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Private Pilot Ground School
Massachusetts Institute of Technology
IAP 2019

Aircraft Ownership and
Maintenance



Buy versus Rent

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Fixed costs of four-seat airplane:

- hangar (\$800 per month) or tie-down (\$150) at Hanscom
- insurance (\$2,000 to \$10,000 per year)
- annual inspection (\$3,000-5,000)
- cost of capital (3 percent times \$100,000?)
- Depreciation (\$10,000 to \$30,000)

Total of at least \$20,000 per year? That's \$200/hour at 100 hours per year. Compare to [flight school rental rates](#).



Owning makes sense...

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- fly 200+ hours per year,
- fly away every weekend and let the plane sit (flight school typically charges 3 hours/day minimum), *or*
- want a pristine airplane and can find a couple of partners

Now you're the **operator** as well as the **pilot**.

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Part 91 Subpart E – Maintenance, Preventative Maintenance, and Alterations

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Owner/Operator is Responsible

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- “The owner or operator of an aircraft is primarily responsible for maintaining that aircraft in an **airworthy** condition” (91.403)
- 91.405: “Each owner or operator of an aircraft
 - “Shall have that aircraft inspected...”
 - “Shall ensure that maintenance personnel make appropriate entries in the aircraft maintenance records...”
 - Must fix or placard INOP anything broken

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91.213 - Inoperative Equipment

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- For small airplanes:
 - Pilot may placard inoperative equipment if it is not part of minimum required equipment



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91.407 - Operation After Maintenance

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- Work must be properly signed off and approved
- If flight characteristics may have changed, must be flight tested by at least a private pilot with no passengers onboard
 - Make a log entry in the maintenance records

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91.409 - Inspections

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- Annual Inspection required in preceding 12 calendar months
- 100 hour inspection required if aircraft used commercially (including for instruction), but jets typically have their own schedule from the manufacturer

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91.413 - Transponder Inspection

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- Must have been inspected within preceding 24 calendar months to be used

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91.207 - Emergency Locator Transmitters

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- Civil **airplane** must have one with some exceptions (e.g., air carrier, single-seaters, local trainers)
- Batteries must be replaced if:
 - Cumulative use > 1 hour
 - 50 % of useful life has expired
- Must be inspected each 12 months



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91.417 - Maintenance Records

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- Must keep records of maintenance on aircraft, engines, propellers, and appliances

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14 CFR Part 39

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- Airworthiness Directives
 - Mandatory regulations to address unsafe conditions in aircraft, engines, propellers, and appliances
 - Part of the CFR, but not codified
 - Published in the Federal Register (and FAA website)
 - Distributed to appropriate people by FAA
 - **Some AD's allow limited continued flight**

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Airworthiness Directive



AIRWORTHINESS DIRECTIVE

www.faa.gov/aircraft/safety/alerts/
www.gpoaccess.gov/ir/advanced.html

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2008-14-13 Cirrus Design Corporation: Amendment 39-15608; Docket No. FAA-2007-28245; Directorate Identifier 2007-CE-047-AD.

Effective Date
(a) This AD becomes effective on August 14, 2008.

Affected ADs
(b) None.

Applicability
(c) This AD applies to the following airplane models and serial numbers that are certificated in any category:


Models	Serial Nos.
SR20	1423 through 1906.
SR22	0795 and 0820 through 2912.

Unsafe Condition
(d) This AD results from two known occurrences of in-flight cabin door separation (one total separation and one retained by the door strut). We are issuing this AD to prevent in-flight failure of the cabin door, which could result in door separation from the airplane.


Compliance
(e) Unless already done, within the next 50 hours time-in-service (TIS) after August 14, 2008 (the effective date of this AD) or within 180 days after August 14, 2008 (the effective date of this AD), whichever occurs first, following Cirrus Design Corporation Service Bulletin SB 2X-52-07 R4, dated January 24, 2008, do one of the following:
(1) If threaded sleeve is installed at the cabin door rod end, install cabin door rod end Kit 70186-004.
(2) If threaded sleeve is not installed at the cabin door rod end, install cabin door rod end Kit 70186-005.

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14 CFR Part 43


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- **Maintenance**
 - Mostly applies to mechanics, but pilots need to be familiar
 - Appendix A section (c) lists 31 preventive maintenance items pilot is allowed to perform
 - (1) Removal, installation, and repair of landing gear tires.
 - (2) Replacing elastic shock absorber cords on landing gear.
 - (3) Servicing landing gear shock struts by adding oil, air, or both.
 - (4) Servicing landing gear wheel bearings, such as cleaning and greasing.
 - (5) Replacing defective safety wiring or cotter keys.
 - ...

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Pilot Preventive Maintenance Requirements

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- Allowed by 14 CFR 43.7
- Must be owner or operator (pilot)
 - No student pilots
 - Not on charter or air carrier aircraft
- Must sign off action in A/C logbook
 - Description, date, signature, cert. number, and kind of cert.



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Too much work?

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- Purchase an airplane and cooperate with a flight school on a “leaseback”
- Depreciation goes to the owner (new tax law: 100% of cost can be written off in first year)
- Flight school becomes the “operator” and will handle maintenance

This is why you can rent a \$700,000 Cirrus SR22 for \$350 per hour.

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Too little work?

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- Build aircraft (at least 50 percent) and then you can work on it yourself.
- The American Way:
 - Pilot forms an LLC with a professional builder; the LLC is the “person” who builds 50 percent or more; pilot buys out builder when the plane is complete
 - Pilot goes to factory for “factory-assist” build, bringing 20 different outfits to wear during one week
- Experimentals cannot be used commercially, e.g., by a flight school, and are placarded heavily
- Classically the high performance comes from less redundant structure and less forgiving handling

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Renter pilots are still responsible

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- Ensure aircraft is airworthy
- Ensure proper documents are on board (A.R.O.W.):
 - **A**irworthiness certificate
 - **R**egistration
 - **O**perating limitations (“owner’s manual”)
 - **W**eight and balance
- Report accidents

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MIT
AEROASTRO

91.3 - Responsibility and Authority of PIC

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- Pilot in command is directly **responsible** for, and is the **final authority** as to, the operation of the aircraft
- Allowed to deviate from rules in an emergency
- Report deviation *if requested to*

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MIT
AEROASTRO

91.7 - Airworthiness

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- Aircraft must be airworthy to be flown
- Pilot is responsible for making sure that it is, and for discontinuing flight if no longer airworthy

You can reasonably rely on the flight school for doing the 100-hour or progressive inspections. But abort the mission if you see something broken during preflight!

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91.203 - Certifications Required

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- Airworthiness Certificate
 - Must be displayed at entrance and legible for passengers and crew
- Registration Certificate

UNITED STATES OF AMERICA DEPARTMENT OF TRANSPORTATION—FEDERAL AVIATION ADMINISTRATION STANDARD AIRWORTHINESS CERTIFICATE			
1. NATIONALITY AND REGISTRATION MARKS	2. MANUFACTURER AND MODEL	3. AIRCRAFT SERIAL NUMBER	4. CATEGORY
N2631A	PIPER PA-22-135	22-903	NORMAL
5. AUTHORITY AND BASIS FOR ISSUANCE This airworthiness certificate is issued pursuant to the Federal Aviation Act of 1958 and certifies that, as of the date of issuance, the aircraft to which issued has been inspected and found to conform to the type certificate therefor, to be in condition for safe operation, and has been shown to meet the requirements of the applicable compliance and identified airworthiness code as provided by Annex 8 to the Convention on International Civil Aviation, except as noted herein. EXEMPTION: NONE			
6. TERMS AND CONDITIONS Unless noted, suspensions, suspensions, revivals or a termination date is otherwise established by the Administrator, this airworthiness certificate is effective as long as the maintenance, preventative maintenance, and alterations are performed in accordance with PART 43, SECT. 43 of the Federal Aviation Regulations, as appropriate, and the aircraft is registered in the United States.			
DATE OF ISSUANCE	FAA REPRESENTATIVE	DESIGNATION NUMBER	
08-10-95	MARION W. WILLIAMS	SW-FSDO-OKC	
ANY REVISION, MODIFICATION, OR FRAUD OF THIS CERTIFICATE MAY BE PENALIZED BY THE FEDERAL AVIATION ADMINISTRATION UP TO 5 YEARS OF IMPRISONMENT AND/OR \$50,000 FINE. THIS CERTIFICATE MUST BE DISPLAYED IN THE AIRCRAFT IN ACCORDANCE WITH APPLICABLE FEDERAL AVIATION REGULATIONS.			
FAA Form 8100-2 (8-82) GPO: 892-894			

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Start Shopping

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- Controller.com (jets, turboprops, Cirrus)
- Trade-A-Plane (\$25,000 Cessnas and Pipers)
- Barnstormers.com (homebuilt)

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Questions?

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