NAVIGATION LOG

Aircraft Number	N 14	Notes

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Alt to climb 8

Alt to descend 10

Cruise RPM 14

Check Points (Fixes)	VOR Ident / Freq	Course (Route)	Altitude	Wind Dir. / Vel. / Temp.	CAS / TAS	TC / -L +R WCA	TH / -E +W Var.	MH / ± Dev.	CH	Dist. Leg / Rem.	GS Est. / Act.	Time Off ETE / ATE	ETA / ATA	GPH / Fuel / Rem.
	32				12									14
Departure	32													
	32	3	5	15 15 / 15	13	1 / 16	28 / 2	29 / 30	31	17	16	9		21
T.O.C	32													
	32	3	7	15 15 / 15	14	1 / 16	28 / 2	29 / 30	31	19	16	20		22
4	32													
	32	3	7	15 15 / 15	14	1 / 16	28 / 2	29 / 30	31	19	16	20		22
4	32													
	32	3	7	15 15 / 15	14	1 / 16	28 / 2	29 / 30	31	19	16	20		22
4	32													
	32	3	7	15 15 / 15	14	1 / 16	28 / 2	29 / 30	31	19	16	20		22
4	32													
	32	3	7	15 15 / 15	14	1 / 16	28 / 2	29 / 30	31	19	16	20		22
4	32													
	32	3	7	15 15 / 15	14	1 / 16	28 / 2	29 / 30	31	19	16	20		22
T.O.D	32													
	32	3	6	15 15 / 15	14	1 / 16	28 / 2	29 / 30	31	18	16	11		22
Arrival	32									Totals ▶ 23		24		25

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Flight Plan and Weather Log on Reverse Side

Airport & ATIS Advisories		
Departure		Destination
	ATIS Code	
	Ceiling & Visibility	
	Wind	
	Altimeter	
	Approach	
	Runway	
	Time Check	

Airport Frequencies			
Departure		Destination	
	33		33
ATIS	33	ATIS	33
Gnd	33	Apch	33
Tower	33	Tower	33
Dep	33	Gnd	33
CTAF	33	CTAF	33
FSS	33	FSS	33
UNICOM	33	UNICOM	33
Field Elev.	5	Field Elev.	6

Block In		Log Time
Block Out		

1. Plot and note **True Course** with plotter and sectional chart
2. Note **Magnetic Variation** on sectional chart *(depicted by magenta-dashed "Isogonic" line)*
3. Compute **Magnetic Course** *(True course ± Magnetic Variation)*
4. Identify and plot **Checkpoints** along the route of flight
5. Note departure **Field Elevation** *(found in Chart Supplement)*
6. Note arrival **Traffic Pattern** & **Field elevation** *(found in Chart Supplement)*
7. Select **Cruise alt** Based off magnetic course *(14 CFR 91.159)*
8. Calculate **Altitude to climb** *(Cruise altitude - departure Field elevation)*
9. Calculate **TOC ETE** divide "altitude to climb"(8) by climb rate in POH, cross-verify *time* with T.T.C.
10. Calculate **Altitude to Descend** (cruise alt - arr. Traffic Pattern Alt)
11. Calculate **TOD ETE** divide alt to descend (10) by desired descent rate (500fpm) to get mins
12. Calculate **CLIMBOUT CAS** convert 67KIAS to CAS using POH
13. Calculate **CLIMBOUT TAS** using CAS above and Forecast (daily forecast, prog chart, AWC…)
14. Obtain **Cruise Performance** (TAS, RPM, GPH) using POH Cruise performance chart
15. Copy **Winds aloft** data
16. Calculate **Groundspeed** and WCA Using E6B
17. Calculate **Distance Traveled** Using E6B and plot this point on sectional
18. Calculate **Distance Traveled** Using E6B and plot this point on sectional
19. Measure remaining **distances using plotter** from sectional
20. Calculate **Estimated time en route** using E6B
21. Calculate **Fuel consumed** *at full throttle* AND add ground fuel as per POH (~8.4 GPH in 152)
22. Calculate **Fuel consumed** for each leg given POH *cruise setting* (14)
23. Add up **total distance** - logic-check with plotter
24. Add up **total time** - Logic check with distance and speed
25. Add up **total Fuel** CONSUMED - Logic check with total flight time
26. Note Fuel Reserve *(14 CFR 91.151, HAA SOP, Personal minimum)*
27. Add fuel *CONSUMED* with fuel reserve to get total fuel *to carry*
28. Calculate **True Heading** by adding/subtracting WCA from TC
29. Calculate **Magnetic Heading** by adding/subtracting Mag. Var. from TH
30. Note magnetic **Deviation** from Aircraft compass deviation card
31. Calculate **Compass Heading** by adding/subtracting Deviation from TH
32. Note En-route frequencies to use Ie: Center/app/dept, possible VOR's and radials
33. Note departure and arrival airport Frequencies.
34. Notes: Airport Sketch, TP Directions, Entry Plan, FBO, Lights are available, NOTAMS

Glossary

T.C.	**True Course**	Path over ground compared to TRUE north
M.C.	**Magnetic Course**	Path over ground compared to MAGNETIC north
T.H.	**True Heading**	T.C. with wind correction accounted for
M.H.	**Magnetic Heading**	TH With magnetic compass accounted for
C.H.	**Compass Heading**	This is *THE* heading we fly in the airplane
M.V.	**Magnetic Variation**	The angular difference between True North and Magnetic North.
M.D.	**Magnetic Deviation**	Electrical wires create small magnetic fields which interfere with our compass reading, this error we measure, and call M.D.
W.C.A	**Wind Correction Angle**	The angle we need to turn *into* the wind in order to fly in a straight line. Imagine a boat trying to cross a river flowing quickly
	Field Elevation	Elevation in feet that an airport is above sea level.
T.P.	**Traffic Pattern**	Usually 1,000 ft above our field elevation, however, some older airports are only 800 AGL. refer to chart supplement
	Cruise Altitude	Must comply with 91.159. Pilot can also look at winds aloft, aircraft cruise performance to determine optimum altitude
	Altitude to climb	Cruise altitude - our field elevation = the actual amount of altitude we will climb, example: if we cruise at 6,500, but we
	Altitude to descend	departed from a field elevation of 1,000, we are only climbing an additional 5,500 ft!
E.T.E.	**Estimated Time En-route**	
I.A.S.	**Indicated Air-Speed**	Airspeed read off our airspeed indicator, it's a good indicator, however, it suffers from many errors.
C.A.S.	**Calibrated Air-Speed**	This is IAS corrected for Pitot tube position error. Imagine blowing air through a straw. If we turn the straw, less air enters
T.A.S.	**True Air-Speed**	Speed at which one flies past clouds. This speed corrects for differences in air pressure and temperature
G.S.	**Ground-Speed**	Speed relative to the ground. TAS-wind=groundspeed
R.P.M.	**Rotations Per Hour**	RPM setting is chosen based on fuel economy and sometimes is chosen based on engine age (New engine = lower rpm)
G.P.H.	**Gallons Per Hour**	Obtained from our POH cruise section. This tells us *at* a given RPM setting & altitude, what will our fuel burn rate be
T.T.	**Totaling Up**	Always "logic-check" our total numbers. Also cross-verify with a forflight or skyvector calculation… etc…
	Fuel Consumed	Always ask, Do these numbers make sense? Verify numbers approximately with calculator / Foreflight / Skyvector.
	Fuel Reserve	Fuel actually burnt.
	Fuel to Carry	Fuel we want to NOT burn, but will still carry in case of an EMERGENCY, also personal minimums, alternate fuel, etc…
		Fuel we will actually burn + fuel reserve

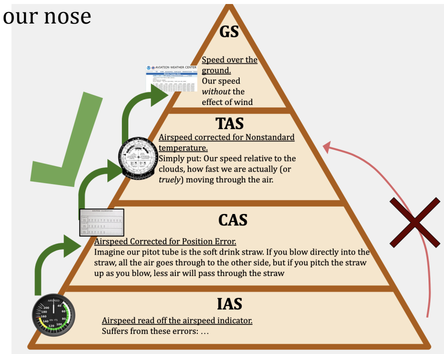
F.A.Q. & Basic Concepts

Course v.s. Heading?

Course is what we would *like* to fly over the ground, Heading is where our nose needs to point *in order to* achieve a specific course over the ground

IAS v.s. CAS v.s. TAS v.s. GS?

Remember our Speed Pyramid:



<u>Note:</u> Airspeed calculations *depend* on those below

Refer to [THIS ARTICLE](#) for greater explanation

How do we calculate TAS in the *future*?

To calculate TAS we need Pressure Altitude and temperature, we use weather <u>forecasts</u> like winds/temperature aloft forecasts, Foreflight "DAILY" forecasts, Prog charts, and AWC forecasts

How does one choose checkpoints?

Checkpoints should be within a *reasonable* distance from one another, and a *reasonable* distance from the centerline of our course. -- "*reasonable"* depends: low visibility? Then pick things closer together. A good ballpark average (usually pretty good distance) is at most 15NM, however practically speaking, points will almost always be a bit more or a bit less than this.

How does one determine ETE to TOC & from TOD?

Since we are *climbing* to our "T.O.C" point, we *reach* this point only when we arrive on our altitude. So our first step to determine where our TOC is, is to determine how *long* it will take us to climb to altitude. Then, when we know how long it will take us to climb up to altitude, we can find our ground-speed during this time, and we can use our speed and time to determine how far we will fly; thus giving us a distance we can plot on our sectional as our TOC *point*.

How does one determine Full Throttle Fuel burn rate (GPH)?

During our first leg of our nav log, we will be climbing out (to our TOC of course). Whilst climbing out, we will have our nose up and our throttle full. During this time, we will not be burning the same amount of fuel as in cruise (when we *reduce RPM and lean*). So, We need to find the rate at which we burn fuel *during* this high power time. Before we calculate, logically, we know when we climb at *full* throttle, our fuel burn rate would be *higher* than at cruise. If that is unclear, a review of engine system is in order (PHAK ch 7).