Flight Computer Calculations

Flight Computers

- Paper/Metal flight computers have been used for decades in aviation to perform all sorts of calculations.
- In recent year, electronic calculators have surfaced, such as the CX-3.
- It can be a great asset when you know how to use it properly.
- Examples of calculations are time/distance/speed, fuel burn, density altitude, conversions (NM/SM/km, gallon/liter/imp gallon, TAS/CAS), wind correction angle, ground speed, etc…

CX-3 Modes

- The CX-3 has 5 modes available:
  - **FLT**: The "E6B" mode. Conversion, Altitude, Cloud Base, Wind Correction, etc…
  - **PLAN**: Cross Country Planning
  - **TIMER**: Stopwatch, timer.
  - **CALC**: Basic Calculator
  - **W/B**: Weight and Balance Calculations

FLT Mode

Conversions

FLT > Unit Conversions

- Distance
- Speed
- Duration
- Temperature
- Pressure
- Volume
- Rate

Practice

- Convert 120 NM to SM.
- Convert 236 km to SM.
- Convert 522 mph to knots.
- Convert 4.2 hours into minutes.
- Convert 264 minutes into hours (10-base)
- Convert 55 liters to US Gallons.
- How much does 46 gallons on AvGas weigh? (FLT > Fuel)

Pressure/Density Altitude Calculations

FLT > Altitude

- Density altitude is the Pressure Altitude converted for non-standard temperature.
- If you know the airport elevation and the altimeter setting, you can calculate Pressure Altitude
- If you know the Pressure Altitude and the outside temperature, you can calculate the Density Altitude.

Practice

- What is the standard temperature at 5000 feet? (FLT > Standard Atm)
- If Airport is at 2400 feet and Pressure = 28.74 and OAT = -5°F, what is the Density Altitude?
- If PA = 8000 feet and OAT = 15°C, what is Density Altitude?

True/Calibrated Airspeed (TAS/CAS)

FLT > Airspeed

- True Airspeed is the Calibrated Airspeed corrected for altitude and non-standard temperatures.
- At sea level on a standard day: CAS = TAS.

Practice

- Flying at 11,000 feet, OAT is -15°C, what is TAS if CAS = 138 kt.

Speed/Distance/Time

FLT > Ground Speed

- The CX-3 can solve speed/distance/time problems, assuming two of the three variables are available.

$$\text{Speed} = \frac{\text{distance}}{\text{time}}$$

Practice

- If you traveled for 1h25min and covered 162 NM, what was your ground speed?
- How long does it take to fly 70NM at 135 kt.
- How far will the aircraft travel in 7.5 min with a GS of 114 kt?

Fuel Calculations

FLT > Fuel

- The E6B can solve fuel consumption problems, similarly to speed/distance/time.

$$\text{Fuel Flow} = \frac{\text{fuel burnt}}{\text{time}}$$

Practice

- If you flew for 1h35min and burnt 19 gallons, what was your fuel flow?
- If your fuel flow is 9 gph, how many gallons would you burn in 13min?

Wind Correction Angle

FLT > Wind Correction

During cross-country flight, we must correct for the effect of wind.

- ✓ Ground speed is the True Airspeed (TAS) corrected for wind speed.
- ✓ The wind direction will affect the number of degrees of correction needed to get to destination: Wind Correction Angle (WCA).

Practice

- True Course = 090°
- True Airspeed = 128 kts
- Wind 210° @ 15 knots
- What is the Wind Correction Angle?
- What is the Ground Speed?

Things the E6B doesn't do!

- Cloud base calculation (FLT > Cloud Base)
- Wind Component (FLT > Wind Component)

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Next up...

Planning a Cross Country