

Aircraft Ownership - The REAL Cost



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Introduction

- Why do I track costs so closely? I ❤️ to fly my plane.
A 💰 surprise would take away the joy.
Anticipating the costs up front brings comfort.
- Quotes
 - “How to make a small fortune in aviation? Start out with a large one.”
 - “You cannot justify an airplane; you can only account for it.”
 - “Mom, when I grow up, I want to be a pilot.”
She said, "You can't do both."
- Focus is on ASEL GA piston aircraft
- Dollar amounts are broad estimates
 - Cessna 172 costs shown – IMPORTANT: not adjusted for inflation
 - Many planes cost more
 - Every plane’s situation is different
- The viewer is solely responsible for choices
 - FAR 91.3 applies



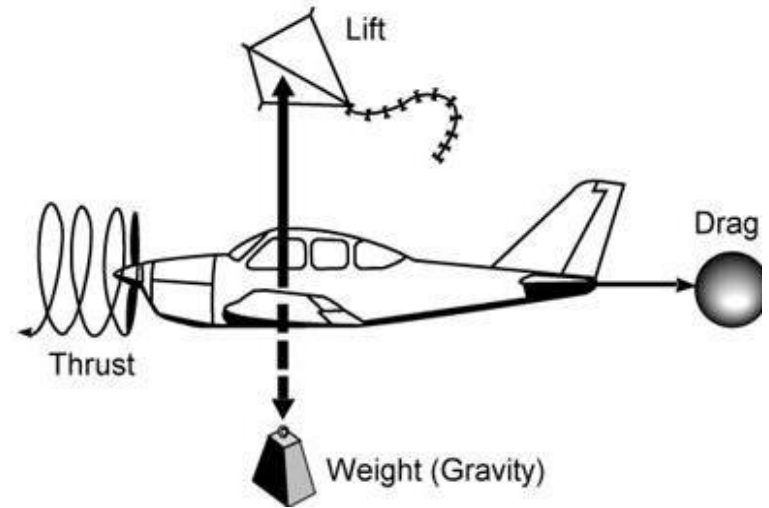
Agenda

- 6 forces of flight
- Rent vs. buy
- Mission
- Ownership – solo, partner, leaseback
- Business choices
- Before you buy
- Time based expenses
- Ballpark costs
- C172 example over 37 years



6 Forces of Flight

1. Lift
2. Thrust
3. Drag
4. Gravity
5. Funding
6. “Management” Support



Without the #5 and #6, #3 and #4 prevail



Full disclosure at home is always best



Rent vs. Buy

- Rent if you fly <50 hours per year
 - Pro
 - Lower total cost
 - Low up-front cost
 - Insulation from large cost surprises
 - Selection of aircraft
 - Aircraft availability
 - Easy walk away
 - Con
 - Higher hourly cost
 - Quality inconsistent
 - No control over equipage or upgrades
 - Time constraints
 - Scheduling conflicts



Rent vs. Buy

- Buy if you fly >100 hours per year
 - Pro
 - Lower hourly cost overall (generally)
 - Quality consistently higher - if you so choose
 - Control over equipage, upgrades
 - No time constraints
 - Aircraft availability
 - Con
 - Higher total cost until sold
 - High up-front cost
 - Large cost surprises
 - Only one aircraft selection
 - Difficult walk away



Ownership

- Solo
 - Simplest of all arrangements
 - One named insured pilot
 - Select based on
 - Mission
 - Skill set
 - Financial capability
 - Spousal support



Ownership

- Partners
 - More complex arrangement
 - Several named insured pilots
 - Select based on
 - Compatibility plus solo characteristics
 - Mission
 - Skill set
 - Financial
 - Spousal support
 - Personal chemistry compatibility
 - Partner's family is part of the compatibility test, too
 - Integrity
 - Based location



Ownership

- Partners
 - Partnership management – Getting in
 - Treat as a business
 - Reasonable partner count
 - Use professional guidance to establish **contract**, LLC
 - LLC does not provide as much protection as you might think
 - Scheduling mechanism with conflict resolution terms



Ownership

- Partners
 - Partnership management – Running it
 - Roles of each partner
 - Accountant, billing agent, maintenance manager, legal administrator, etc.
 - Approach to maintenance
 - Except for cosmetics, fix things immediately.
 - Everything works. No compromise.
 - Maintain so it flies to book numbers, hands off.
 - Make it a plane you are confident in.
 - And better than a rental.
 - Determine rate
 - Include option for non-based fuel purchases
 - Understand expected costs
 - Think holistically
 - Include a reserve for engine overhaul and upgrades



Ownership

- Partners
 - Partnership management – Big decisions
 - Upgrade fee assessment mechanism
 - Aircraft change plan
 - Partner exit plan
 - Divestiture plan



Ownership

- Lease back
 - Most complex arrangement
 - Undetermined insured pilots
 - 100-hour inspections mandatory (plus annuals)
 - Partnership management guidelines plus...
 - Aircraft selection
 - Best with popular model
 - Less popular models = fewer qualified pilots
 - TAA, tailwheel, vintage, MEL, etc.



Ownership

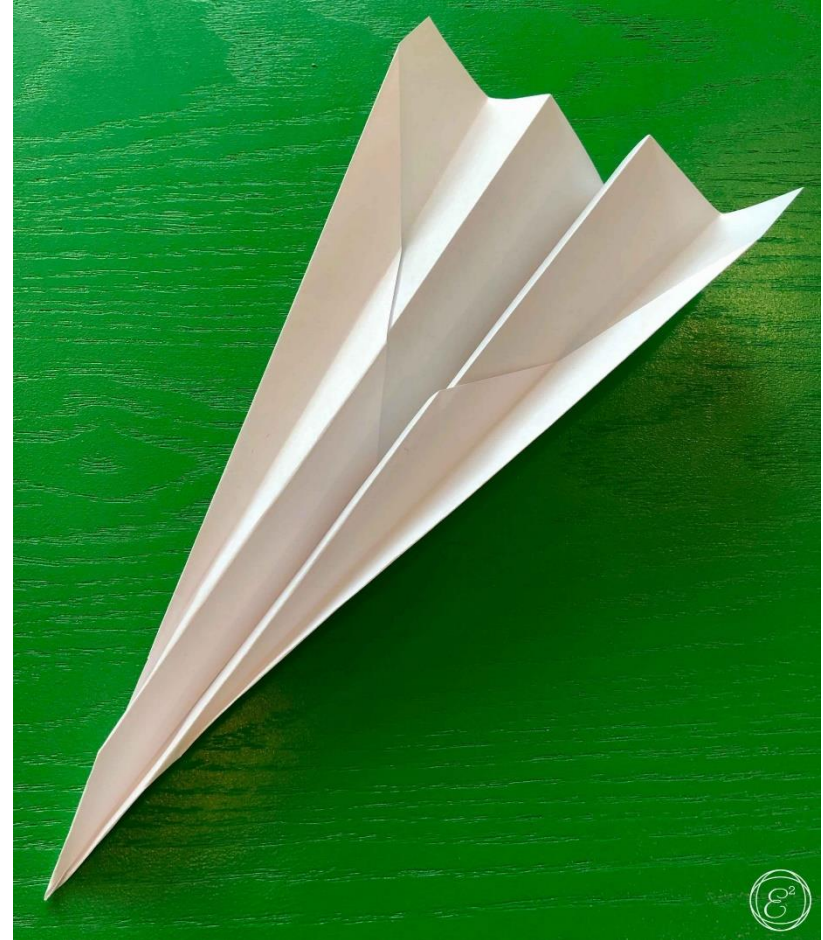
- Lease back
 - Positive
 - **MAY** breakeven or earn profit
 - Negative
 - Breakeven or profit **uncertain**
 - All the cost disadvantages of aircraft ownership
 - Out of service months/years costs you
 - Parts supply chain
 - A&P availability
 - Mandatory service when others need it at the same time
 - All the disadvantages of a partnership
 - Higher insurance
 - Depends on competency of the club management & billing
 - **Aircraft will get torn up**
 - Think long and hard before entering a lease back



The Perfect Airplane

- Beautiful
- Fast
- Great useful load
- Long range
- Plenty of seats
- All weather capable
- Easy to fly
- Sips fuel
- Low cost
- Low maintenance

- You cannot have all of these
- Look for the best compromise



Understand Your Mission

Have a Clear Flight Plan



- Buy for the most common use case, not the rare case – rent the rare case
- Buy IFR if IFR is even remotely in the plan
- Lower total cost to buy aircraft equipped as desired than creating it from a project. Let someone else pay the new equipment price.
- Train in the model before purchasing it.
- Double speed = square the horsepower, cube the dollars



IFR

ESTIMATED ACTIVE AIRMEN CERTIFICATES HELD AS OF DECEMBER 31

	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Student	119,946	120,285	120,546	122,729	128,501	149,121	167,804	197,665	222,629	250,197
Recreational	218	238	220	190	175	153	144	127	105	85
Sport	4,493	4,824	5,157	5,482	5,889	6,097	6,246	6,467	6,643	6,801
Private, Airplane	188,001	180,214	174,883	170,718	162,313	162,455	163,695	161,105	160,860	161,459
Commercial, Airplane	116,400	108,206	104,322	101,164	96,081	98,161	99,880	100,863	103,879	104,610
ATP	145,590	149,824	152,933	154,730	157,894	159,825	162,145	164,947	164,193	163,934
Rotorcraft (only)	15,126	15,114	15,511	15,566	15,518	15,355	15,033	14,248	13,629	13,191
Glider (only)	20,802	20,381	19,927	19,460	17,991	18,139	18,370	19,143	19,753	20,328
Total Pilots	610,576	599,086	593,499	590,039	584,362	609,306	633,317	664,565	691,691	720,605
Total Non-Student Pilots	490,630	478,801	472,953	467,310	455,861	460,185	465,513	466,900	469,062	470,408
All airplane: no Student, Glider (only), Rotorcraft (only), Remote	454,702	443,306	437,515	432,284	422,352	426,691	432,110	433,509	435,680	436,889
CFI	98,328	98,842	100,993	102,628	104,382	106,692	108,564	113,445	117,558	121,270
Instrument Rating	311,952	307,120	306,066	304,329	302,572	306,652	311,017	314,168	316,651	317,169
Remote	N/A	N/A	N/A	N/A	20,362	69,166	106,321	160,302	206,322	254,587
Instrument Rating %	69%	69%	70%	70%	72%	72%	72%	72%	73%	73%

Student licenses include inactive with current medical. They no longer expire as of 4/2016.

- 73% of active airplane pilots have an Instrument Rating (2021)
- 317,169 IFR out of 436,889 total airplane pilots (less Student, Glider, Rotorcraft, Remote)
- Based on analysis by Doug Tilghman, CPA mag, 3/2023



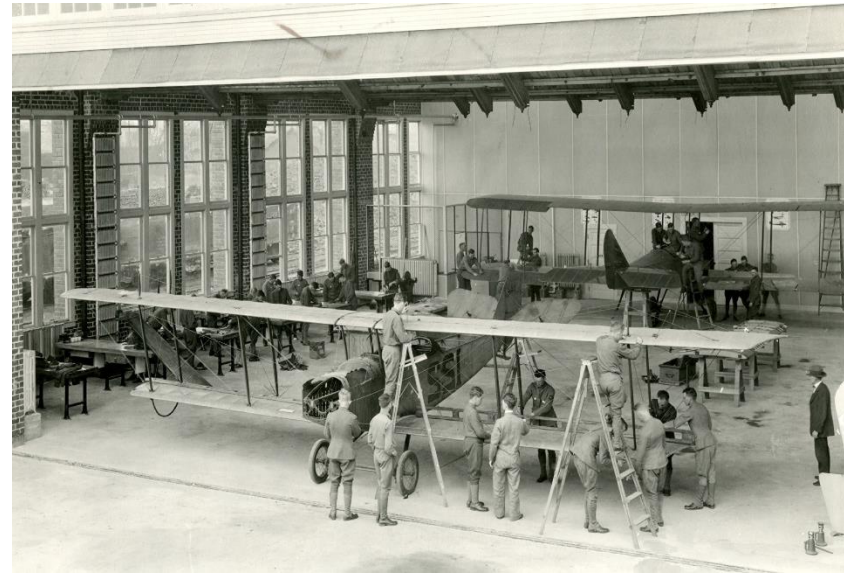
Business choices

- Choose a home base
 - Convenience
 - IAPs
 - Secure access
 - Services
 - Hours of operation
 - Runway plowing
 - Pull out, put away tug included with hangar rent, or not
 - Cautious about community hangar – hangar rash
 - Get on hangar list right away – even if you are not ready
 - Chose tiedown/hangar
 - Planes are rarely watertight on the ramp
 - Ex: 3x avionics problems as a result - \$2K + challenging relationship



Business choices

- Chose a maintenance shop
 - Chemistry
 - Integrity
 - Ex: Fuel tank straps - 1999
 - Ex: Hail damage estimate - 2003
 - Ex: Garmin 530W price - 2008
 - Multiple A&P/AIs
 - Permits/encourages owner assisted annuals
 - Knows how to shop using Trade-A-Plane, other atypical sources
 - They need you. But you need them more
 - Will never be perfect – Foster the relationship
 - Forgive (but don't forget) faux pas
 - Move toward resolution instead



Before You Buy

- Get trusted advice
- Type club
- Prebuy inspection using your trusted mechanic is a must
 - A&P paid by you
- “Fresh” annual or “fresh” overhaul may not very good
- Research AD list
- Logbook review by knowledgeable A&P
- FAA files – Registration, 337s, etc.
- Title search for liens



Before You Buy

- Broken equipment
- Missing or swapped components
- Cosmetics
- Understand TBO, overhaul, IRAN definitions
- Set aside many \$K for known costs
- Set aside 25% more for unexpected maintenance
- Variable costs may be 25% of total cost for 100 hours a year
- Accept that some enhancements have a shelf life
 - Ex: 1992 -> 2008 Loran
 - Ex: non-GPS based avionics stack
 - Ex: 6 pack instruments for hard IFR



Time based expenses

- Registration – Fed – 7 years
- Registration/tax/property tax – annual
- Tiedown/hangar – monthly
- Insurance – annual
- Annual inspection – annual
- 100-hour inspection – rental/commercial service
- ELT – 24 months
- IFR certification – 24 months
- Magneto 500-hour inspection (often replacement)
- Battery 3-6 years
- Clock battery – 5 years
 - Difficult to get to in some installations
- Battery for glass panel – TBD
- Others



Ballpark costs (or more)

- Administrative
 - Registration – Fed - \$5
 - Registration – OH - \$60. Some states: based on % of value
 - Insurance \$1K-\$2K/year
 - more for low time, retractable, TAA, etc
- Home base
 - TieDown \$1K/year
 - Hangar - \$3K-\$5K/year
 - On the road – up to \$75
- Plane maintenance
 - Annual inspection \$1K-\$2K
 - IFR certification - \$250 & up
- Airframe
 - Paint & windows \$15K-\$25K
 - Exterior or interior plastic \$1K-\$5K each
 - CS prop overhaul \$10K
 - Tire - \$250 & up each
 - Brakes \$500



Ballpark costs (or more)

- Engine

- Engine overhaul \$22K-\$40K
- Engine upgrade – O-320->O-360 - \$42K
- Engine heater \$200-\$1K
- Magneto (2) \$2K – overhaul is nearly the new cost
- Battery \$500-\$1K 24v



- Avionics

- Autopilot, G5 (x2), nav/com, transponder w/ ADS-B (v2) \$30-\$40K
- ADS-B \$2K-\$10K
- IFR GPS \$8K-\$25K
- IFR GPS database \$300-\$1K/year

- Cabin

- Interior \$8K-\$25K
- Gyro instruments (3) \$2K

- Personal extras

- ANR headsets \$650-\$1K each
- Tablets & mounts \$500-\$1K
- Aviation map apps free to \$350/yr
- Sporty's catalog ! \$ undefined



C172 Cost



Extra Expenses in 37 years

- Engine

- Lifters - \$1.5K - 2004
- Engine overhaul – 160 HP - \$12K -1990
- Engine upgrade – 180 HP - \$33K - 2005
- Engine replacement - \$36K - 2020
- SkyTec starter – (2x) - \$500 - 2016
- Alternator - \$1K - 2019
- EZ-heat oil pan heater - \$200 - 2020
- Vacuum pump (3x) - \$400
- Standby vacuum - \$400 - 1988
- Carb overhaul - \$800
- Mags - \$2.2K
- Cowl mounts (many) - \$25 each
- Muffler (4x) – muffler with flame tubes didn't last - \$1K
- Vacuum system removal - \$700 - 2019
- Hoses, engine mounts, contactors, primer, etc. - \$misc.



Extra Expenses in 37 years

- Airframe
 - Most exterior plastic before painting - \$1K - 1998
 - Windscreen and all glass - \$4K - 1998
 - Paint (2x) - \$11K-\$15K - 1998, 2005
 - Hail repair – 1 year downtime - \$20K - 2005
 - Fuel tanks - \$4K each - 2017
 - Shimmy dampener - \$800 - 2008
 - Spinner bulkhead - \$500
 - Landing lights & bulbs – many - \$misc.
 - Regulator – 3x in one year - \$60 each - 1986
 - Seat tracks, rail housings - \$3K - 1990, 2011, 2022
 - Yolk bushings \$ 300
 - Instrument panel mounts - \$500
 - Pitot static - \$700
 - Tires and brakes – lots - \$250 each
 - Flap, aileron gap seals - \$1K - 1989



Extra Expenses in 37 years

- Cockpit
 - Instruments – many times - \$1.5-\$2K
 - Altimeter \$1K - 2023
 - Fuel instruments - \$1.5K - 2005
 - Interior - \$7K - 2003
 - Rosen visors - \$250 - 1993
 - Interior plastic repair - \$500-\$3K - 1998
- Avionics
 - Headsets (many) - \$650 each
 - PulseLight - \$400 - 1998
 - Loran - \$2K - 1991, 2003
 - StormScope - \$4K - 1992
 - IFR GPS & audio panel - \$19K - 2008
 - Altitude encoder – 2X - \$500
 - ADS-B (978) - \$7K - 2014
 - G5 pair - \$9K - 2019
 - Autopilot \$12K - 2019
 - Nav/Com - (existing CDI) - \$5K - 2019
 - ADS-B 1090 transponder - \$7K - 2019



C 172 cost summary

- Recent years ~100-150 hours per year
 - \$5K hangar
 - \$2K insurance – simple plane, IFR pilot, high time
 - Increasing as plane value increases
 - Increasing with age over a magic number
 - \$6K fuel – throttle back when appropriate
 - \$2.5K annual inspection – sometimes more
 - \$Big surprise maintenance (several)
- 37 years
 - Plane purchase was 2% of 37 year total cost
 - Planning figure \$1K-\$2K/month plus surprises
- 37 years total cost per hour - no inflation adjustment 1985->2023
 - Tach time = ~85% of hobbs time
 - \$144/\$122 per tach/hobbs hour
 - Assuming a reasonable selling price
 - \$92/\$78 per tach/hobbs hour



The joy of flying is worth it



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