CROSS-COUNTRY FLIGHT PLANNING

FULFILLS IR.I.C & CFII PTS III.B

Objective	
The student shall understand the process of planning a cross country flight under IFR, including route and altitude selection, performance calculations, applicable regulations, and risk management tools. The student shall become familiar with filing IFR flight plans using an EFB.	
Instructor Actions	**Student Actions**
- Explain terms and altitude definitions - Explain route and altitude selection (including TEC routes) - Demonstrate filing, activating, and closing IFR flight plans - Explain applicable regulations - Discuss with the student risks associated with weather on an IFR cross country	- Take notes and participate in instructor's discussion - Work with instructor in flight planning for subsequent cross country - Simulate - Practice identifying hazards using PAVE checklist - Practice identifying alternatives as part of NWKRAFT checklist with instructor
Case Studies	**Equipment**
	- Chart Supplement - Computer - E-6B Flight Computer - IFR Low Chart - Pilots Operating Handbook
Completion Standards	
The student shall explain methods to minimize hazards relating to fuel planning, unforcasted weather, and aircraft performance. The student shall demonstrate proficiency in planning a simulated cross country, including all aspects of NWKRAFT.	

17 FEBRUARY 2024 ANDREW TRAFICANTE

ELEMENTS

RESOURCES

14 CFR 91.103 Preflight Action
14 CFR 91.123 ATC Clearances
14 CFR 91.167 Fuel Requirements
14 CFR 91.179 IFR cruising altitude or flight level
14 CFR 91.181 Course to be flown
14 CFR 91.185 IFR operations: Two-way radio communications failure
AIM 5-3 En Route Procedures

FAA-S-ACS-8C IR ACS - Area I Task C
FAA-S-8089-9B CFII PTS - Area III Task B

FAA-H-8083-15B Instrument Flying Handbook - Chapter 10: IFR Flight
FAA-H-8083-16B Instrument Procedures Handbook - Chapter 2: En Route Operations

1. OPERATING IN THE IFR ENVIRONMENT

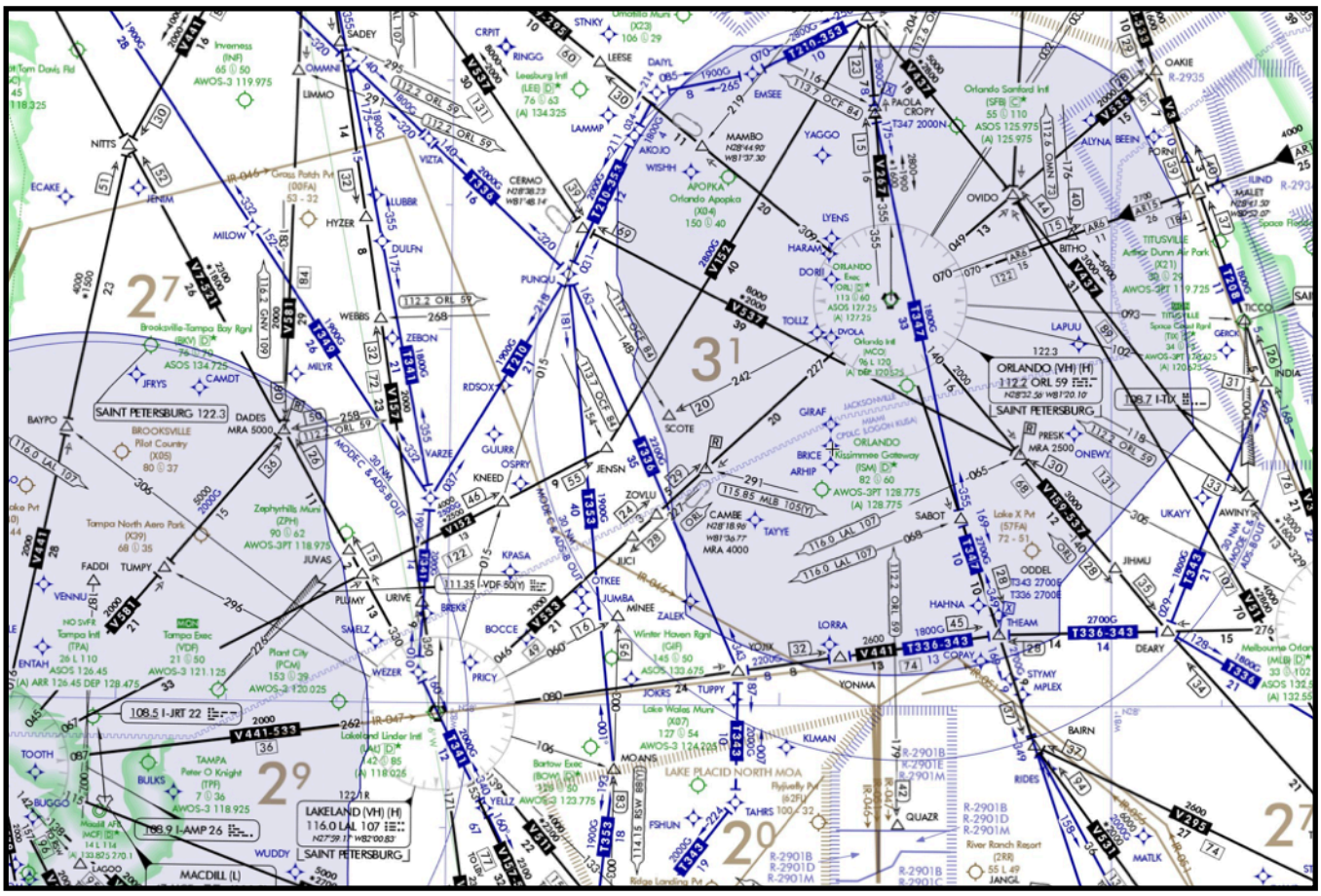
Unlike our VFR flights, we must submit our planned route of flight to ATC via a flight plan. Luckily, filing is easier in the IFR environment than VFR.

2. ENROUTE CHARTS

2.1. Airways

As we learned in PPL training, a three-dimensional highway, known as an airway, runs between two VORs. The IFR low-altitude sectional highlights these airways clearly.

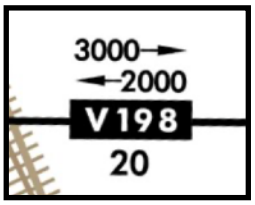
With the advent of GPS, airways are no longer constrained to emanate from VORs. T-routes connect GPS fixes in a similar fashion as airways, but typically have lower MEAs, as they are not reliant on ground signal reception.



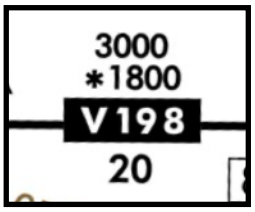
2.2. Altitudes

Understanding the types of altitudes and how the appear on the enroute charts is important as we begin our discussion on cross country planning.

Minimum Enroute Altitude (MEA). The MEA is the lowest published altitude between radio fixes that assures acceptable navigational signal coverage and meets obstacle clearance requirements between those fixes. Provide 1000ft terrain separation in non-mountainous areas, and 2000ft in mountainous areas.[1] GPS MEA is appended with a "G".

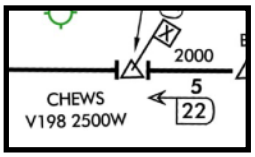


Minimum Obstacle Clearance Altitude (MOCA). The MOCA provides obstacle clearance for the entire airway segment but only provides adequate navigation signal within 25 statute (22 nautical) miles of a VOR. A MOCA is only shown on the Enroute Low Charts and only published when it is lower than the MEA. When shown, it is preceded by an asterisk.

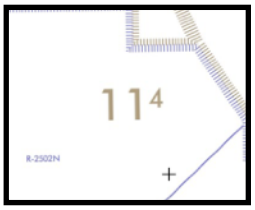


Minimum Reception Altitude (MRA). The lowest altitude at which an intersection can be determined from other NAVAIDs. If higher than the MEA, it is indicated with the following figure.

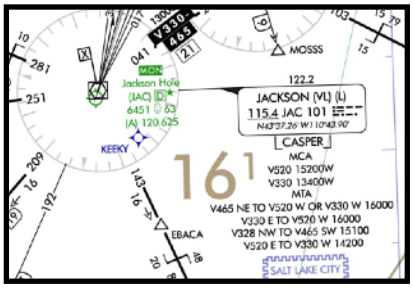
Minimum Crossing Altitude. The lowest altitude at certain fixes at which an aircraft must cross. Aircraft must cross the fix AT the altitude listed near the flag in the directional specified.



Off Route Obstacle Clearance Altitude (OROCA). An off-route obstruction clearance altitude (OROCA) is an off-route altitude that provides obstruction clearance with a 1,000ft buffer in non-mountainous areas and a 2,000ft buffer in designated mountainous areas. This altitude doesn't guarantee signal coverage from ground-based NAVAIDs, ATC radar, or communications coverage.



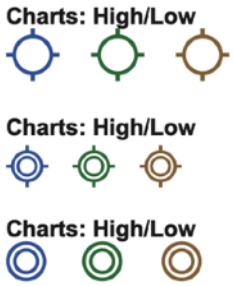
Minimum Turning Altitude. Minimum turning altitude (MTA) is a charted altitude providing vertical and lateral obstruction clearance based on turn criteria over certain points. When a VHF airway or route terminates at a NAVAID or fix, the primary area extends beyond that termination point. When a change of course on VHF airways and routes is necessary, the enroute obstacle clearance turning area extends the primary and secondary obstacle clearance areas to accommodate the turn radius of the aircraft. Since turns at or after fix passage may exceed airway and route boundaries, pilots are expected to adhere to airway and route protected airspace by leading turns early before a fix. The turn area provides obstacle clearance for both turn anticipation (turning prior to the fix) and flyover protection (turning after crossing the fix). Turning fixes requiring a higher MTA are charted with a flag along with accompanying text describing the MTA restriction.



[1] See Part 95 for what constitutes a mountainous area.

2.1. Symbols

2.1.1. Airports

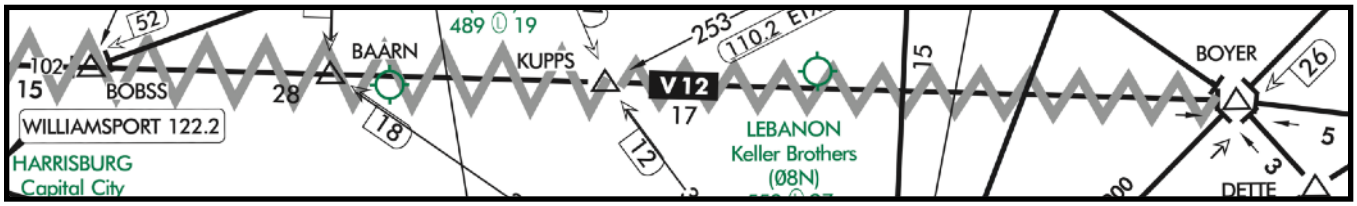


Airports without instrument approaches are shown with a brown symbol. Airports with an instrument approach are shown with a green symbol. It is worth noting that a few airports have certain DoD approaches originating from a high altitude, in which case they are shown in blue.

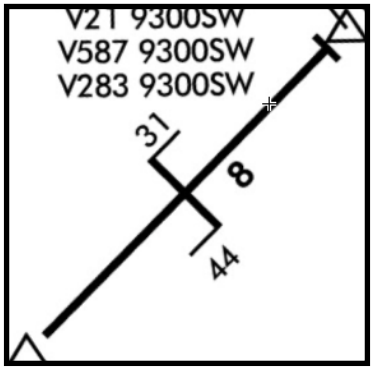
2.1.2. NAVAIDs

Note that filled in symbols depict compulsory reporting points when not in radar contact (see AIM 5-3-2).

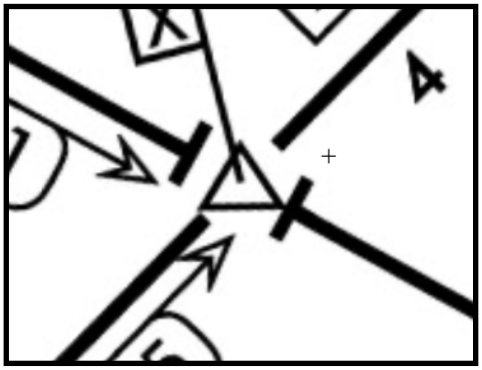
If a NAVAID is shutdown, it will be covered with the hashed symbol: (▨). Unusable airway segments will be crossed with the following depiction: (⩘⩘⩘⩘).



When the VOR changeover point is not directly halfway between VORs, it is depicted with the zig-zag symbol.



If the MEA, MOCA, or MAA change at an intersection (rather than a NAVAID), the “T" symbol is shown.



3. PREFLIGHT ACTION

Recall that part a of 91.103 includes a provision for flights under IFR. The rule states that the PIC must become familiar with:

For any flight – Runway lengths and takeoff and landing distances

For flights under IFR or not in the vicinity of an airport – Weather reports and forecasts, fuel requirements, alternatives, and known traffic delays.

NWKRAFT	
N NOTAMs	Departure, enroute, and arrival NOTAMs, found here
W Weather	Departure, enroute, and arrival weather.
K Known ATC Delays	Found on FAA website here
R Runway Lengths	Found on Chart Supplement or ForeFlight
A Alternatives	Other options for completing flight
F Fuel	Fuel requirements and reserves considering 91.151
T Takeoff and landing distances	From POH performance charts

4. THE ROUTE

4.1. IFR Preferred Routes

Preferred routes have been established to improve traffic flow between larger terminals. These routes are found in the back of the Chart Supplement.

LOW ALTITUDE

Terminals	Route	Effective Times (UTC)
DAYTONA BEACH(DAB)		
FORT MYERS(RSW)	KIZER T353 PUNQU T336 YOJIX T343 FEBRO LBV or (TURBOPROPS)KIZER T353 PUNQU T336 YOJIX T343 FEBRO LBV	
KEY WEST(EYW)	SMYRA T208 DIMBY DIDDY SWAGS GIGIH	
MARATHON(MTH)	SMYRA T208 DIMBY SWAGS	

4.2. Tower Enroute Control

Within the national airspace system it is possible for a pilot to fly IFR from one point to another without leaving approach control airspace. This is referred to as "Tower Enroute" which allows flight beneath the enroute structure. Routes are tabulated in the back of the Chart Supplement.

TOWER ENROUTE CONTROL FOR SOUTHERN CALIFORNIA

BURBANK AREA

FROM: BUR VNY WHP

TO:	ROUTE	ROUTE	ALTITUDE
HHR (RWY25)	BURP1	V186 ADAMM V394	PQ50
HHR	BURP2	V186 ITSME V264 POM V394	JM70
HHR (LAXE)	BURP3	VNY095 ELMOO	JMPQ50
LAX	BURP4	VNY095 PURMS	JMPQ50

4.3. Using ForeFlight

Realistically, we are going to select our destination airport, and then choose a route under the "Routes" picker. There is nothing wrong with that, but it is good practice to review preferred or TEC route information for added SA.

5. FILING AN ALTERNATE

Under 91.169, we need to file an alternate if either is true:

a. our destination airport does not have an instrument approach

b. Between 1 hour ETA, weather is forecast to be <2000 ft ceilings or 3 SM visibility.

The weather at our alternate must meet the following forecast requirements.

- **If a usable precision approach is available:** 600 ft ceilings and 2 SM of visibility.
- **If only a non-precision approach is useable:** 800 ft and 2 SM of visibility.
- **If no instrument approaches are available:** Descent from the MEA and landing must be conducted under VFR.

Unfortunately, these regulatory alternate minimums are often superseded by non-standard alternate minimums. These can be found in the TPP or in ForeFlight under the airports arrival tab. Approaches with non-standard alternate minimums also have the shaded A symbol (A). Some approaches may be not-authorized at all for alternate consideration, which is also indicated in the TPP.

These alternate minimums are only filling minimums. If we need to fly to the alternate and utilize an approach, we can follow the published approach minimums. If our destination airport doesn't have a TAF, we can use an alternate source of weather such as the ceiling/visibility tool on the AWC website.

5.1. Considerations for GPS-Based Approaches

5.1.1. WAAS (TSO-C145/C146 GPS)

AIM 1-1-18c9a, if planning to use WAAS at the alternate airport, the flight planning must be done using LNAV or circling mins on "GPS" procedure.

5.1.2. Non-WAAS (TSO-C129/C196 GPS)

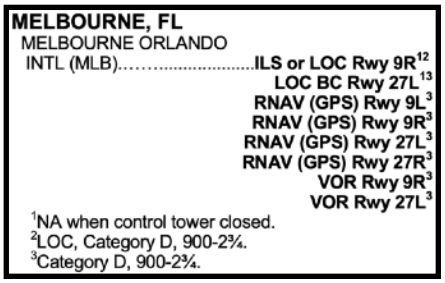
AIM 1-1-17b5c, cannot plan for a GPS approach at BOTH the primary or alternate airport. Per AC 90-108, Use of Suitable Area Navigation (RNAV) Systems on Conventional Routes and Procedures, this applies to any approach procedure that requires GPS at ANY point.

6. SELECTING AN ALTITUDE

IFR cruise altitudes are outlined in 91.179.

Westbound: even thousand

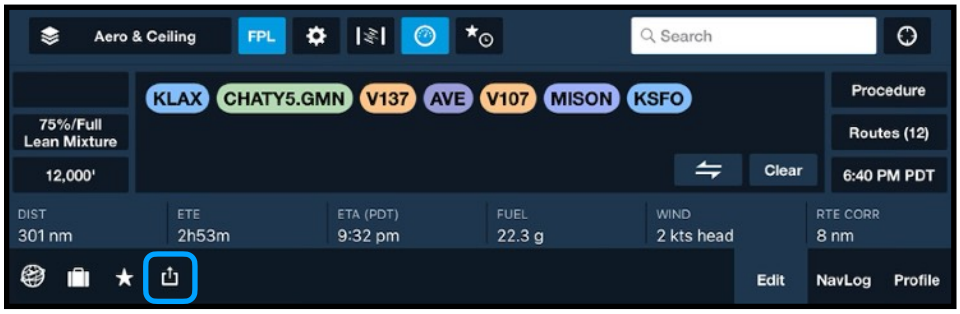
Eastbound: odd thousand



7. FUEL REQUIREMENTS

91.167 requires planning for fuel to fly to your destination, then to your alternate (if required), then for an additional 45 minutes.

8. FILING AND ACTIVATING THE FLIGHT PLAN



Once we have our route and altitude selected, we will click share, then "Flights".

Once in the Flights tab, we can begin filling our pertinent information we may have missed from the planning page.

Departure / Destination

- Update ETD to align with your expected takeoff time
- View takeoff and landing distances (required under 91.103)
- Add alternate as required

Aircraft

- Populate with your aircraft as required

Route

- This will import from the planning page. Ensure that IFR is selected and the desired altitude is set. We could also plan a route and update the altitude from here.

Payload, Fuel and **Weights**

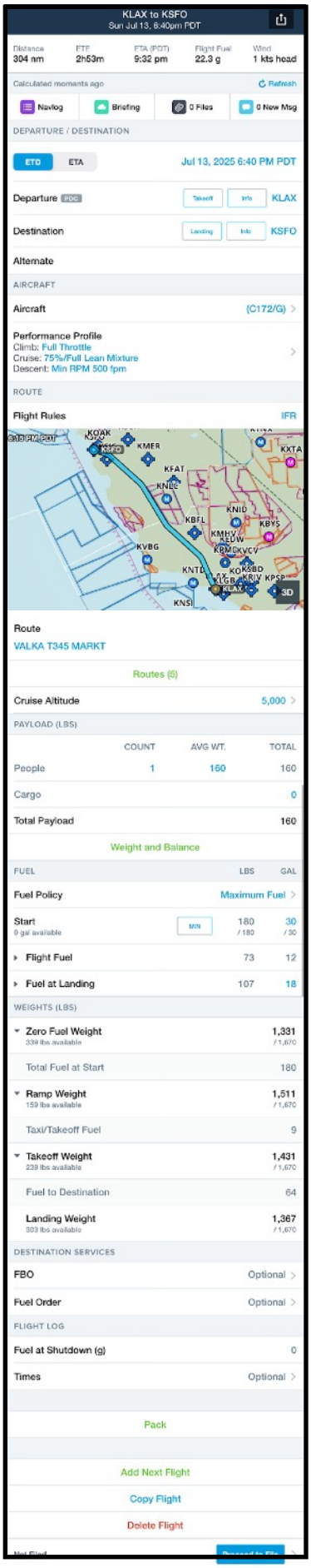
- These sections are not required for an ICAO flight plan, but allow ForeFlight to calculate max allowable fuel and weight and balance. Set the loads as required.

Destination Services

- This is an optional tab where you can compare FBOs. You can also send a fuel order in advance.

Flight Log

- May be useful for record keeping.



After review, we can click “Proceed to File.” This will open another window which we must review.

Flight Plan Type

- Ensure this is set to IFR and General Aviation

Aircraft

- This should populate from the previous page. Input TAS as planned. Slant codes can be found in the AIM, Appendix 4.

Departure

- Set Persons On Board as necessary

Enroute

- This will auto populate

Remarks

- Fill as required

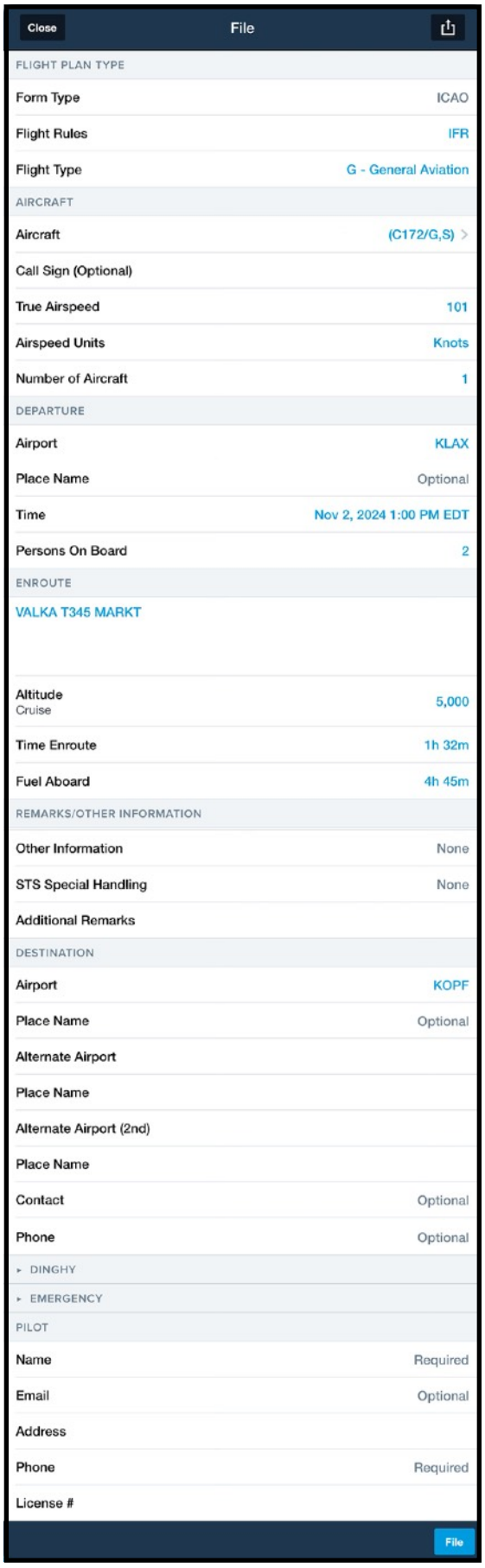
Destination

- Fill as required

Pilot

- Address is not usually required

Then hit “File”, and now our flight plan is sent to ATC! We will receive a notification almost instantaneously that our flight plan was received. We will also receive an “expected route” notification.



9. VFR-ON-TOP

> Pilots on IFR flight plans operating in VFR weather conditions may request VFR-on-top in lieu of an assigned altitude. This permits them to select an altitude or flight level of their choice (subject to any ATC restrictions). – Instrument Flying Handbook 10-26

VFR-on-top clearances may be used above, below, or between cloud layers. While the pilot remains on an IFR flight plan, VFR cloud clearances and visibility requirements must be maintained.

Remember:

a. Fly at the appropriate VFR cruise altitude per **91.153** and notify ATC prior to any altitude changes

b. Comply with the VFR visibility and cloud clearance criteria in 91.155.

c. Comply with applicable IFR procedures (minimum IFR altitudes, position reporting, radio communications, course to be flown, adherence to ATC clearance, etc.).

Other pertinent information:

a. While operating in VFR conditions at any time (including VFR-on-top), it is the pilot's responsibility to see and avoid other aircraft.

b. Do not confuse VFR-on-top, an IFR clearance, with the VFR phrase "VFR over-the-top", which means to operate under VFR above a ceiling.

c. A VFR-on-top clearance will never be solicited by ATC, it must be requested by the pilot.

10. REPORTING POINTS

The requirements for position reports vary depending on whether we are in "radar contact" with ATC. See the table below for when to report certain positions/events to ATC. See AIM 5-3-3.

If you need an acronym to remember, consider MARVELOUS VFR C500.

ALWAYS REPORT		WHEN NOT IN RADAR CONTACT "ALWAYS REPORT ITEMS" PLUS THESE ITEMS	
V	When vacating any previously assigned altitude for a newly assigned altitude.	**F**	When leaving final approach fix inbound.
V	When an altitude change will be made while VFR-on-top.	**E**	ETA change greater than 2 mins.
500	When unable to climb/descend at a rate of a least 500 feet per minute.	**C**	When crossing a compulsory reporting point.
M	When approach has been missed.	**O**	Outer marker inbound.
A	Change in the average TAS in cruise when it varies by 5% or 10 knots (whichever is greater) from that filed in the flight plan.		
R	The time and altitude upon reaching a holding fix or point to which cleared.		
L	When leaving any assigned holding fix or point.		
R	Any loss in NAV equipment or complete or partial loss of ILS receiver capability or impairment of comms capability. Reports should include aircraft identification, equipment affected, degree to which the capability to operate under IFR in the ATC system is impaired, and the nature and extent of assistance desired from ATC.		
S	Any information relating to the safety of flight. (91.183)		
U	Unforcasted weather. (91.183)		

11. RECEIVING CLEARANCE

CLEARANCE ITEM	EXAMPLE
C Cleared to	KSBA
R Route	PALMDALE ONE, V386 FIM D->
A Altitude	2000, 4000 10
F Frequency	124.55
T Transponder	5638

12. CRUISE CLEARANCES

A cruise clearance is an ATC instruction to fly at any altitude between the minimum IFR altitude and the altitude specified.

13. LOSS OF COMMS

See Lesson Plan IX.A and 91.185.

14. SIDS AND STARS

See Lesson Plan V.B.

15. RISK MANAGEMENT TOOLS

See Lesson Plan II.A Human Factors

16. FREQUENTLY ASKED QUESTIONS

What kind of restrictions do I face if I do not have a WAAS GPS?

The AIM (1-1-17(b)(2)(a)(2)) is quite clear:

> Aircraft using un-augmented GPS (TSO-C129() or TSO-C196()) for navigation under IFR must be equipped with an alternate approved and operational means of navigation suitable for navigating the proposed route of flight. (Examples of alternate navigation equipment include VOR or DME/DME/IRU capability). Active monitoring of alternative navigation equipment is not required when RAIM is available for integrity monitoring. Active monitoring of an alternate means of navigation is required when the GPS RAIM capability is lost.

Additionally, regarding approach planning (1-1-17(b)(5)(c))

> For flight planning purposes, TSO-C129() and TSO-C196()-equipped users (GPS users) whose navigation systems have fault detection and exclusion (FDE) capability, who perform a preflight RAIM prediction for the approach integrity at the airport where the RNAV (GPS) approach will be flown, and have proper knowledge and any required training and/or approval to conduct a GPS-based IAP, may file based on a GPS-based IAP at either the destination or the alternate airport, but not at both locations.

Also see AC 90-108, Use of Suitable Area Navigation (RNAV) Systems on Conventional Routes and Procedures.

You filed with an alternate. Then you go pre-flight the plane. You are about to take off, and check wx at the alternate. It no longer satisfies 800/2 or 600/2, depending. What are you required to do?

I am required to do nothing. However, I should investigate what adverse weather is causing the decrease in vis/ceiling, and think about other alternates should I plan to go fly. Remember, ATC does not see my alternate.