentioned earlier that Remarks may be required for PBN aircraft. By listing PBN (or R), you only notified ATC that your equipment is PBN approved. Since PBN describes many different types of equipment, you must specify your equipment in the Remarks.
 - The majority of general aviation piston aircraft will enter: PBN/B2C2D2
 - B2= RNAV 5 capability; C2 = RNAV 2 capability; D2 = RNAV 1 capability
 - By listing this code, you're telling ATC you're capable of handling RNAV based procedures for the en route structure and terminal procedures
 - For more information: A great, short ICAO flight plan instructional [video from AOPA](#)
- Filing and Cancelling an IFR Flight Plan
 - Filing
 - General
 - Filing should be done at least 30 minutes prior to departure
 - Your ATC clearance can be picked up 30 minutes prior to two hours after departure time
 - Can coordinate with FSS or ATC to change departure time/keep it in the system longer
 - Filing on the Ground - Submit the flight plan to the nearest FSS or ATCT
 - In person, by phone (1800 WX-Brief), radio, computer, app (such as ForeFlight)
 - Filing in the Air - File with the nearest FSS or directly with ARTCC
 - FSS will relay the information to ARTCC
 - ARTCC saturation can prevent them from accepting your flight plan by radio
 - Do not enter IFR conditions until clearance is received
 - Cancelling ([AIM 5-1-15](#))
 - IFR flight plan may be cancelled any time a pilot is operating in VFR conditions outside of Class A
 - ATC separation/information services are stopped, but VFR flight following can be requested
 - Landing at a Towered Airport – Flight plan is cancelled automatically on landing
 - Landing at a Non-Towered Airport – Pilot is responsible for cancelling (radio ATC, or call FSS)
 - Cancel expeditiously to allow other IFR aircraft to use the airspace

Control Sequence (towered to towered)

1. FSS - Obtain a weather briefing for departure/destination/alternate and file flight plan
2. ATIS - Preflight complete, obtain present conditions and approach/runways in use
3. Clearance Delivery (if available) - Obtain departure clearance
4. Ground Control - Noting that you are IFR, receive clearance and/or taxi instructions
5. Tower – Pre-takeoff checks complete, receive takeoff clearance
6. Departure Control - Contact departure to establish radar contract
7. ARTCC - Once out of the departure controller's area, center will coordinate flight en route
8. ATIS - Obtain weather information at your destination airport
9. Approach Control - Center will hand off to approach who will provide clearances to your destination
10. Tower - Approach passes to Tower who will clear you to land and close your flight plan

GPS & RAIM

- **RAIM is the receiver's ability to verify the integrity of the signals received from the satellites**
 - Without RAIM capability, the pilot has no assurance of the accuracy of the GPS position
- **Requires minimum of 5 satellites or 4 + a barometric altimeter input (baro-aiding) to operate properly**
 - Some receivers can isolate and remove a bad signal if 6 satellites in view (or 5 with baro-aiding)
- **Generally, there are 2 types of RAIM messages**
 - There are not enough satellites in view to provide RAIM
 - RAIM has detected a potential error that exceeds the limit required for the current phase of flight
- **Aircraft using GPS navigation equipment under IFR must be equipped with an approved and operational alternate means of navigation appropriate to the route of flight**
 - Monitoring of the alternate equipment is not required if the GPS receiver uses RAIM
 - Active monitoring of the navigation equipment is required if the RAIM capability is lost
 - Use other equipment, delay, or cancel the flight if the loss of RAIM capability is predicted to occur

VOR Minimum Operating Network (MON)

- National Airspace System is transitioning to performance-based navigation (PBN)
 - Number of VORs is being reduced (going from 896 to 590 by 2030)
 - Two new, larger service volumes will still enable near continuous navigation above 5,000' AGL
 - Coverage will exist lower, but may not be guaranteed
- Designed to enable aircraft, having lost GPS (or without GPS), to use conventional navigation procedures
 - Pilots can use VOR station to station nav to reach a MON airport and fly a conventional approach
 - ILS, LOC, VOR, etc.
 - MON airport assured within 100 nm

- New VOR Service Volumes AIM 1-1-8

Airframe Icing

- **Recognizing**
 - Early detection is critical – be alert in visible moisture and temps near freezing (-10° to +2° C)
 - Monitor the windscreen for signs of ice accumulation
 - Monitor the wings (use a flashlight at night)
- **Adverse Effects**
 - Effects are cumulative – reduced thrust and lift, increased drag and weight
 - Increased stall speed and reduce performance
 - ½ inch of ice can reduce wing's lifting power by 50% and increase frictional drag by 50%
- **Procedures**
 - Using any deicing/anti-icing equipment per the manufacturer's guidelines
 - Leave the area of precipitation and/or get to an altitude that's above freezing (not necessarily lower)
 - If unable to get out, land at the nearest suitable airport

Conclusion & Review

Conclusion:

Brief review of the main points

PTS Requirements:

To determine that the applicant exhibits instructional knowledge of cross-country flight planning by describing the:

1. Regulatory requirements for instrument flight within various types of airspace.
2. Computation of estimated time en route and total fuel requirement for an IFR cross-country flight.
3. Selection and correct interpretation of the current and applicable en route charts, RNAV, DPs, STARs, and standard instrument approach procedure charts (IAP).
4. Procurement and interpretation of the applicable NOTAM information.
5. Completes and files an IFR flight plan that accurately reflects the conditions of the proposed flight. (Does not have to be filed with ATC.)
6. Demonstrates adequate knowledge of GPS and RAIM capability, when aircraft is so equipped.
7. Demonstrates the ability to recognize wing contamination due to airframe icing.
8. Demonstrates adequate knowledge of the adverse effects of airframe icing during landing phases of flight and corrective actions: pretakeoff, takeoff, and cruise.
9. Demonstrates familiarity with any icing procedures and/or information published by the manufacturer that is specific to the aircraft used on the practical test.