Area of Operation **II** - Task **G**

Cross Country Flight Planning

Content

Key References:
- Airplane Flying Handbook
- Pilot's Handbook of Aeronautical Knowledge

Types of Navigation

- **Pilotage**
  - Navigation by reference to landmarks or checkpoints on the ground
  - Lakes, rivers, mountains, roads, cities, other airports, etc
- **Dead Reckoning**
  - Navigation based on time, airspeed, distance, and direction
  - Calculated position (“where the math says I will be”)
- **Radio Navigation**
  - Usage of navigational aids (follow the signal)
  - Ground based: VOR, DME, NDB
  - Satellite based: GNSS (GPS)

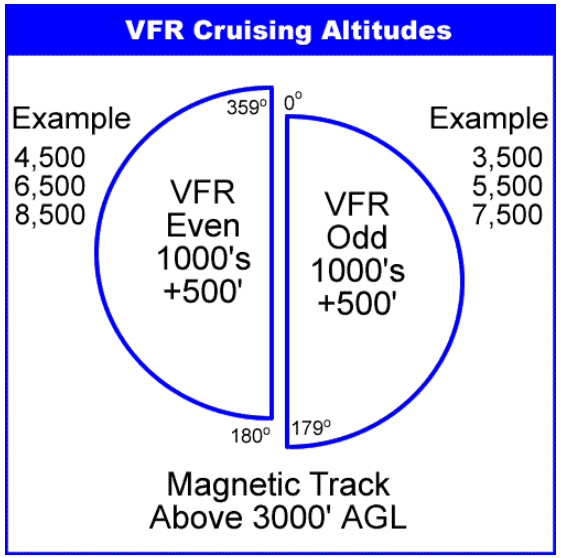
Why request Flight Following? (Basic Radar Services)

- ATC will give you Basic Radar Services
- **Safety alerts**, traffic advisories, limited radar vectoring (workload permitting)
- Safety alerts can be Traffic Alert and/or Low-Altitude Alert (prox to terrain)

VFR Altitudes

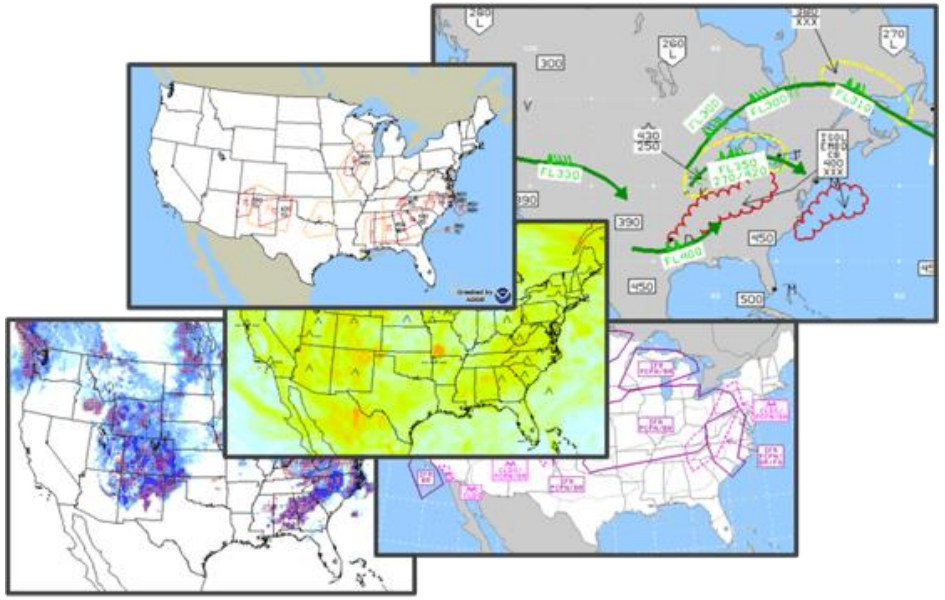
- **VFR Minimum Safe Altitudes** (§91.119)
  - Anywhere: An altitude allowing an emergency (no power) landing without hazard to persons/property in the surface
  - Congested: 1000ft above highest obstacle, 2000ft lateral
  - Non-Congested: 500ft AGL.
    - ✓ *If open water or sparsely populated, then 500ft from person, vessel, vehicle, structure*

- **VFR Cruising Altitudes** (§91.159)
  - Except if ≤ 3000ft AGL, holding a patterns (up to 2min) or above 18,000ft MSL
  - Depends on Magnetic Course/Track:
    - 0 to 179º ➔ Odd 1000s + 500ft (e.g. 5,500 ft)
    - 180 to 359º ➔ Even 1000s + 500ft (e.g. 6,500 ft)

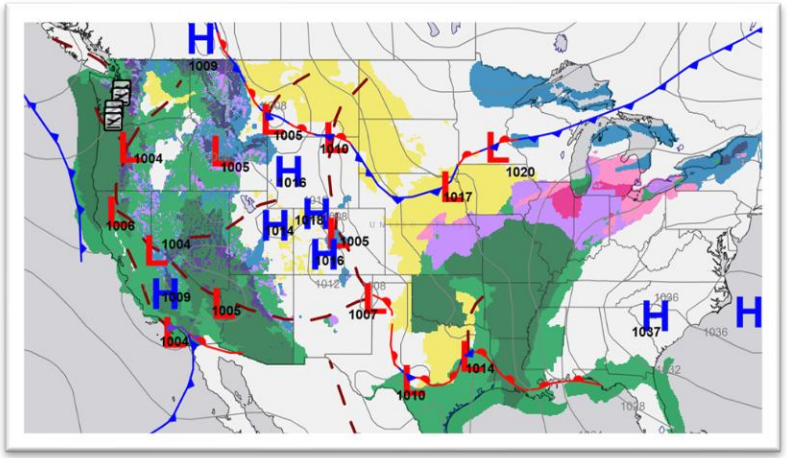


Preflight Check

- **Pre-Flight Actions** (§91.103) ➔ NW KRAFT
  - **N** – NOTAMs
  - **W** – Weather report and forecasts
  - **K** – Known Traffic/ATC delays
  - **R** – Runway lengths of intended use
  - **A** – Alternate airports available
  - **F** – Fuel requirements (30min day, 45min night, per 91.151)
  - **T** – Takeoff/Landing performance data

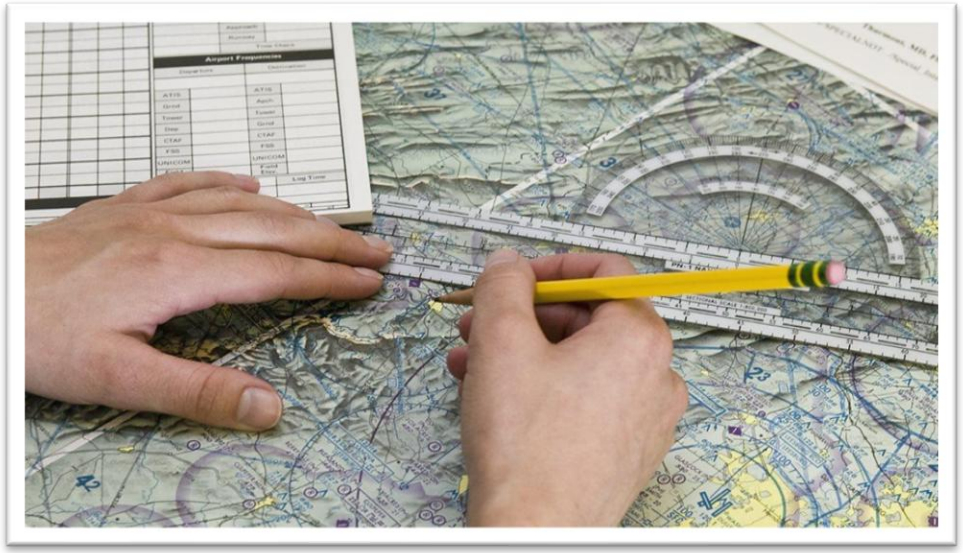


- **Identify Weather along your route** ➔ Sigmet/Airmet and other hazards
  - Aviation Weather tools (e.g. GFA), FSS, Leidos, Foreflight, etc
  - Use PAVE and I'M SAFE checklists, assess risks and mitigate them
  - Determine if the flight can be completed safely (Make a Go / No-go decision)
    - ✓ *Have personal limits and don't bend them*
    - ✓ *Weather is a major factor and change rapidly (have a plan B)*
    - ✓ *Continual decision-making process enroute*



Cross-Country Flight Planning

- **STEP 1 ➔** Briefly check the airport and runways you wan to use
- **STEP 2 ➔** Trace route, select checkpoints and altitudes
  - Verify airspaces to cross and equipment required (e.g. transponder)
- **STEP 3 ➔** Populate **NAVLOG** (+wind data)
  - Climb and Descend: Time, Distance and GPH
  - Cruise: TAS and GPH based on power settings and altitude
  - Find TOC/TOD and define legs
  - Calculate ETE, ETA and Fuel (compare w/ VFR reserve)
- **STEP 4 ➔** Calculate Runway required (takeoff/landing distances)
- **STEP 5 ➔** Calculate W&B
- **STEP 6 ➔** Identify Alternates and check airport data
- **STEP 7 ➔** Weather briefing (clouds, winds, icing, metar, turbulence, airmet/sigmet), NOTAMs, ATC delays ➔ **GO or NO-GO Decision**
- **STEP 8 ➔** Enter frequencies (including approach for flight following), VORs, TPAs, METAR/TAF, etc
- **STEP 9 ➔** File Flight Plan (not mandatory for VFR, but advisable)



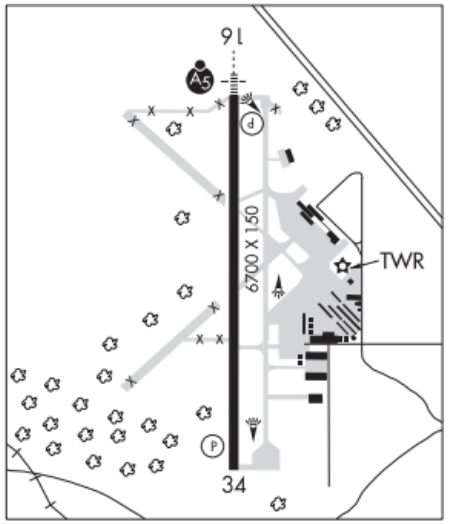
1. Calculate TAS and GPH based on Cruise Performance (POH) for each leg ➔ Enter PA, RPM and Temperature
2. Enter TC and True Wind (or MC and Mag Wind) and TAS to calculate WCA ➔ Find MH (MH = TH – East Var)
3. With TAS, Course, Wind and Leg Distance ➔ Calculate Ground Speed and Time
4. With Fuel Burn Rate and Time ➔ Calculate Total Fuel Burn (and Fuel Remaining)
5. Note: TOC comes from POH calculations; TOD comes from FPM and GS

STEP 1 | Destination Airport (KBLI)

BELLINGHAM

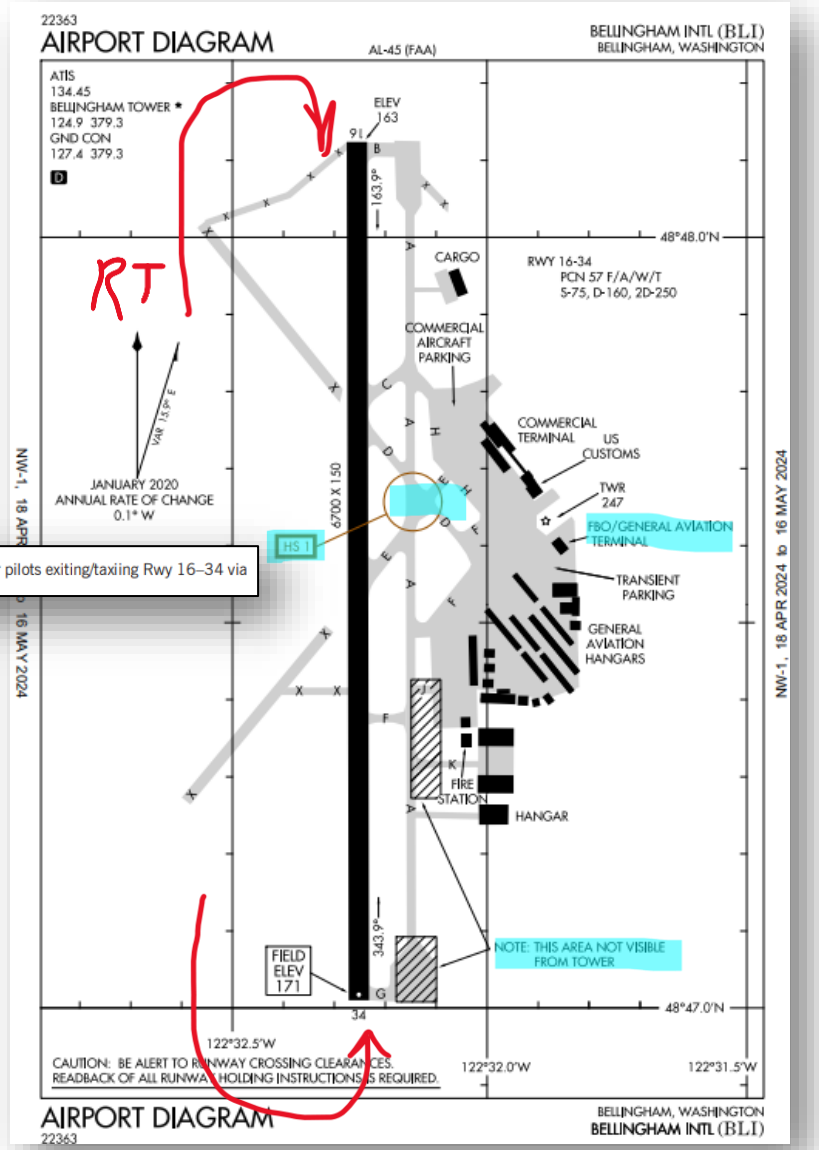
BELLINGHAM INTL (BLI)(KBLI) 3 NW UTC–8(–7DT) N48°47.56′ W122°32.25′ **SEATTLE**
171 B TPA—See Remarks AOE Class I, ARFF Index B NOTAM FILE BLI **H–1B, L–1E**
IAP, AD

RWY 16–34: H6700X150 (ASPH–GRVD) S–75, D–160, 2S–175, 2D–250 PCN 57 F/A/W/T HIRL
RWY 16: MALSR. PAPI(P4L)—GA 3.0° TCH 50′. RVR–T Rgt tfc.
RWY 34: REIL. PAPI(P4L)—GA 3.0° TCH 50′. RVR–R



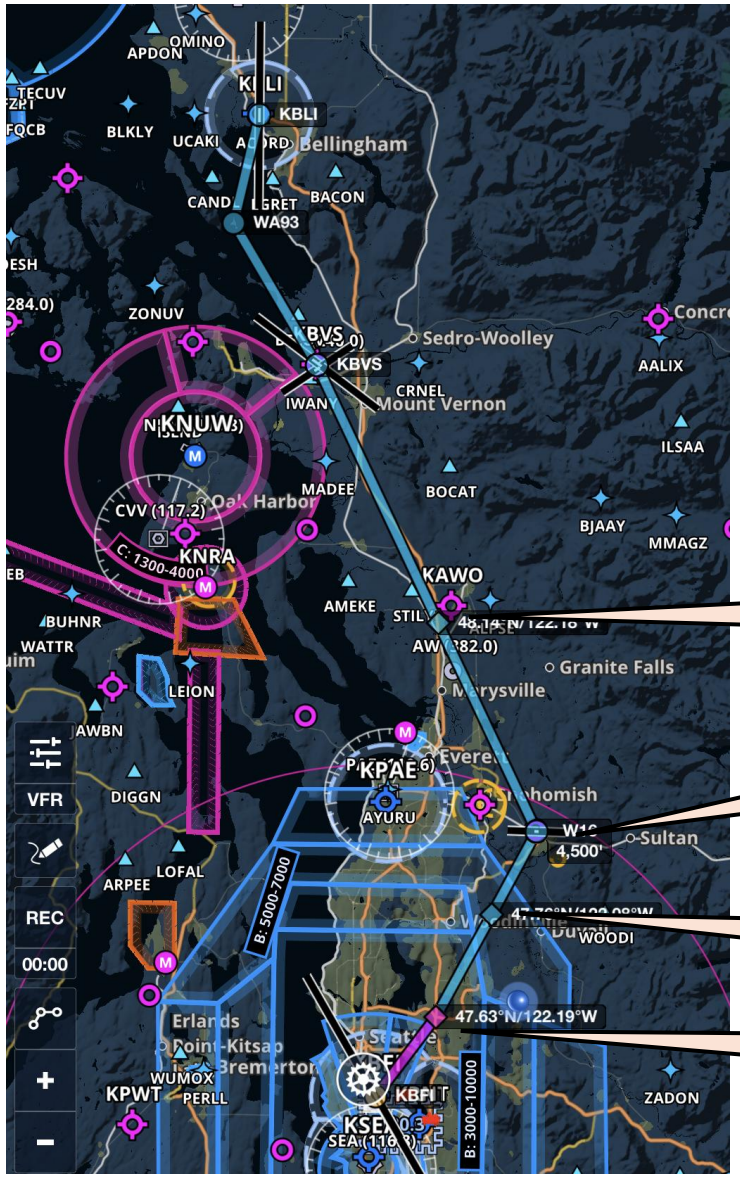
RUNWAY DECLARED DISTANCE INFORMATION
RWY 16: TORA–6700 TODA–6700 ASDA–6700 LDA–6700
RWY 34: TORA–6700 TODA–6700 ASDA–6700 LDA–6700
SERVICE: S7 **FUEL** 100LL, JET A **LGT** When twr clsd ACTIVATE HIRL Rwy 16–34, MALSR Rwy 16 and REIL Rwy 34—CTAF.
NOISE: Noise abatement proc in efct ctc ops at 360–739–1944.
AIRPORT REMARKS: Attended continuously. Birds and coyotes on and invof arpt movement areas. PPR for unscheduled air carrier ops with more than 30 pax seats ctc ops at 360–739–1944. Twy A btn Twy E and Twy F clsd to acft winspan more than 118′. Portions of Twy A at Twy G and Twy J not vsbl from twr. Air carrier ops use Twy A, Twy B, Twy C, Twy D West of Twy E, Twy E, Twy F West of Twy A, Twy G, and Twy H. Coml ramp clsd to pvt acft. TPA—1200 (1030) fixed wing, 700(530) helicopter, 2000(1830) turbo. Ldg fee over 7,500 lbs. Flight Notification Service (ADCUS) avbl.
AIRPORT MANAGER: 360-676-2500
WEATHER DATA SOURCES: ASOS (360) 671–8688
COMMUNICATIONS: CTAF 124.9 **ATIS** 134.45 360–647–5939 **UNICOM** 122.95
RCO 122.15 (SEATTLE RADIO)
Ⓡ**VICTORIA TERMINAL APP/DEP CON** 132.7
TOWER 124.9 (1500–0630Z‡) **GND CON** 127.4
CLEARANCE DELIVERY PHONE: For CD if una to ctc on FSS freq, ctc Victoria trml on 133.95 or at 604-586-4561.
AIRSPACE: CLASS D svc 1500–0630Z‡; other times CLASS E.
RADIO AIDS TO NAVIGATION: NOTAM FILE BLI.
WHATCOM (H) (H) VORTACW 113.0 HUH Chan 77 N48°56.72′ W122°34.76′ 150° 9.3 NM to fld. 82/20E.
TACAN AZIMUTH unusable:
155°–165° byd 15 NM blo 6,000′
ILS/DME 108.5 I–BLI Chan 22 Rwy 16. Class IA. ILS DME unusable beyond 30° left of course.

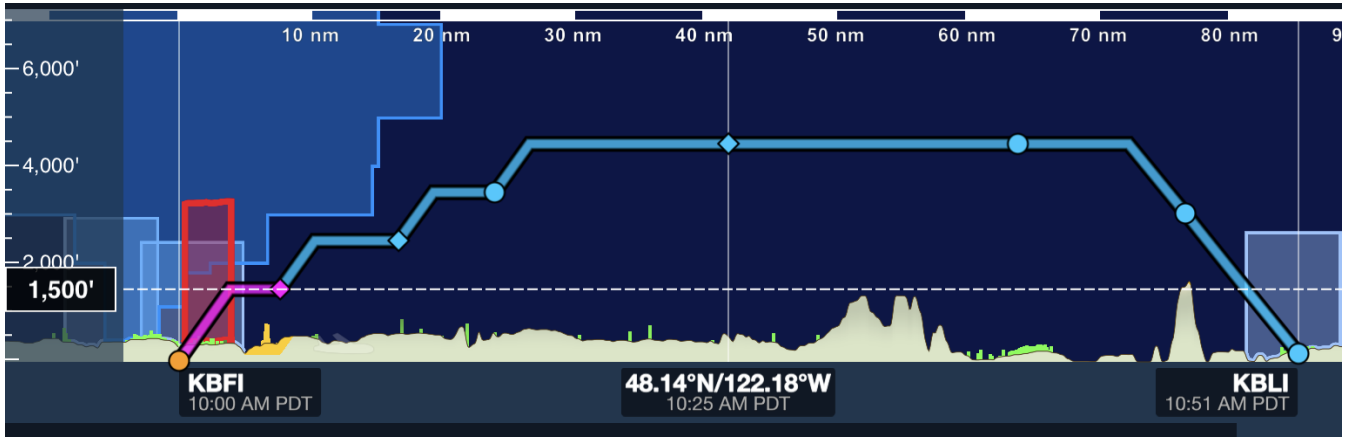
NW, 21 MAR 2024 to 16 MAY 2024



Confusing twy int for pilots exiting/taxiing Rwy 16–34 via Twy D.

STEP 2 | Route, Checkpoints & Altitudes





Arlington

Monroe
(W16)

Cottage Lake
(120 radial PAE)

Intersection
I-405 x SR-520

STEP 3 | Performance: Climb, Fuel and Distance

- **Time, Fuel and Distance to Climb**
  - Important for TOC, Fuel Calculations, Clear obstacles, etc
  - Example:

Climb 2,000 → 6,000ft (PA) @ 2550lbs, 15°C

- *10 – 3 = 7 minutes*
- *2.2 – 0.8 = 1.4 Gal*
- *13 – 4 = 9nm*
- *4000ft in 7min = 571fpm*

Climb	Time	Distance	Fuel	Burn
0 → 1500 ft	2 min	3 NM	0.6 G	18 GPH
1500 → 2500 ft	1.5 min	2 NM	0.4 G	16 GPH
2500 → 3500 ft	1.5 min	2 NM	0.4 G	16 GPH
3500 → 4500 ft	2 min	2 NM	0.3 G	9 GPH

CESSNA
MODEL 172S NAV III
GFC 700 AFCS

SECTION 5
PERFORMANCE

TIME, FUEL AND DISTANCE TO CLIMB AT 2550 POUNDS

CONDITIONS:
Flaps UP
Full Throttle
Standard Temperature

Pressure Altitude Feet	Temp °C	Climb Speed KIAS	Rate of Climb FPM	From Sea Level		
				Time Minutes	Fuel Used Gallons	Distance NM
Sea Level	15	74	730	0	0.0	0
1000	13	73	695	1	0.4	2
2000	11	73	655	3	0.8	4
3000	9	73	620	4	1.2	6
4000	7	73	600	6	1.5	8
5000	5	73	550	8	1.9	10
6000	3	73	505	10	2.2	13
7000	1	73	455	12	2.6	16
8000	-1	72	410	14	3.0	19
9000	-3	72	360	17	3.4	22
10,000	-5	72	315	20	3.9	27
11,000	-7	72	265	24	4.4	32
12,000	-9	72	220	28	5.0	38

NOTE

- Add 1.4 gallons of fuel for engine start, taxi and takeoff allowance.
- Mixture leaned above 3000 feet pressure altitude for maximum RPM.
- Increase time, fuel and distance by 10% for each 10°C above standard temperature.
- Distances shown are based on zero wind.

STEP 3 | Performance: Cruise

SECTION 5
PERFORMANCE

CESSNA
MODEL 172S NAV III
GFC 700 AFCS

CRUISE PERFORMANCE

CONDITIONS:
2550 Pounds
Recommended Lean Mixture

Pressure Altitude Feet	RPM	20°C BELOW STANDARD TEMP			STANDARD TEMPERATURE			20°C ABOVE STANDARD TEMP		
		% MCP	KTAS	GPH	% MCP	KTAS	GPH	% MCP	KTAS	GPH
2000	2550	83	117	11.1	77	118	10.5	72	117	9.9
	2500	78	115	10.6	73	115	9.9	68	115	9.4
	2400	69	111	9.6	64	110	9.0	60	109	8.5
	2300	61	105	8.6	57	104	8.1	53	102	7.7
	2200	53	99	7.7	50	97	7.3	47	95	6.9
	2100	47	92	6.9	44	90	6.6	42	89	6.3
4000	2600	83	120	11.1	77	120	10.4	72	119	9.8
	2550	79	118	10.6	73	117	9.9	68	117	9.4
	2500	74	115	10.1	69	115	9.5	64	114	8.9
	2400	65	110	9.1	61	109	8.5	57	107	8.1
	2300	58	104	8.2	54	102	7.7	51	101	7.3
	2200	51	98	7.4	48	96	7.0	45	94	6.7
	2100	45	91	6.6	42	89	6.4	40	87	6.1
6000	2650	83	122	11.1	77	122	10.4	72	121	9.8
	2600	78	120	10.6	73	119	9.9	68	118	9.4
	2500	70	115	9.6	65	114	9.0	60	112	8.5
	2400	62	109	8.6	57	108	8.2	54	106	7.7
	2300	54	103	7.8	51	101	7.4	48	99	7.0
	2200	48	96	7.1	45	94	6.7	43	92	6.4

NOTE

- Maximum cruise power using recommended lean mixture is 75% MCP. Power settings above 75% MCP are listed to aid interpolation. Operations above 75% MCP must use full rich mixture.
- Cruise speeds are shown for an airplane equipped with speed fairings. Without speed fairings, decrease speeds shown by 2 knots.

No speed fairings → Reduce 2kts (already accounted below):

- TAS = between 102 and 100 kts → Using 100 kts for simplicity
- GPH = between 7.7 and 8.1 GPH → Using 9 GPH for safety

STEP 3 | NAVLOG (Simple version → w/o TOC)

VFR NAVLOG

Aircraft Number	N611EK	Fuel	53	Fuel left (@10GPH): 4.2h	Mag. Variation	-15	Origin/Destination	KBFI - KBLI

Alternate Information:

KPAE ==> CT 132.95 // ATIS: 128.65 // Runways: **34R** (Right Traffic) - **16L** // TPA: 1600ft

KBVS ==> CTAF 123.075 // AWOS: 121.125 // Runways: 11 - 29 // TPA: 1100ft

KAWO ==> CTAF 122.725 // AWOS: 135.625 // Runways: **16** (Right Traffic) - **34**, **11** (Right Traffic) - **29** // TPA: 1200ft

Flight Following: Seattle Departure 119.2

Check Points (Fixes)	Landmark / Pilotage / Dead Rekoning	TC	MC	Altitude (feet)	Wind Dir. True / Dir. Mag	Wind Vel. / OAT (C)	TAS	WCA	MH	Dist. Leg / Rem.	GS Est. / Act.	GPH	Time ETE / ATE	Fuex Taxi / Fuel / Rem.
KBFI										86				3.0
		37	22	1,500	182 / *167*	7	100	2	24	8 / 78	106	9	0:05	0.7 / 49.3
Intersection (I-405 x SR-520)														
Cottage Lake	Lake to the left, intersection ahead **PAE VOR (110.6) - 120 Radial**													
W16 (First Air Field)	**Monroe to the right Just after the rail tracks** (GPS Waypoint W16)													
Arlington Airport (KAWO)	Airport to the right **Just over crossing I5**													
Skagit Airport (KBVS)														
South of Eliza Island **<TOD>**	WA93													
KBLI														
										86			0:52	10.6

42.4 ==> Fuel Left (G)

ATIS/METAR (Current)		
Departure	Time Taken	Destination
KBFI	Airport Code	**KBLI**
	ATIS	
	Ceiling/Vis	
	Wind	
	Altimeter	
	Temp/Dew Point	
	Rwy (*RP)	
TAF (at Departure / at Arrival) - Closest Station		
KBFI	Station	*KBLI*
	Ceiling/Vis	
	Wind	
	Rwy (*RP)	
Airport Information		
1000 ft	TPA	1200 ft
22 ft	Field Elev.	171 ft
3700 ft	TODA / LDA	6700 ft
	Take off / Landing Dist	
Airport Frequencies		
127.75	ATIS/AWOS	134.45
121.9	Ground	127.4
118.3	Tower/CTAF	124.9
119.2	Dep/App	132.7
122.5	FSS	122.15

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Flight Following: Seattle Departure 119.2

Check Points (Fixes)	Landmark: Pilotage / Dead Rekoning	TC	MC	Altitude (feet)	Wind: Dir. True / *Dir. Mag*	Wind: Vel. / OAT (C)	TAS	WCA	MH	Dist. Leg / Rem.	GS Est. / Act.	GPH	Time ETE / ATE	Fuex Taxi / Fuel / Rem.
KBFI										86				3.0
		37	22	1,500	182	7	100	2	24	8	106	9	0:05	0.7
Intersection (I-405 x SR-520)					*167*					78				49.3
		28	13	2,500	182	7	100	2	15	9	106	9	0:05	0.8
Cottage Lake	Lake to the left, intersection ahead **PAE VOR (110.6) - 120 Radial**				*167*					69				48.6
		28	13	3,500	187	7	100	1	14	7	107	9	0:04	0.6
W16 (First Air Field)	**Monroe to the right Just after the rail tracks** (GPS Waypoint W16)				*172*					62				48.0
		335	320	4,500	200	2	100	-1	319	18	101	9	0:11	1.6
Arlington Airport (KAWO)	Airport to the right **Just over crossing I5**				*185*					44				46.4
		335	320	4,500	200	2	100	-1	319	22	101	9	0:13	2.0
Skagit Airport (KBVS)					*185*					64				44.4
		329	314	4,500	200	2	100	-1	313	13	101	9	0:08	1.2
South of Eliza Island <TOD>	WA93				*185*					73				43.3
		12	357	171	182	2	85	0	357	9	87	8	0:06	0.8
KBLI					*167*					77				42.4
										86			0:52	10.6

42.4 ==> Fuel Left (G)

ATIS/METAR (Current)		
Departure	**Time Taken**	Destination
KBFI	Airport Code	**KBLI**
	ATIS	
	Ceiling/Vis	
	Wind	
	Altimeter	
	Temp/Dew Point	
	Rwy (*RP)	
TAF (at Departure / at Arrival) - Closest Station		
KBFI	Station	*KBLI*
	Ceiling/Vis	
	Wind	
	Rwy (*RP)	
Airport Information		
1000 ft	TPA	1200 ft
22 ft	Field Elev.	171 ft
3700 ft	TODA / LDA	6700 ft
	Take off / Landing Dist	
Airport Frequencies		
127.75	ATIS/AWOS	134.45
121.9	Ground	127.4
118.3	Tower/CTAF	124.9
119.2	Dep/App	132.7
122.5	FSS	122.15

STEP 3 | NAVLOG (Complete version → w/ TOC)

VFR NAVLOG

Aircraft Number	N611EK	Fuel	53	Fuel left (@10GPH): 4.1h	Mag. Variation	-15	Origin/Destination	KBFI - KBLI

Alternate Information:

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Flight Following: Seattle Departure 119.2

Check Points (Fixes)	Landmark / Pilotage / Dead Rekoning	TC	MC	Altitude (feet)	Wind Dir. True / Dir. Mag	Wind Vel. / OAT (C)	TAS	WCA	MH	Dist. Leg / Rem.	GS Est. / Act.	GPH	Time ETE / ATE	Fuex Taxi / Fuel / Rem.
KBFI														3.0
		37	22	1,500	182 / *167*	7	74	3	25	3 / 83	80	18	0:02	0.7 / 49.3
<TOC>														
		37	22	1,500	182 / *167*	7	100	2	24	5 / 78	106	9	0:03	0.4 / 48.9
Intersection (I-405 x SR-520)														
KBLI										86			0:54	11.6

8 9 7 18

41.4 ==> Fuel Left (G)

ATIS/METAR (Current)		
Departure	Time Taken	Destination
KBFI	Airport Code	**KBLI**
	ATIS	
	Ceiling/Vis	
	Wind	
	Altimeter	
	Temp/Dew Point	
	Rwy (*RP)	

TAF (at Departure / at Arrival) - Closest Station		
KBFI	Station	*KBLI*
	Ceiling/Vis	
	Wind	
	Rwy (*RP)	

Airport Information		
1000 ft	TPA	1200 ft
22 ft	Field Elev.	171 ft
3700 ft	TODA / LDA	6700 ft
	Take off / Landing Dist	

Airport Frequencies		
127.75	ATIS/AWOS	134.45
121.9	Ground	127.4
118.3	Tower/CTAF	124.9
119.2	Dep/App	132.7
122.5	FSS	122.15

STEP 3 | NAVLOG (Complete version → w/ TOC)

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Check Points (Fixes)	Landmark / Pilotage / Dead Rekoning	TC	MC	Altitude (feet)	Wind Dir. True / Dir. Mag	Wind Vel. / OAT (C)	TAS	WCA	MH	Dist. Leg / Rem.	GS Est. / Act.	GPH	Time / ETE / ATE	Fuex Taxi 3.0 / Fuel / Rem.
KBFI										86				
		37	22	1,500	182 / *167*	7 /	74	3	25	3 / 83	80 /	18	0:02 /	0.7 / 49.3
<TOC>														
		37	22	1,500	182 / *167*	7 /	100	2	24	5 / 78	106 /	9	0:03 /	0.4 / 48.9
Intersection (I-405 x SR-520)														
		28	13	2,500	182 / *167*	7 /	74	2	15	1 / 77	80 /	16	0:01 /	0.2 / 48.7
<TOC>														
		28	13	2,500	182 / *167*	7 /	100	2	15	8 / 78	106 /	9	0:05 /	0.7 / 48.0
Cottage Lake	Lake to the left, intersection ahead **PAE VOR (110.6) - 120 Radial**													
KBLI										86			0:54	11.6

8 / 9 / 7 / 18

41.4 ==> Fuel Left (G)

ATIS/METAR (Current)		
Departure	Time Taken	Destination
KBFI	Airport Code	**KBLI**
	ATIS	
	Ceiling/Vis	
	Wind	
	Altimeter	
	Temp/Dew Point	
	Rwy (*RP)	

TAF (at Departure / at Arrival) - Closest Station		
KBFI	Station	*KBLI*
	Ceiling/Vis	
	Wind	
	Rwy (*RP)	

Airport Information		
1000 ft	TPA	1200 ft
22 ft	Field Elev.	171 ft
3700 ft	TODA / LDA	6700 ft
	Take off / Landing Dist	

Airport Frequencies		
127.75	ATIS/AWOS	134.45
121.9	Ground	127.4
118.3	Tower/CTAF	124.9
119.2	Dep/App	132.7
122.5	FSS	122.15

STEP 3 | NAVLOG (Complete version → w/ TOC)

VFR NAVLOG

Aircraft Number	N611EK	Fuel	53	Fuel left (@10GPH): 4.1h	Mag. Variation	-15	Origin/Destination	KBFI - KBLI

Alternate Information:

KPAE ==> CT 132.95 // ATIS: 128.65 // Runways: **34R** (Right Traffic) - **16L** // TPA: 1600ft

KBVS ==> CTAF 123.075 // AWOS: 121.125 // Runways: 11 - 29 // TPA: 1100ft

KAWO ==> CTAF 122.725 // AWOS: 135.625 // Runways: **16** (Right Traffic) - **34**, **11** (Right Traffic) - **29** // TPA: 1200ft

Flight Following: Seattle Departure 119.2

	Check Points (Fixes)	Landmark / Pilotage / Dead Rekoning	TC	MC	Altitude (feet)	Wind Dir. True / Dir. Mag	Wind Vel. / OAT (C)	TAS	WCA	MH	Dist. Leg / Rem.	GS Est. / Act.	GPH	Time ETE / ATE	Fuex Taxi 3.0 / Fuel / Rem.
	KBFI										86				
8	**<TOC>**		37	22	1,500	182 / *167*	7	74	3	25	3 / 83	80	18	0:02	0.7 / 49.3
	Intersection (I-405 x SR-520)		37	22	1,500	182 / *167*	7	100	2	24	5 / 78	106	9	0:03	0.4 / 48.9
9	**<TOC>**		28	13	2,500	182 / *167*	7	74	2	15	1 / 77	80	16	0:01	0.2 / 48.7
	Cottage Lake	Lake to the left, intersection ahead **PAE VOR (110.6) - 120 Radial**	28	13	2,500	182 / *167*	7	100	2	15	8 / 78	106	9	0:05	0.7 / 48.0
7	**<TOC>**		28	13	3,500	187 / *172*	7	74	2	15	1 / 77	80	16	0:01	0.2 / 47.8
	W16 (First Air Field)	**Monroe to the right Just after the rail tracks** (GPS Waypoint W16)	28	13	3,500	187 / *172*	7	100	1	14	6 / 80	107	9	0:03	0.5 / 47.3
18															
	KBLI										86			0:54	11.6

41.4 ==> Fuel Left (G)

ATIS/METAR (Current)		
Departure	Time Taken	Destination
KBFI	Airport Code	**KBLI**
	ATIS	
	Ceiling/Vis	
	Wind	
	Altimeter	
	Temp/Dew Point	
	Rwy (*RP)	
TAF (at Departure / at Arrival) - Closest Station		
KBFI	Station	*KBLI*
	Ceiling/Vis	
	Wind	
	Rwy (*RP)	
Airport Information		
1000 ft	TPA	1200 ft
22 ft	Field Elev.	171 ft
3700 ft	TODA / LDA	6700 ft
	Take off / Landing Dist	
Airport Frequencies		
127.75	ATIS/AWOS	134.45
121.9	Ground	127.4
118.3	Tower/CTAF	124.9
119.2	Dep/App	132.7
122.5	FSS	122.15

STEP 3 | NAVLOG (Complete version → w/ TOC)

VFR NAVLOG

Aircraft Number	N611EK	Fuel	53	Fuel left (@10GPH): 4.1h	Mag. Variation	-15	Origin/Destination	KBFI - KBLI

Alternate Information:

KPAE ==> CT 132.95 // ATIS: 128.65 // Runways: **34R** (Right Traffic) - **16L** // TPA: 1600ft

KBVS ==> CTAF 123.075 // AWOS: 121.125 // Runways: 11 - 29 // TPA: 1100ft

KAWO ==> CTAF 122.725 // AWOS: 135.625 // Runways: **16** (Right Traffic) - **34**, **11** (Right Traffic) - **29** // TPA: 1200ft

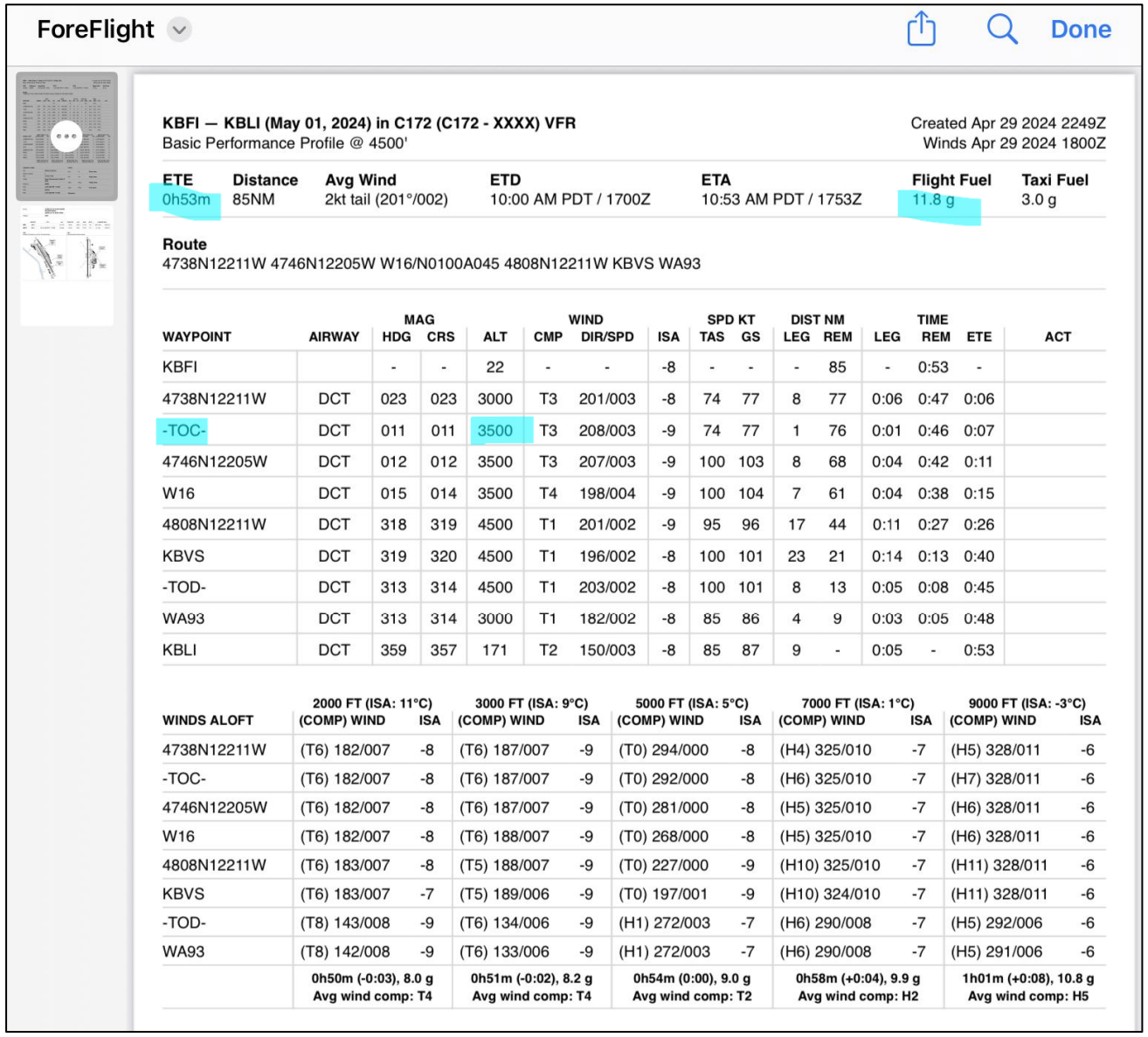
Flight Following: Seattle Departure 119.2

	Check Points (Fixes)	Landmark: Pilotage / Dead Rekoning	TC	MC	Altitude (feet)	Wind: Dir. True / *Dir. Mag*	Wind: Vel. / OAT (C)	TAS	WCA	MH	Dist. Leg / Rem.	GS Est. / Act.	GPH	Time / ETE / ATE	Fuex Taxi 3.0 / Fuel / Rem.
	KBFI														86
8	**<TOC>**		37	22	1,500	182 / *167*	7	74	3	25	3 / 83	80	18	0:02	0.7 / 49.3
	Intersection (I-405 x SR-520)		37	22	1,500	182 / *167*	7	100	2	24	5 / 78	106	9	0:03	0.4 / 48.9
9	**<TOC>**		28	13	2,500	182 / *167*	7	74	2	15	1 / 77	80	16	0:01	0.2 / 48.7
	Cottage Lake	Lake to the left, intersection ahead **PAE VOR (110.6) - 120 Radial**	28	13	2,500	182 / *167*	7	100	2	15	8 / 78	106	9	0:05	0.7 / 48.0
7	**<TOC>**		28	13	3,500	187 / *172*	7	74	2	15	1 / 77	80	16	0:01	0.2 / 47.8
	W16 (First Air Field)	**Monroe to the right Just after the rail tracks** (GPS Waypoint W16)	28	13	3,500	187 / *172*	7	100	1	14	6 / 80	107	9	0:03	0.5 / 47.3
18	**<TOC>**		335	320	4,500	200 / *185*	2	74	-1	319	3 / 77	75	16	0:02	0.6 / 46.7
	Arlington Airport (KAWO)	Airport to the right **Just over crossing I5**	335	320	4,500	200 / *185*	2	100	-1	319	15 / 62	101	9	0:09	1.3 / 45.3
	Skagit Airport (KBVS)		335	320	4,500	200 / *185*	2	100	-1	319	22 / 64	101	9	0:13	2.0 / 43.4
	South of Eliza Island <TOD>	WA93	329	314	4,500	200 / *185*	2	100	-1	313	13 / 73	101	9	0:08	1.2 / 42.2
	KBLI		12	357	171	182 / *167*	2	85	0	357	9 / 77	87	8	0:06	0.8 / 41.4
											86			0:54	11.6

41.4 ==> Fuel Left (G)

ATIS/METAR (Current)		
Departure	**Time Taken**	Destination
KBFI	Airport Code	**KBLI**
	ATIS	
	Ceiling/Vis	
	Wind	
	Altimeter	
	Temp/Dew Point	
	Rwy (*RP)	
TAF (at Departure / at Arrival) - Closest Station		
KBFI	Station	*KBLI*
	Ceiling/Vis	
	Wind	
	Rwy (*RP)	
Airport Information		
1000 ft	TPA	1200 ft
22 ft	Field Elev.	171 ft
3700 ft	TODA / LDA	6700 ft
	Take off / Landing Dist	
Airport Frequencies		
127.75	ATIS/AWOS	134.45
121.9	Ground	127.4
118.3	Tower/CTAF	124.9
119.2	Dep/App	132.7
122.5	FSS	122.15

STEP 3 | NAVLOG (Foreflight Version)



ForeFlight Done

KBFI — KBLI (May 01, 2024) in C172 (C172 - XXXX) VFR
Basic Performance Profile @ 4500'

Created Apr 29 2024 2249Z
Winds Apr 29 2024 1800Z

ETE	Distance	Avg Wind	ETD	ETA	Flight Fuel	Taxi Fuel
0h53m	85NM	2kt tail (201°/002)	10:00 AM PDT / 1700Z	10:53 AM PDT / 1753Z	11.8 g	3.0 g

Route
4738N12211W 4746N12205W W16/N0100A045 4808N12211W KBVS WA93

		MAG			WIND			SPD KT		DIST NM		TIME			
WAYPOINT	AIRWAY	HDG	CRS	ALT	CMP	DIR/SPD	ISA	TAS	GS	LEG	REM	LEG	REM	ETE	ACT
KBFI		-	-	22	-	-	-8	-	-	-	85	-	0:53	-	
4738N12211W	DCT	023	023	3000	T3	201/003	-8	74	77	8	77	0:06	0:47	0:06	
-TOC-	DCT	011	011	3500	T3	208/003	-9	74	77	1	76	0:01	0:46	0:07	
4746N12205W	DCT	012	012	3500	T3	207/003	-9	100	103	8	68	0:04	0:42	0:11	
W16	DCT	015	014	3500	T4	198/004	-9	100	104	7	61	0:04	0:38	0:15	
4808N12211W	DCT	318	319	4500	T1	201/002	-9	95	96	17	44	0:11	0:27	0:26	
KBVS	DCT	319	320	4500	T1	196/002	-8	100	101	23	21	0:14	0:13	0:40	
-TOD-	DCT	313	314	4500	T1	203/002	-8	100	101	8	13	0:05	0:08	0:45	
WA93	DCT	313	314	3000	T1	182/002	-8	85	86	4	9	0:03	0:05	0:48	
KBLI	DCT	359	357	171	T2	150/003	-8	85	87	9	-	0:05	-	0:53	

	2000 FT (ISA: 11°C)		3000 FT (ISA: 9°C)		5000 FT (ISA: 5°C)		7000 FT (ISA: 1°C)		9000 FT (ISA: -3°C)	
WINDS ALOFT	(COMP) WIND	ISA	(COMP) WIND	ISA	(COMP) WIND	ISA	(COMP) WIND	ISA	(COMP) WIND	ISA
4738N12211W	(T6) 182/007	-8	(T6) 187/007	-9	(T0) 294/000	-8	(H4) 325/010	-7	(H5) 328/011	-6
-TOC-	(T6) 182/007	-8	(T6) 187/007	-9	(T0) 292/000	-8	(H6) 325/010	-7	(H7) 328/011	-6
4746N12205W	(T6) 182/007	-8	(T6) 187/007	-9	(T0) 281/000	-8	(H5) 325/010	-7	(H6) 328/011	-6
W16	(T6) 182/007	-8	(T6) 188/007	-9	(T0) 268/000	-8	(H5) 325/010	-7	(H6) 328/011	-6
4808N12211W	(T6) 183/007	-8	(T5) 188/007	-9	(T0) 227/000	-9	(H10) 325/010	-7	(H11) 328/011	-6
KBVS	(T6) 183/007	-7	(T5) 189/006	-9	(T0) 197/001	-9	(H10) 324/010	-7	(H11) 328/011	-6
-TOD-	(T8) 143/008	-9	(T6) 134/006	-9	(H1) 272/003	-7	(H6) 290/008	-7	(H5) 292/006	-6
WA93	(T8) 142/008	-9	(T6) 133/006	-9	(H1) 272/003	-7	(H6) 290/008	-7	(H5) 291/006	-6
	0h50m (-0:03), 8.0 g Avg wind comp: T4		0h51m (-0:02), 8.2 g Avg wind comp: T4		0h54m (0:00), 9.0 g Avg wind comp: T2		0h58m (+0:04), 9.9 g Avg wind comp: H2		1h01m (+0:08), 10.8 g Avg wind comp: H5	

- Be aware of Foreflight's limitations
- Airplane's Performance is simplified in foreflight
- Sometimes foreflight doesn't handle well changes in altitudes in the navlog

STEP 4 | Performance: Runway Required

Runway Required

- Paved, Level, Dry runway
- Temperature 18ºC, Winds Calm
- Field elevation 171ft
- Altimeter 30.10 inHg
- Steps:
  1. Read the conditions
  2. Read the notes
  3. Calculate PA
  4. Find info in the table
  5. Apply corrections & Safety factor

PA = 171 + 1000x(29.92-30.10)
*PA = 171 – 180 ➔ **PA = -9 ft***

*Takeoff (50ft) = **1690ft** ➔ **2535 ft***
*Landing (50ft) = **1350ft** ➔ **2025 ft***

1.5x safety factor added

CESSNA
MODEL 172S NAV III
GFC 700 AFCS

SECTION 5
PERFORMANCE

SHORT FIELD TAKEOFF DISTANCE AT 2550 POUNDS

CONDITIONS:
Flaps 10°
Full Throttle prior to brake release.
Paved, Level, Dry Runway
Zero Wind

Lift Off: 51 KIAS
Speed at 50 Feet: 56 KIAS

Pressure Altitude Feet	0°C		10°C		20°C		30°C		40°C	
	Gnd Roll Feet	Total Feet To Clear 50 Foot Obst	Gnd Roll Feet	Total Feet To Clear 50 Foot Obst	Gnd Roll Feet	Total Feet To Clear 50 Foot Obst	Gnd Roll Feet	Total Feet To Clear 50 Foot Obst	Gnd Roll Feet	Total Feet To Clear 50 Foot Obst
Sea Level	860	1465	925	1575	995	1690	1070	1810	1150	1945
1000	940	1600	1010	1720	1090	1850	1170	1990	1260	2135
2000	1025	1755	1110	1890	1195	2035	1285	2190	1380	2355
3000	1125	1925	1215	2080	1310	2240	1410	2420	1515	2605
4000	1235	2120	1335	2295	1440	2480	1550	2685	1660	2880
5000	1355	2345	1465	2545	1585	2755	1705	2975	1825	3205
6000	1495	2605	1615	2830	1745	3075	1875	3320	2010	3585
7000	1645	2910	1785	3170	1920	3440	2065	3730	2215	4045
8000	1820	3265	1970	3575	2120	3880	2280	4225	2450	4615

NOTE

- Short field technique as specified in Section 4.
- Prior to takeoff from fields above 3000 feet pressure altitude, the mixture should be leaned to give maximum RPM in a full throttle, static run-up.
- Decrease distances 10% for each 9 knots head wind. For operation with tail winds up to 10 knots, increase distances by 10% for each 2 knots.
- For operation on dry grass runway, increase distances by 15% of the "ground roll" figure.

SECTION 5
PERFORMANCE

CESSNA
MODEL 172S NAV III
GFC 700 AFCS

SHORT FIELD LANDING DISTANCE AT 2550 POUNDS

CONDITIONS:
Flaps FULL
Power IDLE
Maximum Braking

Zero Wind
Paved, Level, Dry Runway
Speed at 50 ft: 61 KIAS

Pressure Altitude Feet	0°C		10°C		20°C		30°C		40°C	
	Gnd Roll Feet	Total Feet To Clear 50 Foot Obst	Gnd Roll Feet	Total Feet To Clear 50 Foot Obst	Gnd Roll Feet	Total Feet To Clear 50 Foot Obst	Gnd Roll Feet	Total Feet To Clear 50 Foot Obst	Gnd Roll Feet	Total Feet To Clear 50 Foot Obst
Sea Level	545	1290	565	1320	585	1350	605	1380	625	1415
1000	565	1320	585	1350	605	1385	625	1420	650	1450
2000	585	1355	610	1385	630	1420	650	1455	670	1490
3000	610	1385	630	1425	655	1460	675	1495	695	1530
4000	630	1425	655	1460	675	1495	700	1535	725	1570
5000	655	1460	680	1500	705	1535	725	1575	750	1615
6000	680	1500	705	1540	730	1580	755	1620	780	1660
7000	705	1545	730	1585	760	1625	785	1665	810	1705
8000	735	1585	760	1630	790	1670	815	1715	840	1755

NOTE

- Short field technique as specified in Section 4.
- Decrease distances 10% for each 9 knots head wind. For operation with tail winds up to 10 knots, increase distances by 10% for each 2 knots.
- For operation on dry grass runway, increase distances by 45% of the "ground roll" figure.
- If landing with flaps up, increase the approach speed by 9 KIAS and allow for 35% longer distances.

STEP 5 | Weight & Balance

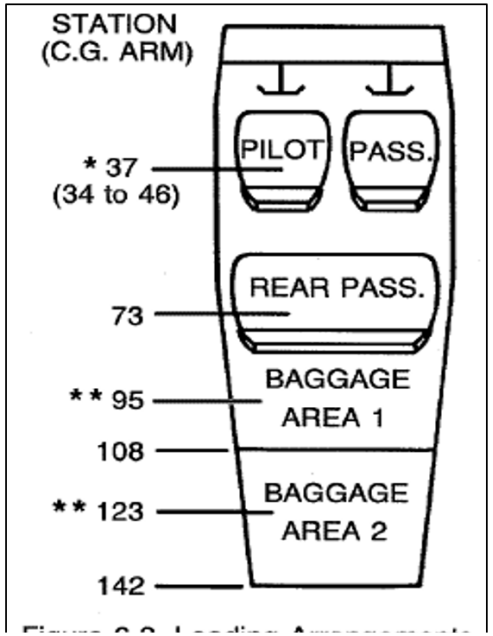
WEIGHT & BALANCE

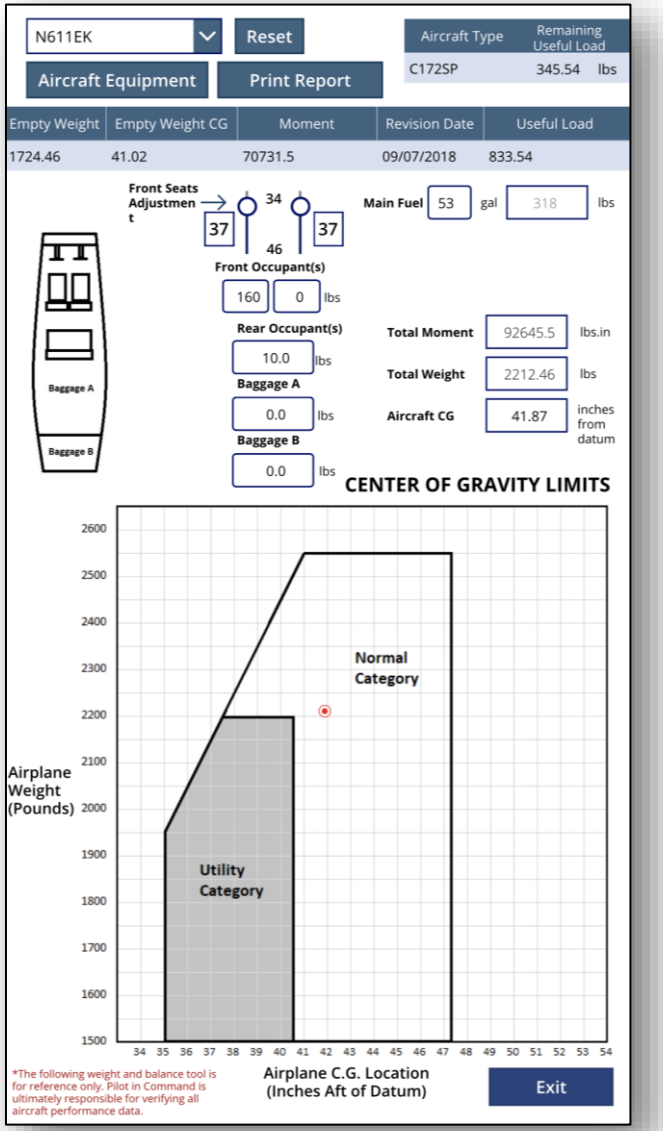
Airplane Model & Maker:	C172S G1000	Tail #	N611EK	Date & Time (local)	5/1/2024	10:00

	Gal	W (lbs)	Arm (in)	Mom
Empty Weight (incl un. Fuel/Oil)		1724	41.0	70732
Fuel Start (gal), 53 max	53	318	48.0	15264
Pilot		160	37.0	5920
Front Passenger / Instructor		0	37.0	0
Rear Passenger 1 (or pilot's bag)		10	73.0	730
Rear Passenger 2		0	73.0	0
Baggage Area 1 (120lbs max)		0	95.0	0
Baggage Area 2 (50lbs max)		0	123.0	0
Fuel End (gal), 53 max	0	0.0	47.8	0
BEGIN TRIP (2,550lbs max):	Weight	**2212**	CG	**41.9**
END TRIP:	Weight	**1894.0**	CG	**40.9**
ZERO FUEL:	Weight	**1894**	CG	**40.9**

Drawing of CG x Weight Envelope

	X (Mom)	Y (Wgt)	CG
Point A	52500	1500	35.0
Point B	68200	1950	35.0
Point C	104500	2550	41.0
Point D	120500	2550	47.3
Point E	71000	1500	47.3
Point F	60700	1500	40.5
Point G	89000	2200	40.5
Point H	82500	2200	37.5





STEP 6-9 | Weather Briefing & Filing a Flight Plan

Weather Briefing

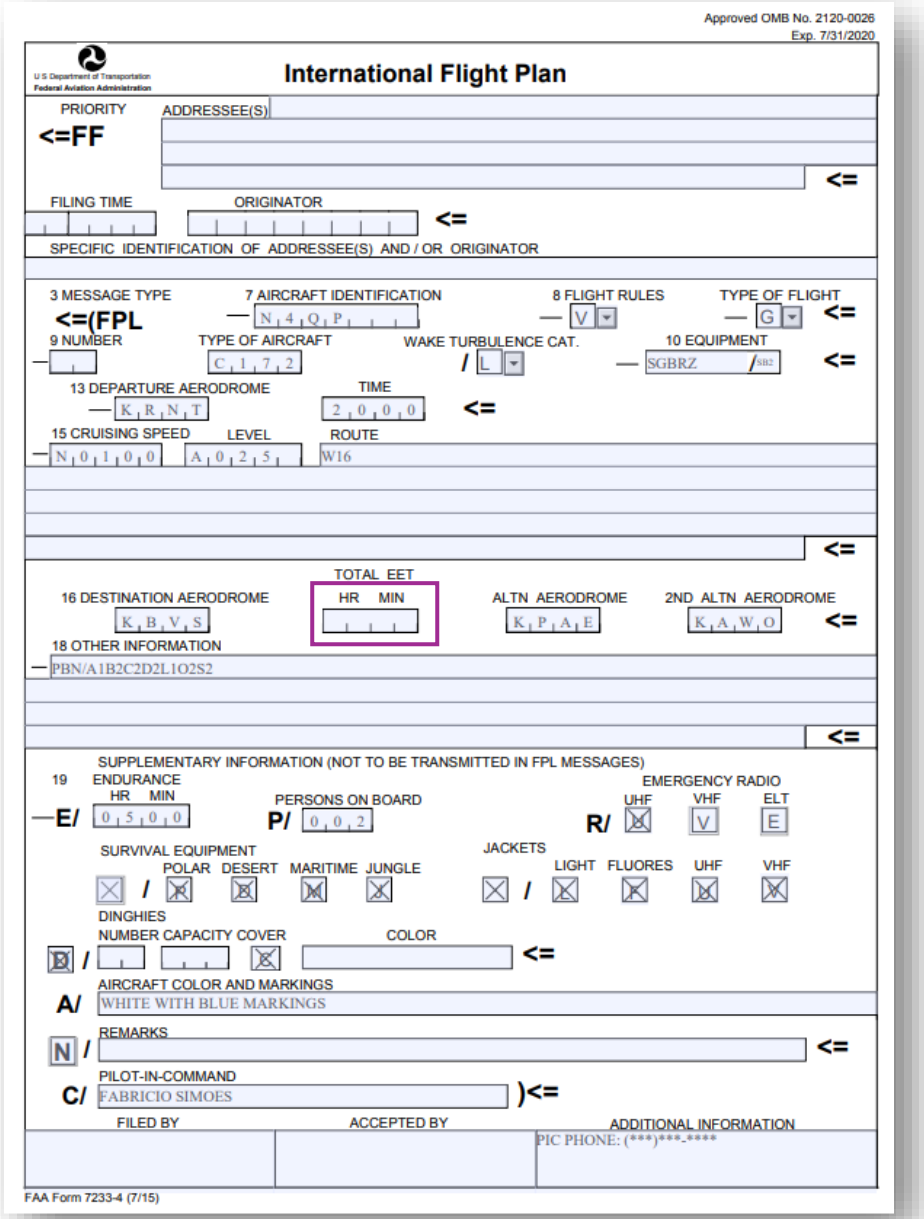
- Aviation Weather Center
- Foreflight
- https://www.1800wxbrief.com/
- FSS (1-800-WX-BRIEF or radio)

Filing Flight Plan

- Not required under VFR, but ensures search/rescue if you don't arrive
  - ✓ They will look for you if plan is not closed 30min after ETA
- Foreflight
- https://www.1800wxbrief.com/
- FSS (1-800-WX-BRIEF or radio)

ICAO Codes

FAA FPL Quick Reference Brochure.pdf



Approved OMB No. 2120-0026
Exp. 7/31/2020

U S Department of Transportation
Federal Aviation Administration

International Flight Plan

PRIORITY <=FF
ADDRESSEE(S)
FILING TIME
ORIGINATOR
SPECIFIC IDENTIFICATION OF ADDRESSEE(S) AND / OR ORIGINATOR

3 MESSAGE TYPE <=(FPL
7 AIRCRAFT IDENTIFICATION — N4QP
8 FLIGHT RULES — V
TYPE OF FLIGHT — G
9 NUMBER
TYPE OF AIRCRAFT C172
WAKE TURBULENCE CAT. / L
10 EQUIPMENT — SGBRZ /SB2
13 DEPARTURE AERODROME — KRNT
TIME 2000
15 CRUISING SPEED N0100
LEVEL A025
ROUTE W16

TOTAL EET
16 DESTINATION AERODROME KBVS
HR MIN
ALTN AERODROME KPAE
2ND ALTN AERODROME KAWO
18 OTHER INFORMATION — PBN/A1B2C2D2L1O2S2

SUPPLEMENTARY INFORMATION (NOT TO BE TRANSMITTED IN FPL MESSAGES)
19 ENDURANCE HR MIN —E/ 0500
PERSONS ON BOARD P/ 002
EMERGENCY RADIO R/ UHF VHF ELT
SURVIVAL EQUIPMENT / POLAR DESERT MARITIME JUNGLE
JACKETS / LIGHT FLUORES UHF VHF
DINGHIES / NUMBER CAPACITY COVER COLOR
AIRCRAFT COLOR AND MARKINGS A/ WHITE WITH BLUE MARKINGS
REMARKS N /
PILOT-IN-COMMAND C/ FABRICIO SIMOES)<=

FILED BY
ACCEPTED BY
ADDITIONAL INFORMATION
PIC PHONE: (***)***-****

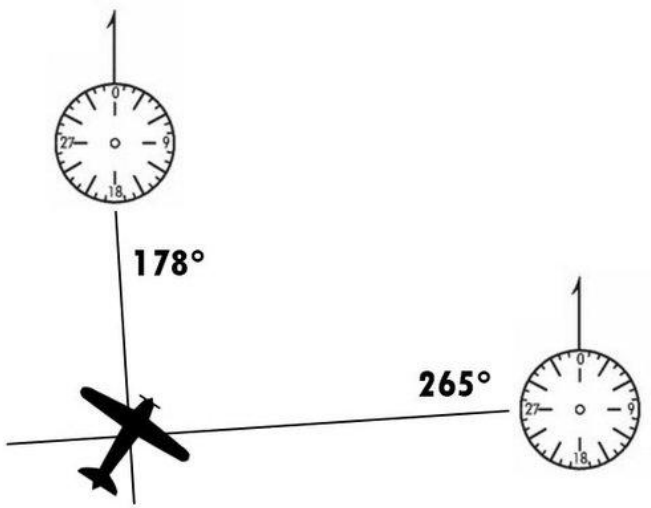
FAA Form 7233-4 (7/15)

Diverting to an Alternate

- **Be aware of potential diversion airports along the route**
- **Use Rule of Thumb Computations when necessary to divert**
  - Use a compass rose or airway on the chart to estimate the heading
  - GS: 60kts (1nm/min), 120kts (2nm/min). Fuel = C172S use 10gal/h (or 1gal each 5min)
- **GPS:** If available, Use the 'Nearest' page in the GPS
- **Procedure**
  - Find your position on the chart
  - Divert immediately to the alternate
  - Choose an altitude
    - ✓ *Consider terrain, radio reception, clouds, winds*
  - Determine arrival time and fuel required
- **Aviate, Navigate, Communicate**

Lost Procedures

- **Avoid getting lost**
  - Plan ahead
  - Use multiple sources to monitor location
    (Pilotage, Dead reckoning, Radio navigation, Flight following)
- **If Lost**
  - Don't panic
  - Five C's
    - Confess – to yourself and accept you are lost
    - Climb – See more, and improves radio reception
    - Conserve – Reduce power, airspeed to save fuel
    - Communicate – Ask help from ATC, frequencies on charts, 121.5
    - Comply – Follow ATC instructions
  - Additional Considerations
    - Look for prominent marks
    - Attempt to plot your position with navaids or GPS
    - Water towers often have city names on them

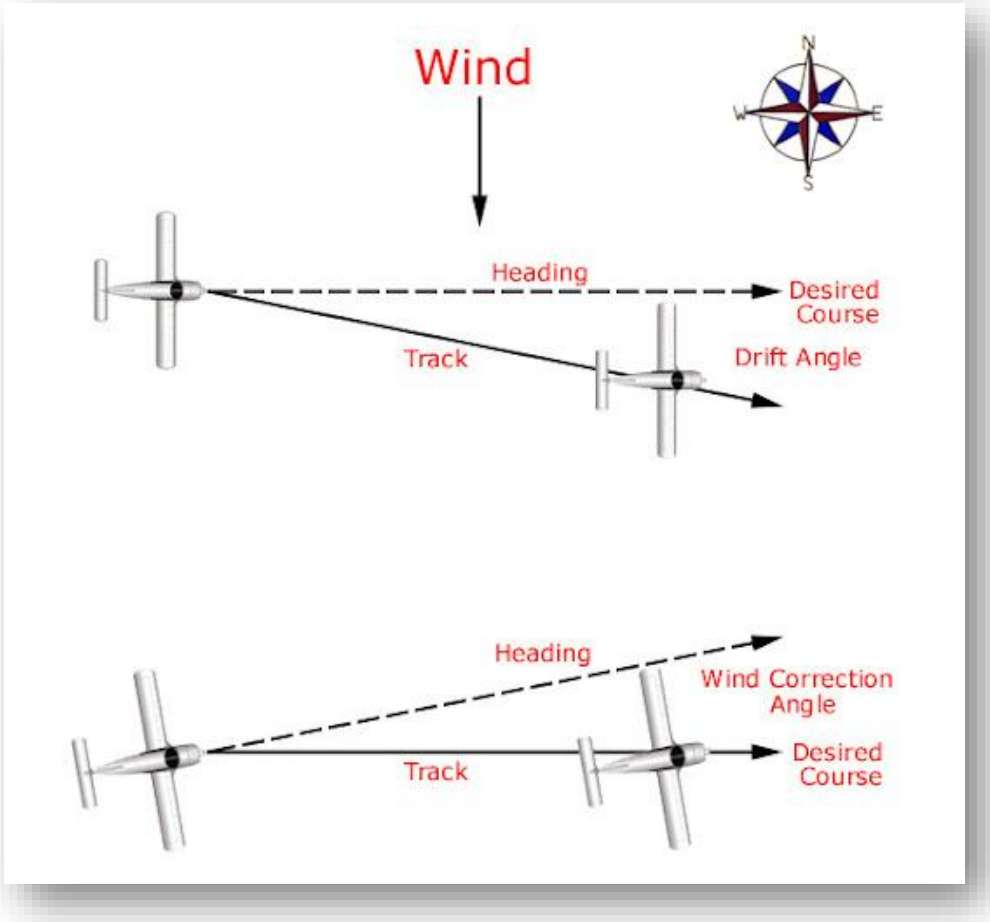


Appendix

Terminology | Navigation

- **Compass Basics**
  - True North: Points directly to the geographic north pole
  - Magnetic North: Aligns with the Earth's magnetic field
  - Variation: Angular difference between TN and MN
    - ✓ *Shown by isogonic lines on charts*
    - ✓ *Magnetic = True ± Variation (-E, +W)*
  - Deviation: error due to magnetic disturbances in the airplane
- **Heading**
  - Direction the longitudinal axis points to
- **Course**
  - Direction of the airplane ground track
  - Heading corrected by the wind
- **Wind Correction Angle (WCA)**
  - Angle to fly into the wind to maintain the desired track

For (Magnetic)	N	30	60	E	120	150
Steer (Compass)	0	28	57	86	117	148
For (Magnetic	S	210	240	W	300	330
Steer (Compass)	180	212	243	274	303	332

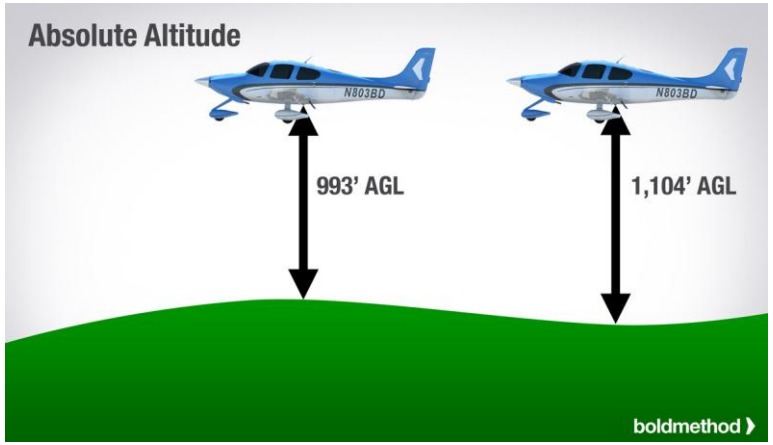


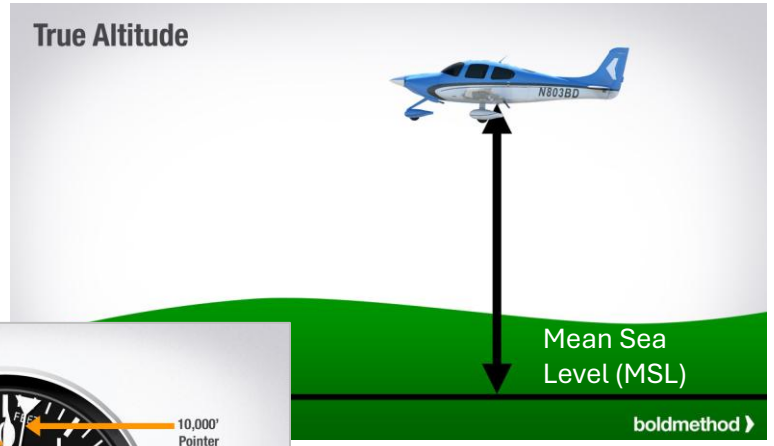
Terminology | Altitude

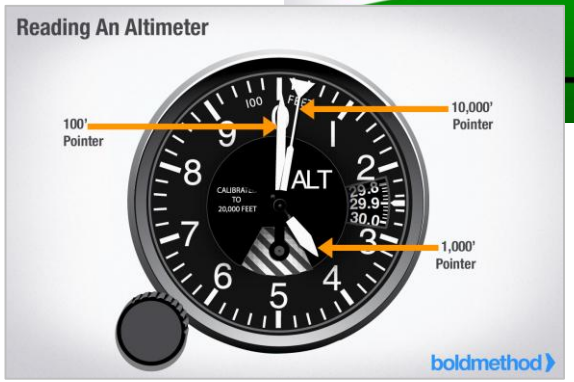
- **Absolute Altitude (AGL)**
  - Vertical distance of the aircraft above the surface
- **True Altitude (MSL)**
  - Vertical distance of the aircraft above sea level

Finding True Altitude:
+1ft for each 1000ft Ind,
for each +1°C above ISA

- **Indicated Altitude**
  - Read directly from the altimeter
  - Shows as MSL after adjusting the altimeter setting
- **Pressure Altitude (PA)**
  - Height above the standard datum plane (29.92”)
  - Used in performance charts
  - PA (ft) = Indicated Alt (ft) + 1000 x (29.92 – Alt Setting)
- **Density Altitude (DA)**
  - Pressure altitude corrected for nonstandard temperatures
  - The altitude the airplane “feels” they are flying
  - DA (ft) = PA (ft) + 120 x (OAT ΔISA °C)







Terminology | Airspeed

- **Indicated Airspeed (IAS)**
  - Speed of an aircraft shown on the airspeed indicator
- **Calibrated Airspeed (CAS)**
  - IAS corrected for installation and instrument errors
- **Equivalent Airspeed (EAS)**
  - CAS corrected for compressible flow for the particular altitude
  - Neglectable below 200kts and 10,000ft
- **True Airspeed (TAS)**
  - Speed at which an aircraft is moving relative to the surrounding air
  - CAS corrected for density altitude
  - The higher altitude, the higher TAS
    - Estimate TAS: Add 2% of IAS per 1000
- **Groundspeed (GS)**
  - Speed of the aircraft in relation to the ground
  - TAS corrected for wind

AIRSPEED CALIBRATION

ALTERNATE STATIC SOURCE

CONDITION:

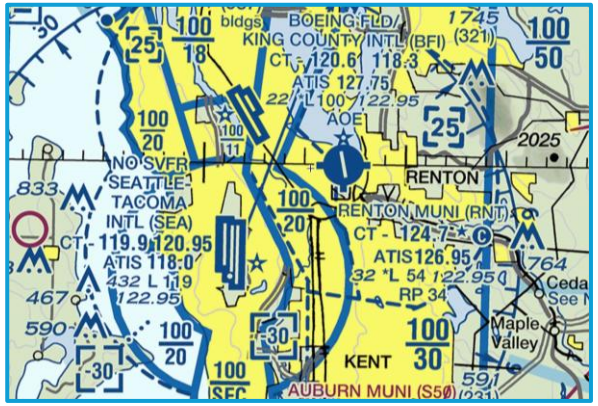
Power required for level flight or maximum power descent.

FLAPS UP												
KIAS	50	60	70	80	90	100	110	120	130	140	150	160
KCAS	56	62	68	76	85	95	105	115	125	134	144	154
FLAPS 10°												
KIAS	40	50	60	70	80	90	100	110	---	---	---	---
KCAS	51	55	60	68	77	86	96	105	---	---	---	---
FLAPS 30°												
KIAS	40	50	60	70	80	85	---	---	---	---	---	---
KCAS	49	54	61	69	78	83	---	---	---	---	---	---

Aeronautical Charts

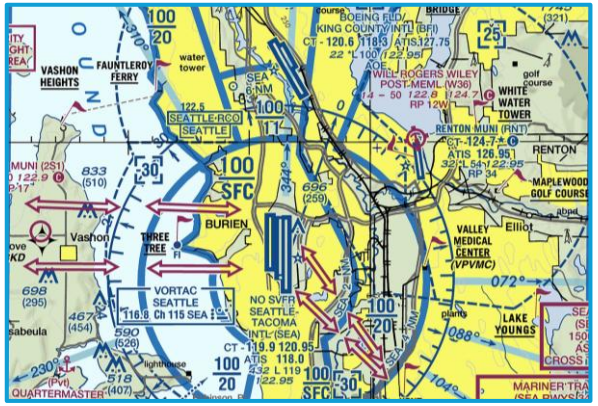
Always use the proper and a current aeronautical chart (check updates out-of-cycle via FDC NOTAM)

Sectional



- **Scale 1:500,000**
- **Most common used**
- Airport data
- Comms data
- Navigation Aids
- Airspace
- Topography
- Revised every 56 days

Terminal Area (TAC)



- **Scale 1:250,000**
- **More detailed**
- **Most Class B airspaces**
- Same data as Sectional
- Revised every 56 days

VFR Flyway Planning

- **Scale 1:250,000**
- **Back of the TAC**
- Guide VFR aircraft on how to avoid congested areas
- Revised every 56 days

VFR Wall Planning

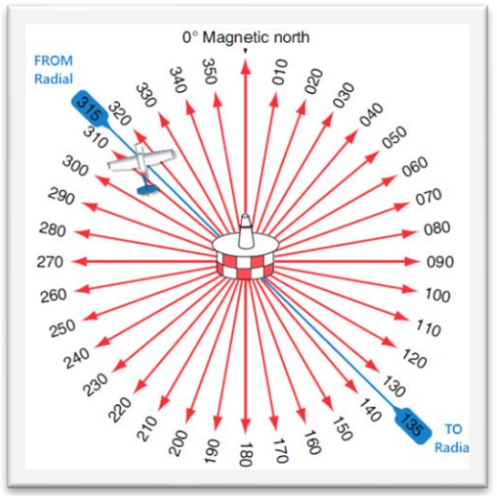
- **Scale 1:3,100,000**
- **Entire continuous US**
- Airport data
- No comms data
- Navigation Aids
- Airspace (special use + class B)
- Topography
- Revised every annually

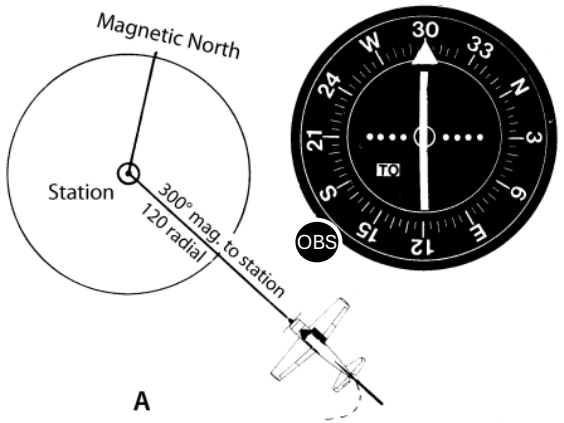
Ground-Based Navigation

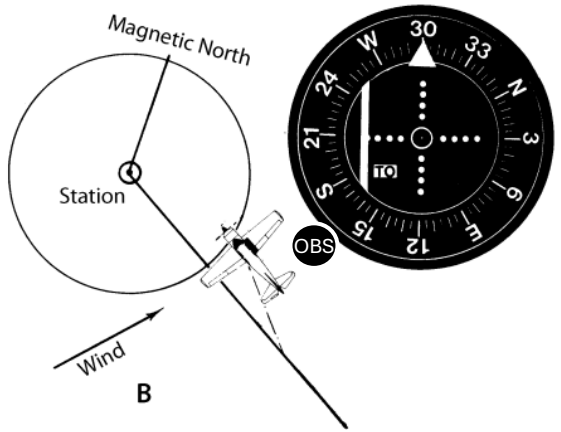
AIM 1-1-3

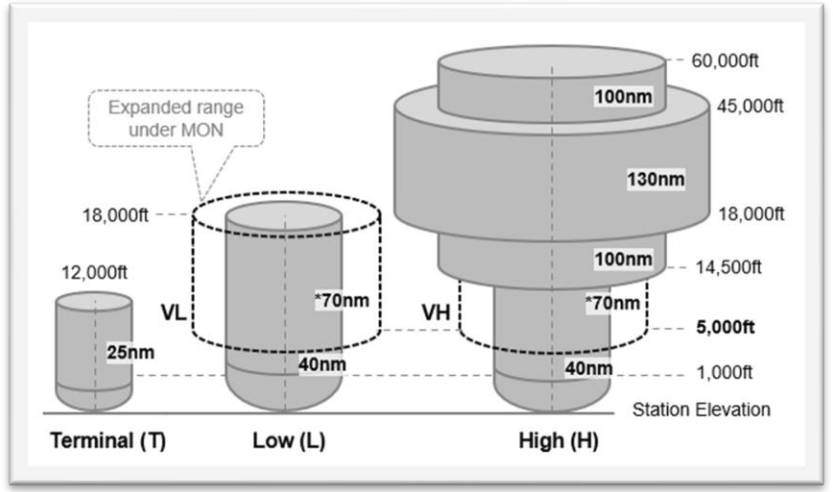
VOR (VHF Omni-Directional Range):

- 3 Classes: Terminal, Low, High ➔ Based on Service Volumes
- Different variations: VOR, VOR/DME (VOR+DME), VORTAC (VOR + TACAN)
- 108.0 to 117.95 MHz *(excl LOC frequencies of 108.10-111.95 w/ odd tents)*
- Limitations: Line-of-Sight, Cone of confusion, Reverse Sensing
- Minimum Operational Network (MON): VOR within 100nm (>5000ft)
- VOR Receiver Check (every 30 days for IFR per §91.171)
  - VOT (360 From), Dual VOR, Ground Checkpoint, Repair Station ➔ ±4°
  - VOR Airborne Checkpoint, Above landmark within 20nm of a VOR (low altitude) ➔ ±6°
  - Record: Date, Error, Place, Signature









Service Volumes expanded under MON

Satellite-Based Navigation

AIM 1-1-17

GNSS (Global Navigation Satellite System) (AIM 1-1-17)

- Types of systems: GPS (US), Galileo (EU), GLONASS (Russia), BeiDou (China)
- GPS: constellation of min 24 satellites (current 31) orbiting earth at 11,000 miles
- Number of satellites required for triangulation: 3 (2D), 4 (3D), 5 (RAIM), 6 (fault exclusion)
- Database: Update every 28 days

Steps:
1. Load waypoints
2. Magenta needle (like a VOR)
3. Moving maps in the MFD

Be careful, GPS will not avoid terrain for you...