So, You Wanta Be A Plane Owner!

by BRYANT ANDREWS / AOPA 210237

■■ The dining room table was buried under yellow sheets of paper. The wastebasket was overflowing with crumpled yellow paper. All of the sheets were covered with columns of figures. With only a few sheets of paper still left on the pad, Joe needed to arrive at an answer soon. But he was still pushing the ball-point pen over an already crowded sheet, copying numbers from aircraft manufacturer's data sheets and magazine articles.

Joe wanted to buy an airplane. *But he wanted to be sure he could afford to fly it once he got it.*

When he first started scribbling on the top sheet of the yellow pad, he had been sure he could fly his own airplane for less than the hourly rental rate of the Squanderbird Flying Service. After all, that outfit *must* be making money, Joe thought. But he wasn't sure owning a plane would be as cheap as the charge levied by the Flapping Wing Flying Club, since he was equally sure that this group was losing money. After more calculations, though, and after talking to some of his friends who owned airplanes, he was no longer sure about anything.

One of his friends was trying to sell his airplane because he claimed it was costing him $17 an hour and he could rent for that without the bother of the maintenance.

Another friend, flying the same type of airplane, said it couldn't possibly cost $17 an hour, since *his* only cost him $11 an hour.

Even Joe figured out the difference; the first friend only flew 50 hours a year, whereas the second flew 200 hours a year. That meant the way to save money was to fly a lot, which was fine. But then, somehow it didn't seem right to Joe that he could save money while burning avgas.

As the supply of yellow paper ran low, Joe decided that if he hadn't solved the problem by the time he ran out of paper, he would just buy an old J-3 Piper Cub. Everyone agreed a Cub was cheap, and he certainly could afford to fly one, unless it needed new fabric of course, in which case . . .

In which case, if Joe has calculated properly, he will have $1,200 sitting in the bank in a reserve maintenance account.

Joe probably has not calculated properly, however, and he probably will not have $1,200 sitting in a reserve account for two reasons. First, his approach to cost estimating is wrong. The error in the approach is that he has combined all the costs associated with the airplane into a lump sum, then calculated the total cost per hour. Calculated in this way, the cost per hour can vary from a very nominal amount to hundreds of dollars an hour. This lump sum cost of flying is a useful number and should be

IAOPA Observer Attends Conclave

■■ An observer from the International Council of Aircraft Owner and Pilot Associations (IAOPA), the worldwide general aviation organization, participated in the Fifth Session of the Commission for Aeronautical Meteorology (CAeM) of the World Meteorological Organization (WMO) in Geneva, Switzerland, shortly before the end of 1971.

Alastair H. Carter of AOPA-United Kingdom (at left in photo) represented IAOPA at the meeting. Observers from other international organizations included (left to right): Mrs. B. Arnold, International Telecommunications Union (ITU); A. Aagaard, International Air Transportation Association (IATA); and M. N. Morss, International Federation of Air Line Pilots Associations (IFALPA).

CAeM is one of WMO's eight specialized commissions and it is responsible for recommending ways and means of developing needed meteorological facilities and services for international civil aviation. WMO activities and recommendations are coordinated through the International Civil Aviation Organization (ICAO). □

Here's an easy way to estimate what aircraft ownership (of almost any airplane) might run you. The use, and reuse, of the number 6 figures prominently in author's method for 'easy airplane costing'

calculated by every pilot who owns or plans to own an airplane. It is the only accurate indication of how much full availability of an airplane costs, or, alternatively, how much renting or shared ownership can save.

However, the lump sum cost of flying is highly dependent on the number of hours flown each year. It is, therefore, as much a function of the pilot as of the airplane. What *is* required is a method for analyzing the cost of *any* airplane, independent of the flying habits of the particular pilot. The effect of the airplane utilization can then be added very easily later.

To eliminate the effects of the pilot's flying habits, the fixed costs, which accrue annually whether or not the airplane is flown, must be separated from the operating costs, which accrue only as flying hours are accumulated. When fixed costs are separated from operating costs, there is no discrepancy between the flying costs of Joe's two friends. The costs are certainly different, but they are calculated by the same method.

The method for estimating the hourly cost of operating any airplane that Joe is likely to purchase is the second technique for costing airplanes that Joe doesn't know. The technique is extremely simple, *because almost anything having to do with airplanes, including cost estimating, can be calculated by multiplying by six and sliding the decimal point until the answer looks reasonable.*

For example, every pilot knows aviation gasoline weighs six pounds per gallon and that one-tenth of an hour on the tach can be entered in the logbook as six minutes. It is also true that the average trip fuel consumption of a light airplane equals 0.06 times the rated horsepower of the engine.

To estimate operating cost, the same rule applies. The hourly operating cost equals the product of the rated engine horsepower and the factor 0.06. Hence, the 65 hp J-3 Cub costs $3.90 per hour, and the 100 hp two-seater costs $6 per hour. The four-place ship with 150 hp will cost $9 per hour, and the six-place miniliner with 250 horses up front will cost $15 per hour. *These numbers include the costs of gasoline, oil, engine and airframe maintenance, tires, avionics and instrument repair, and reserves for engine overhaul, plus that new paint or re-covering job.*

Unbelievable?

How, you ask, can the cost of maintaining and operating an airplane be estimated accurately by considering only one factor? After all, some airplanes have considerably more instru-

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'6' Steps For Calculating Airplane Costs (Piston-Engine Aircraft)

1. Call the appropriate local officials (city treasurer, county assessor, airport manager) and find out the costs of airplane storage and the taxing formula used for aircraft property or use taxes in the locality where you plan to base the plane. Add the annual federal use tax ($25 annually plus two cents per pound, if gross weight is 2,500 pounds or more).
2. Call your insurance agent and find out the cost of the amount of insurance you want to carry on your proposed aircraft.
3. Estimate basic depreciation on the basis that the airplane value, in "mint condition" and with recently completed major overhaul, will decrease to **6**0% of its original sale's price in **6** years (no depreciation will occur thereafter).
4. Estimate lost income on investment as **6**% of the depreciated value of the airplane at the time of purchase.
5. Estimate total operating cost by multiplying the engine horsepower by 0.0**6**, then multiply that figure by the total number of hours you expect to fly per year.
6. Add the results of steps (1) through (5) to determine the total estimated annual operating cost.

Sample Aircraft Operating Cost Calculation* — 150 hp Piston Engine —

	New Aircraft (Purchased for $12,000)	Same Aircraft—Used, 6 Years Old (Purchased for $7,200)
Fixed Costs:		
Lost investment income (purchase cost X 0.06)	$ 720	$ 432
Depreciation (annual average over six years)	800	0
Insurance, storage, taxes	425	425
Total Fixed Costs	$1,945	$ 857
Operating Cost (100 hours) (0.06 X 150 hp X 100 hours)	900	900
Total Annual Cost	$2,845	$1,757
Hourly Cost (annual cost ÷ 100 hours)	$28.45	$17.57

* See text of accompanying article for a detailed explanation of, and justifications for, the use of this format.

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mentation than others, and this certainly costs money, and doesn't the design of the airframe have anything to do with the maintenance costs?

Well, in the first place, the one factor considered represents a very large percent of the total operating cost. If fuel costs 50 cents a gallon, and the engine burns fuel at the rate of 0.06 times the horsepower in gallons per hour, then 50 cents out of every dollar estimated for operating cost goes directly for fuel. In addition, the reserve for major overhaul costs about one cent per horsepower per hour, or almost 17 cents out of every dollar of the estimated operating cost must be set aside for major engine overhaul. With the addition of other costs directly attributable to engine maintenance, such as oil and general engine repair—all of which are functions of engine size—it is evident that the costs associated with the engine alone represent something close to 75% of each maintenance dollar. If a single factor is to be chosen, the engine size is certainly a good selection.

However, as it happens, the size of the engine is also very indicative of the type of airframe and equipment. The full instrument panel, retractable gear, and constant-speed propeller rarely appear in the 65 hp airplane. And the basic airframe with the primary panel rarely appears behind a powerplant producing 250 hp. General experience is that the bigger the engine, the more complex the airplane.

Consequently, it is not too surprising that the cost of maintaining the airframe and accessory equipment, as well as the engine, is roughly proportional to the size of the engine. Actual experience with a number of airplanes owned by flying clubs and individuals that I have been associated with shows that the correlation is very good, generally within 5%, which is certainly sufficiently accurate for a planning estimate. Pilots who do all of their own maintenance to the extent permitted by the FARs for pilot-owners without A&E licenses will make out somewhat better than the estimate. They will, that is, if they do not consider the value of their own time. Similarly, pilots who continually buy all of their maintenance on a rush schedule to be ready for that special weekend flight will probably make out somewhat worse.

Fixed annual costs are somewhat more complicated to calculate because some subtle costs must be anticipated, if unpleasant surprises are to be avoided. However, unlike the items requiring maintenance that cannot be specifically identified, since it is never known whether it will be the directional gyro or the artificial horizon which will fail this year, all of the items with fixed annual costs can be identified and all but two can be assigned a definite, fixed cost.

Fixed-cost items include tiedown or hangar rental, insurance, property or use taxes, federal use tax, lost income from capital used to purchase the airplane (or interest charges on the money

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borrowed for purchase), *and airplane depreciation.*

All but the last three items can be determined by making telephone calls to the local airport manager, the insurance agent, and the appropriate town officials. The total of these items will vary depending on the location, the amount and type of insurance desired, and local tax laws; however, they will run about $200 for the 65 hp puddle-jumper, $400 for the "economy" four-seater, and $600 and up for the mini-liners.

The federal use tax on general aviation aircraft currently is $25 per year plus two cents per pound, if the gross weight is 2,500 pounds or more.

The amount of income lost from the money used to purchase the airplane is open to considerable discussion. If you are a purist, the calculation can become very complicated. Basically, however, it is equal to the interest you don't get from the bank (if you bought the airplane outright), or the interest paid to the finance company (if you borrowed to buy the plane). If the airplane was only partially financed, or if a part of the debt has been paid, the estimate gets complicated. And if you account for the tax deduction you can claim on the interest paid to the finance company, or the taxes you might have paid on the interest you now are not receiving (having purchased the airplane), things get much more complicated.

But, some estimate is better than none. Reach for the *number six*, and estimate that the lost income will be very close to 6% per year of the purchase price of the airplane for as long as you can own it.

If the airplane is heavily financed with high interest rates, the estimate will be too low, and if you bought the airplane outright but normally invest badly on the stock market, the estimate will be too high. Generally though, the $10,000 you removed from the investment bank account to buy the spiffy four-place super sport would have earned $600 per year if you had not removed it. At the end of the year, you will have $600 less than if you had not spent the $10,000. And that lost $600 must be considered to be a "cost" of flying.

Finally, we come to the sticky problem of depreciation. *Depreciation represents, and only represents, the loss in value of the airplane through no fault of the owner. It is equal to the purchase price of the airplane minus the sale price at some later time after the plane has been restored to new condition* (fresh paint, zero-time engine, and all discrepancies corrected). When defined in this way, all airplanes depreciate at essentially the same rate, which simplifies the problem considerably.

The depreciated value of the plane is not to be confused with the "blue book" value or the actual sale price, since these values assume a certain level of airplane deterioration. *What is actually paid for a used airplane is its depreciated value minus the dollar equivalent of the time on the engine* (one cent per hour per horsepower) *minus the dollar equivalent of airframe discrepancies.*

Depreciation can be estimated very simply.

All airplanes depreciate in six years to about 60% of their original cost new (with whatever equipment was originally installed). After six years, they do not depreciate significantly below the 60% value. In fact, because of inflation, they may actually appear to appreciate. The depreciation to 60% in the first six years does not imply a loss of 6.7% per year, since depreciation will be considerably larger than 6.7% the first year and considerably smaller than 6.7% the sixth year.

When it comes to buying a used airplane, calculate the fair selling price by running the depreciation formula backward. Estimate the depreciated value of the airplane from the new purchase price, including the cost of all installed equipment, using the "60% of initial value in six years" rule as a guide. Subtract from the depreciated value one cent per horsepower per hour on the engine. Subtract the cost of fixing any discrepancies. The number you get is what you should pay for the airplane, and the difference between the price you should pay and the depreciated value is what you should set aside, immediately, in a reserve maintenance account.

For example, suppose you are interested in a 100 hp airplane that originally sold, fully equipped, for $8,500. It is now more than six years old, has 400 hours on the engine, and the paint is peeling off. The mint condition depreciated value of the airplane is 60% of $8,500, or $5,100. Since the engine has 400 hours since major overhaul, subtract from $5,100 $0.01 x 100 hp x 400 hours or $400. This reduces the purchase price to $5,100 minus $400 or, $4,700. In addition, if the airplane needs a new paint job to restore it to mint condition, subtract an additional $400. You should pay about $4,300 for the airplane. The difference between $4,300 and $5,100 should be set aside in a reserve maintenance account to provide part of the funds for majoring the engine when it comes due, as well as part of the funds for repainting the airplane when you tire of the peeling paint. The remainder of the funds for majoring the engine will be accumulated as you fly the airplane if you really do set aside $0.06 X 100 hp, or $6 per hour as you fly.

With methods established for estimating fixed and operating costs for any airplane, it is interesting to see where the pilot's dollar goes by calculating ownership costs for two typical airplanes.

Consider first the real total cost of owning and operating a brand-new $12,000 four-place airplane with a 150 hp engine and a total utilization of 100 hours of flying per year. After six years, the airplane value will be 60% of $12,000, or $7,200. Of course you could not actually sell the airplane for $7,200, since it would have 600 hours on the engine and possibly some other discrepancies. However, if $9 per hour has been set aside, the actual sale price, plus the dollars remaining from that set aside for maintenance and engine overhaul, should total $7,200. In any event, depreciation represents a loss of $4,800 over six years or an average of $800 per year. Lost investment income equals 6% per year of $12,000 or $720 per year. Other fixed charges may be estimated, somewhat conservatively, at $425 per year. Consequently, the privilege of saying, "Look over there, that's my airplane," costs $1,945 per year. Operating cost of the airplane at $9 per hour for 100 hours totals $900. Total cost for the year, therefore, is $2,845, or $28.45 per hour, which is certainly an astronomical amount for a four-place airplane that probably doesn't cruise over 120 mph.

Consider now what the cost picture is if you buy the same airplane six years later:

The cost of the airplane, plus the funds you must set aside for engine overhaul and maintenance, would be $7,200. Annual fixed costs include nothing for depreciation, $432 for lost income, and $425 for other fixed charges, resulting in a total of $857. At $9 per hour, you can fly the six-year-old used airplane for 100 hours for a total of $1,757, or $17.57 per hour. *By buying a six-year-old airplane in mint condition* (or, if the plane is not in mint condition, by paying less than the depreciated value and setting aside the difference), *you reduce your flying cost by almost 40%.*

It should be apparent that the value in airplanes lies in the used and not in the new airplane market. It should also be apparent that a little cost analysis before buying can direct you toward more flying fun for fewer dollars, with no unpleasant surprises.

Just remember the number six. □

THE AUTHOR

A technical writer for the Pratt & Whitney Aircraft Division of United Aircraft Corporation, Member Andrews says, "I find it stimulating to spend the week writing about the big 40,000-pound-thrust JT9-D, and then hopping into my little T-Craft for a run down to Block Island, south of Rhode Island on Long Island Sound, for swimming and fun on the weekends." He first became interested in flying while attending Cornell University. "College expenses notwithstanding, I forked out the required $75 (to join a college flying club) and learned to fly their single airplane, a J-3 Cub, for $2.50 an hour. The club lost money, of course, but we had fun anyway in our ignorance. . . . Since then, I've flown every airplane anyone would let me get close to."