



Things to keep in mind when searching for an airplane.

Airframe:

This is the only component that can't really be replaced (such as the engine or prop) so during the prebuy time will be spent looking for corrosion and non reported non documented damage. Some damage is technically ok as long it has been properly repaired and documented. Non reported damage is normally safe but can lead to discounts when purchasing the craft.

Engine: The second most expensive thing on the airplane and MOST important.

A little bit about engines: There are a couple terms to understand when reading these ads.

- **New**; this term is recognized by the FAA as an engine that have never been run. All parts are new and it's built by the engine manufacturer.
- **Rebuilt**; this term is recognized by the FAA and represents an engine that has been reassembled using parts that are new or within wear limits of a new part. So basically the old engine is dismantled, parts are measured and if they measure to the tolerance of a new part they are reused. *Important * only a engine manufacturer such as Continental or Lycoming can 'rebuild' a engine. The total time of this engine after rebuild will be '0' and will come with a new logbook and the engine manufacture will take back all the old logs.
- **Overhaul**; this is the last of the 3 terms recognized by the FAA. This term means an engine that has been dismantled and all parts measured for a wear limit range. As long as the part fits inside this range the part is considered airworthy and can be reused. An A&P mechanic can perform this 'overhaul' and return the engine to service as well as a FAA Certified Repair Facility. The logbooks and total time of the engine will continue after a standard overhaul.

Unlike a new or rebuild engine the total time does not reset to '0'

Now there are other terms such as TOP Overhaul, engine claimed to be 'rebuilt' by an A&P or an engine shop- these are not proper terms and probably fall into the category of a standard 'overhaul'

An engine can be overhauled a lot of times and have a high total engine time (TTE). This is not really desirable because when the engine manufacture rebuilds the engine it comes with all the new engine engineering (new lifters, rockers, ...) Plus it's been overhauled by regular mechanics and not a factory that overhauls engines solely.

1. **TT** - This means the 'total time' of the engine since new or rebuilt.
2. **TTE**- Total Time Engine or Engine total time (ETT)
3. **TSMOH** - Time or hours on the engine since major overhaul.

4. **TSTOH** - Time since top overhaul (this again is not really recognized and means normally the cylinders were all replaced.- engine total time still continues)
5. **TSN**- Time since new (or rebuilt)
6. **AFTT** - This means Airframe Total Time (normally when you see the TSMOH or TTE it means the engine is the original from the date of manufacture of the aircraft)
7. **TBO**- Time between overhaul (Or before overhaul) - The time the manufacture says the engine can run until it should be overhauled.

Considerations for finding a good engine

Disclaimer - Engines will all fail at some point. They turn over a finite amount of revolutions and will fail at a weak point. These are air cooled engines with huge temperature ranges that require small adjustments slowly. A car engine by comparison is water cooled and can be made to stay within 4 degrees of a temperature at all times even while developing horsepower. Aircraft engines can fail anytime so we look for parameters to minimize this risk. The best option is to buy a run out engine and install a new one taking care of it from day one. This is not feasible for most. We can only do so much to identify problems that lead to failures. Here are some of the considerations.

1. Any engine that has not been overhauled in the last 15 years.
After 10 years the price starts coming down. 15 years since overhaul would be my limit. I'm pretty sure all the major engine manufactures recommend 8 years time between overhauls.
2. Any gap more than 1 year of not running the engine (unless properly pickled)
Engines need oil. Not running the engine for a year will dry out the internals and lead to premature wear. The cylinder walls and piston rings will suffer first. Lower compressions and then excessive oil consumption will show the cylinders needing piston rings, cylinder honed, and valve guides and valves. The worst thing is when the buyer says he pulls the plane out every month or year and runs it up for a while. This leads to oil making acid which will eat all the bearings. (water boils off the engine at 180F and the oil wont get this hot unless its flown. It will actually cause MORE water to mix into the oil reacting with the carbon deposits from combustion creating acid)
3. Any engine that doesn't fly at least 50 hours per year. (unless its been properly pickled)
Take the engine TSMOH and divide by the years since overhaul.
4. Any engine at 'mid time' (say 800 to 1200hrs SMOH) will most likely need the cylinders repaired. Not a big deal just a consideration. Normally the valves, valve guides, rings and cylinder should be serviced.
(4-8K depending on the engine)
5. Low cylinder compressions. Every 100 hours or annually compressions on the cylinders are measured for indications of wear on the valve seats and piston rings. Lower compression mean more wear. Looking back a couple years and comparing compressions usually reveal trends. A good compression is usually between 70-80 psi. 50-60psi is lower but can be acceptable under certain circumstances and anything below 50 needs work. (usually I complain if its below 60)

6. No prop strike engines. You can tell these when the airframe has new body parts and a brand new propeller but no engine inspection. Stay away from these.

Engine accessories:

Mags - Need overhauled or inspected in last 500 hours or 5 years.

Propeller - Last 10 years needs overhaul or corrosion will ruin hub. Propeller overhaul usually 3K. New propeller- 9K Props under 10 years since last overhaul normally pass overhaul.

During the Pre-Purchase inspection all of these items are scrutinized and itemized in order of relevance. Exhaust, mags, prop, starter, alternator will all be inspected and tested.